



HAL
open science

Un modèle de gouvernance stratégique pour améliorer le rendement des services d'urgence dans les hôpitaux public de la province d'Ontario au Canada

Stephen Hummel

► To cite this version:

Stephen Hummel. Un modèle de gouvernance stratégique pour améliorer le rendement des services d'urgence dans les hôpitaux public de la province d'Ontario au Canada. Gestion et management. Université Nice Sophia Antipolis, 2013. Français. NNT : 2013NICE0014 . tel-00909524

HAL Id: tel-00909524

<https://theses.hal.science/tel-00909524>

Submitted on 26 Nov 2013

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

UNIVERSITE DE NICE SOPHIA ANTIPOLIS

INSTITUT D'ADMINISTRATION DES ENTREPRISES
École Doctorale DESPEG (ED 513)

Doctorat

Sciences de Gestion

STEPHEN J. HUMMEL

**UN MODÈLE DE GOUVERNANCE STRATÉGIQUE POUR AMÉLIORER LE
RENDEMENT DES SERVICES D'URGENCE DANS LES HÔPITAUX PUBLICS DE
LA PROVINCE D'ONTARIO AU CANADA**

Thèse dirigée par le Professeur Bernard OLIVERO.

Soutenue en Avril 2013

Jury :

Professeur Bernard OLIVERO
Professeur Ingo BOBEL
Professeur Serge EVRAERT
Professeur Eric SEVERIN
Professeur Nadine TOURNOIS



ABSTRACT

A STRATEGIC GOVERNANCE MODEL TO IMPROVE THE PERFORMANCE OF EMERGENCY DEPARTMENTS IN PUBLIC HOSPITALS IN THE PROVINCE OF ONTARIO, CANADA

Stephen J. Hummel, BAsC., MSc, MBA, DBA, P. Eng.

This dissertation has been completed in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of Nice Sophia Antipolis

The rapidly increasing demand for health care in the province of Ontario has led to greater numbers of patients turning to public hospitals for the care they need. The primary entrance for them into the public hospital system is through Emergency Departments. The poor performance of public hospital Emergency Departments in handling the demands put on them calls into question the quality of the Emergency Departments. Assuming that the management of hospitals focuses their attention and resources on problem areas, the quality of management in the Emergency Departments are likely symptomatic of the quality of the management throughout the hospital. Ultimately, responsibility for the quality of management in the hospital rests with the board of directors and is a matter of governance. While prior studies have examined the quality of health care as affected by governance, none appear to have considered the quality of management. This study is a first to our knowledge in addressing whether the quality of management is a reason for differences in performance across hospitals. This study connects the performance of the Emergency Departments with the ultimate determinant of the quality of management which is the board of directors.

Performance of Emergency Departments was assessed by first ascertaining which activities were present in the Emergency Department then the level of performance of those activities, in terms of patient outcomes, was assessed. Data for performance of Emergency Departments, in terms of activities and patient outcomes, as reported in the Balanced Scorecard reports required by the Ministry of Health of Ontario, was collected from all 109 hospitals in Ontario for a three year period. The influence of these activities on patient outcomes was evaluated. Activities which had a positive effect on patient outcomes were classified as critical activities.

The quality of the governance was represented by the makeup of the board, operating under the assumption that the experiences and backgrounds of members would have a direct influence on their behaviour on the board and the board relationship with management of the hospital. Data on the composition of boards and the skills/experience of their members was gathered from hospital annual reports, published biographies, and annual report data from organizations that board members had either started or managed, specifically measuring for the presence of for-profit operational turnaround skills.

Performance of the critical Emergency Department activities was then compared with the structure and skills of each individual hospital board to determine if certain board member skills and experiences influenced those critical activities. This study found three links between the boards and the performance of emergency departments. First, hospitals which had larger percentages of board members with for-profit operational turnaround skill competencies had superior performance with respect to the presence and level of critical activities in Emergency Departments and had superior patient

outcomes. Second, hospitals which have entrepreneurs and medical professionals on their boards have a generally positive effect on the level of critical activities and associated positive patient outcomes. And third, hospitals which have politicians on the board have a negative impact on the presence and level of critical activities and patient outcomes. The implication of these findings is that the boards of hospitals in Ontario need to reconstitute their makeup so that their members have skills and experience that allow them to provide richer governance.

In addition, this study revealed that some activities performed in Ontario hospitals were found to be inappropriate as they had no or negative impact on patient outcomes. Conversely activities which research has shown result in superior patient outcomes and lower costs, when present, were not being measured or managed. Sometimes these critical activities are absent in the hospitals. This is an issue of concern as quality of management and therefore board of director competency can also be assessed by whether a system has employed best practices or not and how well a system is employing best practices. A recommendation of this study is that hospital managers and government examine the activities researched in this study and alter the mix so that those which are critical are performed more effectively and efficiently.

DEDICATION

This effort is dedicated to two very special people in my life. First, this work would not have been possible without the support and the cheerleading of my life partner, Ms. Delia M. Hummel (nee Tustain), B.A., B.Ed. She has taught me how to teach, achieving outstanding ratings at every university that I have had the good fortune to be invited to research and teach at. She has also taught me how to live and for that I am forever grateful as I have a good life. Secondly, this effort owes a great deal to my friend and mentor, Dr. Kenneth Harling, PhD., Full Professor of Strategy at Wilfrid Laurier University. Kenneth taught me how to be a scholar. His work is not yet complete.

TABLE OF CONTENTS

Abstract.....	2
Problem Statement.....	34
Research Field and Disciplines.....	37
Literature Review.....	38
Strategy Literature Review.....	38
Introduction.....	38
Budgetary Planning and Control Systems.....	40
Corporate and Business Unit Strategy.....	42
Competitive Analysis.....	48
Positioning.....	57
Strategic and Organizational Innovation.....	65
Summary of Strategy Literature Review.....	72
Turnaround Literature Review.....	75
Introduction.....	75
Turnaround Pioneer Theory.....	76
Strategic Market Position.....	84
Turnaround Macro Research.....	88
Turnaround Organizational Behaviour Research.....	92
Summary of Turnaround Literature Review.....	98
Leadership of Not-For-Profit Literature Review.....	104

Introduction.....	104
Leadership and Organizational Behaviour.....	105
Not-For-Profit Hospital Implications.....	113
Leadership, Transformation, and Innovation.....	116
Leadership and Organizational Considerations	118
Summary of Leadership of Not-For-Profit Literature Review	123
The Purpose, Culture, and Environment of Not-For-Profit Organizations	124
Introduction.....	124
Stakeholder Theory.....	125
Culture.....	130
Summary of Purpose, Culture and Environment of Not-For-Profit Organizations ..	132
Quantifying the Performance of Public Hospitals	134
Introduction.....	134
Traditional Measurements	136
Public Hospitals and Balanced Scorecard.....	140
Summary of Quantifying the Performance of Public Hospitals	145
Board Composition and Effectiveness.....	146
Introduction.....	146
Board Literature, For-Profit.....	147
Board Literature, Not-For-Profit.....	155
Hospital Board Literature	160
Summary of Summary of Board Literature	164
Literature Summary and Research Questions	167
Evaluation Methodology.....	169

New Approach to Evaluation Methodology	170
Research Methodology	171
Data Sources and Definitions	171
Introduction.....	171
Hospital Performance Measures, Emergency Department	174
Hospital Performance Measures, Hospital Level.....	181
Hospital Board Characteristics	191
Data Consolidation and Relevance	194
Analysis of Results	199
Hospital Size Relevance.....	199
Introduction.....	199
Limitations	200
Hypothesis 1.....	204
Activities and Outcomes	210
Introduction.....	210
Hypothesis 2.....	212
Hypothesis 3.....	255
Hypothesis 4.....	265
Hypothesis 5.....	275
Hypothesis 6.....	291
Hypothesis 7.....	316
Summary.....	365
Board Composition and Activities.....	371
Introduction.....	371

Hypothesis 8.....	373
Hypothesis 9.....	381
Summary.....	415
Conclusions.....	419
Practical Usefulness and Applicability.....	425
References.....	427
Journal Articles.....	427
Books.....	437
World Wide Web Documents.....	441
Interviews.....	443
Appendix A LINEST Function Description in EXCEL.....	444
Appendix B Ontario Hospital Association Emergency Department Data.....	456
Appendix C Ontario Hospital Association Hospital Level Data.....	456
Appendix D Hospital Board of Directors Data.....	457

LIST OF TABLES

Table 1	Philanthropic & Corporate Models of Hospital Governing Boards	44
Table 2	Ministry of Health Balanced Scorecard for Emergency Care Hospitals	163
Table 3	Emergency Performance Based Upon Size/Type, 2005	204
Table 4	Emergency Performance Based Upon Size/Type, 2007	205
Table 5	Hospital Performance, RLD, Based Upon Size/Type, 2005.....	207
Table 6	Hospital Performance, RLD, Based Upon Size/Type, 2007.....	207
Table 7	Hospital Performance, AELD, Based Upon Size/Type, 2005	207
Table 8	Hospital Performance, AELD, Based Upon Size/Type, 2007	208
Table 9	Hospital Performance, HSMR, Based Upon Size/Type, 2005	208
Table 10	Hospital Performance, HSMR, Based Upon Size/Type, 2007	209
Table 11	Hospital Performance, CR, Based Upon Size/Type, 2005	209
Table 12	Hospital Performance, CR, Based Upon Size/Type. 2007	209
Table 13	Hospital Performance, PST, Based Upon Size/Type.....	210
Table 14	Analysis Table, Determination of Critical Activities	211
Table 15	Use of SOP in Emergency Department Based Upon Size/Type, 2005	212
Table 16	Use of SOP in Emergency Department Based Upon Size/Type , 2007	213
Table 17	Correlation Between Use of SOP and Emergency Performance, 2005	214
Table 18	Correlation Between Use of SOP and Emergency Performance, 2007	214
Table 19	SOP Relevance Test in Teaching Hospital versus RVRAb.....	214
Table 20	SOP Relevance Test in Community Hospital versus XRRAFIPc.....	215

LIST OF TABLES CONTINUED

Table 21	SOP in Hospital Based Upon Size/Type, 2005.....	217
Table 22	Use of SOPH Based Upon Size/Type, 2007.....	217
Table 23	Use of SOP versus Hospital SOPH, 2007.....	217
Table 24	Correlation of Use of SOP versus SOPH, 2007.....	218
Table 25	SOP Relevance Test in Small Hospitals versus SOPH.....	218
Table 26	Correlation of Use of SOP, SOPH, and RLD	219
Table 27	SOP Relevance Test in Small Hospitals versus RLD, 2007.....	219
Table 28	SOPH Relevance Test in Small Hospitals versus RLD, 2007	220
Table 29	SOP Relevance Test in Teaching Hospitals versus RLD, 2007	220
Table 30	SOPH Relevance Test in Teaching Hospitals versus RLD, 2007	220
Table 31	Correlation of Use of SOP, SOPH, and AELAD	221
Table 32	SOPH and SOP Relevance Test in Small Hospitals versus AELAD, 2005	221
Table 33	SOPH Relevance Test in Small Hospitals versus AELAD, 2007	221
Table 34	Correlation of Use of SOP, SOPH, and HSMR, 2005.....	222
Table 35	Correlation of Use of SOP, SOPH, and HSMR, 2007.....	222
Table 36	SOPH Relevance Test in Teaching Hospitals versus HSMR, 2005	223
Table 37	SOP Relevance Test in Teaching Hospitals versus HSMR, 2005.....	223
Table 38	Correlation Between Use of SOP, SOPH, and CR, 2005	223
Table 39	SOP Relevance Test in Teaching Hospitals versus CR, 2005	224
Table 40	SOP Relevance Test in Small Hospitals versus CR, 2005	224
Table 41	SOP Relevance Test in Community Hospitals versus CR, 2005.....	224
Table 42	Correlation Between Use of SOP, SOPH, and CR, 2007.....	225

LIST OF TABLES CONTINUED

Table 43	SOP Relevance Test in Teaching Hospitals versus CR, 2007	225
Table 44	SOPH Relevance Test in Teaching Hospitals versus CR, 2007	226
Table 45	SOP Relevance Test in Small Hospitals versus CR, 2007	226
Table 46	SOPH Relevance Test in Small Hospitals versus CR, 2007.....	227
Table 47	Correlation Between Use of SOP, SOPH, and PST	227
Table 48	SOP Relevance Test in Teaching Hospitals versus PST	228
Table 49	PSRA Based Upon Size/Type.....	229
Table 50	Correlation Between PSRA and Emergency Performance.....	229
Table 51	Correlation Between PSRA and RLD	230
Table 52	PSRA Relevance Test in Small Hospitals versus RLD	230
Table 53	Correlation Between PSRA and AELAD.....	230
Table 54	Correlation Between PSRA and HSMR.....	231
Table 55	Correlation Between PSRA and CR.....	231
Table 56	Correlation Between PSRA and PST.....	232
Table 57	Correlation Between PSRA and SOP.....	232
Table 58	PSRA Relevance Test in Small Hospitals versus SOP.....	233
Table 59	PPSC Based Upon Size/Type	234
Table 60	Correlation Between PPSC and Emergency Performance	234
Table 61	PPSC Relevance Test in Teaching Hospitals versus RVRAa	234
Table 62	PPSC Relevance Test in Small Hospitals versus RVRAa.....	235
Table 63	Correlation Between PPSC and RLD	235
Table 64	PPSC Relevance Test in Teaching Hospitals versus RLD	235

LIST OF TABLES CONTINUED

Table 65	PPSC Relevance Test in Small Hospitals versus RLD.....	236
Table 66	Correlation Between PPSC and AELAD.....	236
Table 67	PPSC Relevance Test in Teaching Hospitals versus AELAD.....	236
Table 68	Correlation Between PPSC and HSMR.....	237
Table 69	Correlation Between PPSC and CR.....	237
Table 70	PPSC Relevance Test in Teaching Hospitals versus CR.....	237
Table 71	Correlation Between PPSC and PST	238
Table 72	Correlation Between PPSC and SOP.....	238
Table 73	PPSC Relevance Test in Small Hospitals versus SOP	238
Table 74	PMAC Based Upon Size/Type	239
Table 75	Correlation Between PMAC and Emergency Performance	239
Table 76	PMAC Relevance Test in Teaching Hospitals versus RVRAa	240
Table 77	PMAC Relevance Test in Teaching Hospitals versus XRRAFIPc.....	240
Table 78	Correlation Between PMAC and RLD	240
Table 79	PMAC Relevance Test in Teaching Hospitals versus RLD	241
Table 80	Correlation Between PMAC and AELAD.....	241
Table 81	Correlation Between PMAC and HSMR.....	242
Table 82	PMAC Relevance Test in Teaching Hospitals versus HSMR.....	242
Table 83	PMAC Relevance Test in Community Hospitals versus HSMR.....	242
Table 84	Correlation Between PMAC and CR.....	243
Table 85	PMAC Relevance Test in Teaching Hospitals versus CR.....	243
Table 86	Correlation Between PMAC and PST	244

LIST OF TABLES CONTINUED

Table 87	PMAC Relevance Test in Teaching Hospitals versus PST	244
Table 88	Correlation Between PMAC and SOP	244
Table 89	PMAC Relevance Test in Small Hospitals versus SOP	245
Table 90	SMWPACC Based Upon Size/Type.....	246
Table 91	Correlation Between SMWPACC and Emergency Performance.....	246
Table 92	SMWPACC Relevance Test in Teaching Hospitals versus RVRAa.....	246
Table 93	SMWPACC Relevance Test in Teaching Hospitals versus RVRAb	247
Table 94	SMWPACC Relevance Test in Small Hospitals versus RVRAa	247
Table 95	SMWPACC Relevance Test in Small Hospitals versus RVRAb.....	247
Table 96	Correlation Between SMWPACC and RLD	248
Table 97	SMWPACC Relevance Test in Teaching Hospitals versus RLD.....	248
Table 98	SMWPACC Relevance Test in Small Hospitals versus RLD	248
Table 99	Correlation Between SMWPACC and AELAD.....	249
Table 100	SMWPACC Relevance Test in Small Hospitals versus AELAD.....	249
Table 101	Correlation Between SMWPACC and HSMR.....	250
Table 102	SMWPACC Relevance Test in Teaching Hospitals versus HSMR	250
Table 103	SMWPACC Relevance Test in Community Hospitals versus HSMR.....	250
Table 104	Correlation Between SMWPACC and CR.....	251
Table 105	SMWPACC Relevance Test in Teaching Hospitals versus CR	251
Table 106	Correlation Between SMWPACC and PST.....	252
Table 107	Correlation Between SMWPACC and SOP	252
Table 108	SMWPACC Relevance Test in Teaching Hospitals versus SOP.....	253

LIST OF TABLES CONTINUED

Table 109	SMWPACC Relevance Test in Small Hospitals versus SOP.....	253
Table 110	ICC in Emergency Department Based Upon Size/Type, 2005.....	256
Table 111	ICC in Emergency Department Based Upon Size/Type, 2007.....	256
Table 112	Correlation Between ICC and Emergency Performance, 2007	256
Table 113	ICC Relevance Test in Teaching Hospitals versus RVRaA.....	258
Table 114	ICC Relevance Test in Teaching Hospitals versus RVRAb.....	258
Table 115	ICC Relevance Test in Small Hospitals versus RVRAb	258
Table 116	Correlation Between ICC and RLD.....	259
Table 117	ICC Relevance Test in Teaching Hospitals versus RLD, 2005	259
Table 118	ICC Relevance Test in Teaching Hospitals versus RLD, 2007	259
Table 119	ICC Relevance Test in Small Hospitals versus RLD, 2007	260
Table 120	Correlation Between ICC and AELAD	260
Table 121	ICC Relevance Test in Teaching Hospitals versus AELAD, 2005	261
Table 122	ICC Relevance Test in Community Hospitals versus AELAD, 2005	261
Table 123	ICC Relevance Test in Teaching Hospitals versus AELAD, 2007	261
Table 124	ICC Relevance Test in Small Hospitals versus AELAD, 2007	262
Table 125	Correlation Between ICC and HSMR	262
Table 126	ICC Relevance Test in Teaching Hospitals versus HSMR, 2007.....	262
Table 127	Correlation Between ICC and CR	263
Table 128	ICC Relevance Test in Teaching Hospitals versus CR.....	264
Table 129	ICC Relevance Test in Small Hospitals versus CR.....	264
Table 130	Correlation Between ICC and PST.....	264

LIST OF TABLES CONTINUED

Table 131	ICC Relevance Test in Teaching Hospitals versus PST	265
Table 132	EP In Emergency Department Based Upon Size/Type, 2005	266
Table 133	EP In Emergency Department Based Upon Size/Type, 2007	266
Table 134	Correlation Between EP and Emergency Performance, 2005	267
Table 135	Correlation Between EP and Emergency Performance, 2007	267
Table 136	EP Relevance Test in Small Hospitals versus RVRAb, 2005	268
Table 137	EP Relevance Test in Community Hospitals versus RVRAa, 2005.....	268
Table 138	EP Relevance Test in Teaching Hospitals versus RVRAa, 2007.....	268
Table 139	Correlation Between EP and RLD.....	269
Table 140	EP Relevance Test in Teaching Hospitals versus RLD, 2007.....	269
Table 141	EP Relevance Test in Small Hospitals versus RLD, 2005	269
Table 142	Correlation Between EP and AELAD	270
Table 143	EP Relevance Test in Small Hospitals versus AELAD.....	270
Table 144	Correlation Between EP and HSMR	271
Table 145	EP Relevance Test in Teaching Hospitals versus HSMR.....	271
Table 146	Correlation Between EP and CR	272
Table 147	EP Relevance Test in Teaching Hospitals versus CR, 2005.....	272
Table 148	Correlation Between EP and PST.....	272
Table 149	EP Relevance Test in Teaching Hospitals versus PST.....	273
Table 150	Correlation Between EP and CICC	274
Table 151	EP Relevance Test in Teaching Hospitals versus CICC.....	274
Table 152	EP Relevance Test in Small Hospitals versus CICC	274

LIST OF TABLES CONTINUED

Table 153	MSHR In Emergency Department Based Upon Size/Type, 2005	276
Table 154	MSHR In Emergency Department Based Upon Size/Type, 2007	276
Table 155	Correlation Between MSHR and Emergency Performance, 2005	277
Table 156	Correlation Between MSHR and Emergency Performance, 2007	277
Table 157	MSHR Relevance Test in Small Hospitals versus RVRAb, 2005	277
Table 158	MSHR Relevance Test in Teaching Hospitals versus RVRAa, 2007	277
Table 159	MSHR Relevance Test in Small Hospitals versus RVRAa, 2007	278
Table 160	MSHR Relevance Test in Community Hospitals vs. XRRAFIPc, 2007	278
Table 161	Correlation Between MSHR and RLD	278
Table 162	MSHR Relevance Test in Teaching Hospitals versus RLD, 2005	279
Table 163	MSHR Relevance Test in Small Hospitals versus RLD, 2005	279
Table 164	MSHR Relevance Test in Community Hospitals versus RLD, 2005	279
Table 165	Correlation Between MSHR and AELAD	280
Table 166	MSHR Relevance Test in Small Hospitals versus AELAD , 2007	280
Table 167	MSHR Relevance Test in Community Hospitals versus AELAD, 2007	280
Table 168	Correlation Between MSHR and HSMR	281
Table 169	MSHR Relevance Test in Teaching Hospitals versus HSMR, 2007	281
Table 170	Correlation Between MSHR and CR	282
Table 171	MSHR Relevance Test in Teaching Hospitals versus CR, 2005	282
Table 172	MSHR Relevance Test in Small Hospitals versus CR, 2005	282
Table 173	MSHR Relevance Test in Community Hospitals versus CR, 2005	282
Table 174	MSHR Relevance Test in Teaching Hospitals versus CR, 2007	283

LIST OF TABLES CONTINUED

Table 175	Correlation Between MSHR and PST	283
Table 176	MSHR Relevance Test in Community Hospitals versus PST, 2007	283
Table 177	Correlation Between MSHR and MSHRH.....	284
Table 178	MSHR Relevance Test in Teaching Hospitals versus MSHRH, 2007	284
Table 179	MSHR Relevance Test in Small Hospitals versus MSHRH, 2007.....	285
Table 180	MSHR Relevance Test in Community Hospitals versus MSHRH, 2007.....	285
Table 181	HWE in Emergency Department Based Upon Size/Type, 2007	286
Table 182	Correlation Between HWE and Emergency Performance.....	286
Table 183	Correlation Between HWE and RLD	286
Table 184	HWE Relevance Test in Teaching Hospitals versus RLD, 2007	287
Table 185	Correlation Between HWE and AELAD.....	287
Table 186	HWE Relevance Test in Teaching Hospitals versus AELAD, 2007.....	288
Table 187	HWE Relevance Test in Small Hospitals versus AELAD, 2007	288
Table 188	Correlation Between HWE and HSMR.....	288
Table 189	Correlation Between HWE and CR.....	288
Table 190	Correlation Between HWE and PST	289
Table 191	HWE Relevance Test in Teaching Hospitals versus PST, 2007.....	289
Table 192	Correlation Between HWE and HWEH	290
Table 193	Correlation Between MSHR and HWE	290
Table 194	HWE Relevance Test in Teaching Hospitals versus MSHR, 2007	290
Table 195	HWE Relevance Test in Small Hospitals versus MSHR, 2007.....	291
Table 196	CDCD in Emergency Department Based Upon Size/Type, 2005	292

LIST OF TABLES CONTINUED

Table 197	CDCD in Emergency Department Based Upon Size/Type, 2007	292
Table 198	Correlation Between CDCD and Emergency Performance, 2005.....	293
Table 199	Correlation Between CDCD and Emergency Performance, 2007.....	293
Table 200	CDCD Relevance Test in Small Hospitals versus RVRAa, 2005	293
Table 201	CDCD Relevance Test in Teaching Hospitals versus RVRAb, 2005	293
Table 202	CDCD Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007.....	294
Table 203	CDCD Relevance Test in Community Hospitals vs. XRRAFIPc, 2007	294
Table 204	Correlation Between CDCD and RLD	295
Table 205	CDCD Relevance Test in Teaching Hospitals versus RLD, 2005	295
Table 206	CDCD Relevance Test in Small Hospitals versus RLD, 2005	295
Table 207	CDCD Relevance Test in Community Hospitals versus RLD, 2005	295
Table 208	CDCD Relevance Test in Teaching Hospitals versus RLD, 2007	296
Table 209	Correlation Between CDCD and AELAD.....	296
Table 210	CDCD Relevance Test in Teaching Hospitals versus AELAD, 2005	296
Table 211	CDCD Relevance Test in Teaching Hospitals versus AELAD, 2007.....	297
Table 212	CDCD Relevance Test in Small Hospitals versus AELAD, 2007	297
Table 213	Correlation Between CDCD and HSMR.....	297
Table 214	CDCD Relevance Test in Teaching Hospitals versus HSMR, 2007	298
Table 215	Correlation Between CDCD and CR.....	298
Table 216	Correlation Between CDCD and PST	298
Table 217	CDCD Relevance Test in Small Hospitals versus PST, 2007	299
Table 218	UDDM in Hospital Based Upon Size/Type, 2005.....	299

LIST OF TABLES CONTINUED

Table 219	UDDM in Hospital Based Upon Size/Type, 2007	299
Table 220	Correlation Between CDCD and UDDM	300
Table 221	CDCD Relevance Test in Teaching Hospitals versus UDDM, 2005	300
Table 222	CDCD Relevance Test in Teaching Hospitals versus UDDM, 2007	301
Table 223	CDCD Relevance Test in Small Hospitals versus UDDM, 2007	301
Table 224	CDCD Relevance Test in Community Hospitals versus UDDM, 2007	301
Table 225	UCIT in Emergency Department Based Upon Size/Type, 2005	302
Table 226	UCIT in Emergency Department Based Upon Size/Type, 2007	302
Table 227	Correlation Between UCIT and Emergency Performance, 2005	304
Table 228	Correlation Between UCIT and Emergency Performance , 2007	304
Table 229	UCIT Relevance Test in Teaching Hospitals versus RVRAa, 2005	304
Table 230	UCIT Relevance Test in Community Hospitals versus RVRAa, 2005	305
Table 231	UCIT Relevance Test in Teaching Hospitals versus RVRAb, 2005	305
Table 232	UCIT Relevance Test in Community Hospitals versus RVRAb, 2005	305
Table 233	UCIT Relevance Test in Teaching Hospitals versus RVRAa, 2007	305
Table 234	UCIT Relevance Test in Small Hospitals versus RVRAa, 2007	306
Table 235	UCIT Relevance Test in Community Hospitals versus RVRAa, 2007	306
Table 236	UCIT Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007.....	306
Table 237	UCIT Relevance Test in Small Hospitals versus XRRAFIPc, 2007	306
Table 238	Correlation Between UCIT and RLD	307
Table 239	UCIT Relevance Test in Teaching Hospitals versus RLD, 2005	307
Table 240	UCIT Relevance Test in Community Hospitals versus RLD, 2005	308

LIST OF TABLES CONTINUED

Table 241 UCIT Relevance Test in Teaching Hospitals versus RLD, 2007	308
Table 242 UCIT Relevance Test in Small Hospitals versus RLD, 2007.....	308
Table 243 UCIT Relevance Test in Community Hospitals versus RLD, 2007	308
Table 244 Correlation Between UCIT and AELAD.....	309
Table 245 UCIT Relevance Test in Teaching Hospitals versus AELAD, 2005.....	309
Table 246 UCIT Relevance Test in Teaching Hospitals versus AELAD, 2007.....	309
Table 247 UCIT Relevance Test in Small Hospitals versus AELAD, 2007	310
Table 248 UCIT Relevance Test in Community Hospitals versus AELAD, 2007	310
Table 249 Correlation Between UCIT and HSMR.....	311
Table 250 UCIT Relevance Test in Teaching Hospitals versus HSMR, 2007	311
Table 251 UCIT Relevance Test in Community Hospitals versus HSMR, 2005.....	311
Table 252 UCIT Relevance Test in Community Hospitals versus HSMR, 2007.....	311
Table 253 Correlation Between UCIT and CR.....	312
Table 254 UCIT Relevance Test in Community Hospitals versus CR, 2005.....	312
Table 255 UCIT Relevance Test in Community Hospitals versus CR, 2007.....	313
Table 256 Correlation Between UCIT and PST	313
Table 257 UCIT Relevance Test in Teaching Hospitals versus PST, 2007	313
Table 258 UCIT Relevance Test in Small Hospitals versus PST, 2007	314
Table 259 Correlation Between UCIT and UCITH.....	314
Table 260 UCIT Relevance Test in Teaching Hospitals versus UCITH, 2007	315
Table 261 UCIT Relevance Test in Small Hospitals versus UCITH, 2007.....	315
Table 262 UCIT Relevance Test in Community Hospitals versus UCITH, 2007.....	315

LIST OF TABLES CONTINUED

Table 263	MOSSH in Emergency Department Based Upon Size/Type, 2005.....	317
Table 264	MOSSH in Emergency Department Based Upon Size/Type, 2007.....	317
Table 265	Correlation MOSSH and Emergency Performance, 2005	318
Table 266	Correlation Between MOSSH and Emergency Performance, 2007	318
Table 267	MOSSH Relevance Test in Teaching Hospitals versus RVRAa, 2005	318
Table 268	MOSSH Relevance Test in Teaching Hospitals versus RVRAb, 2005.....	319
Table 269	MOSSH Relevance Test in Small Hospitals versus RVRAb, 2005	319
Table 270	MOSSH Relevance Test in Teaching Hospitals versus RVRAa, 2007	319
Table 271	MOSSH Relevance Test in Small Hospitals versus RVRAa, 2007	319
Table 272	MOSSH Relevance Test in Teaching Hospitals versus RVRAb, 2007.....	320
Table 273	MOSSH Relevance Test in Small Hospitals versus RVRAb, 2007	320
Table 274	MOSSH Relevance Test in Community Hospitals vs. XRRAFIPc, 2007	320
Table 275	Correlation Between MOSSH and RLD.....	321
Table 276	MOSSH Relevance Test in Teaching Hospitals versus RLD, 2005.....	321
Table 277	MOSSH Relevance Test in Small Hospitals versus RLD, 2007	321
Table 278	Correlation Between MOSSH and AELAD	322
Table 279	MOSSH Relevance Test in Teaching Hospitals versus AELAD, 2005	322
Table 280	MOSSH Relevance Test in Small Hospitals versus AELAD, 2005.....	323
Table 281	MOSSH Relevance Test in Small Hospitals versus AELAD, 2007.....	323
Table 282	Correlation Between MOSSH and HSMR	323
Table 283	MOSSH Relevance Test in Teaching Hospitals versus HSMR, 2005	324
Table 284	Correlation Between MOSSH and CR	324

LIST OF TABLES CONTINUED

Table 285	MOSSH Relevance Test in Small Hospitals versus CR, 2005	324
Table 286	MOSSH Relevance Test in Small Hospitals versus CR, 2007	325
Table 287	Correlation Between MOSSH and PST	325
Table 288	MOSSH Relevance Test in Teaching Hospitals versus PST, 2007	325
Table 289	TWH in Emergency Department Based Upon Size/Type, 2005	326
Table 290	TWH in Emergency Department Based Upon Size/Type, 2007	326
Table 291	Correlation Between TWH and Emergency Performance, 2005	327
Table 292	Correlation Between TWH and Emergency Performance, 2007	327
Table 293	TWH Relevance Test in Teaching Hospitals versus RVRAb, 2005	327
Table 294	TWH Relevance Test in Small Hospitals versus RVRAa, 2007	328
Table 295	TWH Relevance Test in Teaching Hospitals versus RVRAb, 2007	328
Table 296	TWH Relevance Test in Community Hospitals vs. XRRAFIPc, 2007	328
Table 297	Correlation Between TWH and RLD	329
Table 298	TWH Relevance Test in Teaching Hospitals versus RLD, 2005	329
Table 299	TWH Relevance Test in Small Hospitals versus RLD, 2007	329
Table 300	TWH Relevance Test in Community Hospitals versus RLD, 2007	330
Table 301	Correlation Between TWH and AELAD	330
Table 302	TWH Relevance Test in Small Hospitals versus AELAD, 2005	331
Table 303	TWH Relevance Test in Community Hospitals versus AELAD, 2005	331
Table 304	TWH Relevance Test in Teaching Hospitals versus AELAD, 2007	331
Table 305	TWH Relevance Test in Small Hospitals versus AELAD, 2007	331
Table 306	Correlation Between TWH and HSMR	332

LIST OF TABLES CONTINUED

Table 307	TWH Relevance Test in Teaching Hospitals versus HSMR, 2005	332
Table 308	TWH Relevance Test in Teaching Hospitals versus HSMR, 2007	332
Table 309	TWH Relevance Test in Community Hospitals versus HSMR, 2007	333
Table 310	Correlation Between TWH and CR	334
Table 311	TWH Relevance Test in Teaching Hospitals versus CR, 2005	334
Table 312	TWH Relevance Test in Community Hospitals versus CR, 2005	334
Table 313	TWH Relevance Test in Teaching Hospitals versus CR, 2007	335
Table 314	TWH Relevance Test in Community Hospitals versus CR, 2007	335
Table 315	Correlation Between TWH and PST	336
Table 316	TWH Relevance Test in Community Hospitals versus PST, 2007	336
Table 317	NWH in Emergency Department Based Upon Size/Type, 2005	337
Table 318	NWH in Emergency Department Based Upon Size/Type, 2007	337
Table 319	Correlation Between NWH and Emergency Performance, 2005	338
Table 320	Correlation Between NWH and Emergency Performance, 2007	338
Table 321	NWH Relevance Test in Teaching Hospitals versus RVRAb, 2005	338
Table 322	NWH Relevance Test in Small Hospitals versus RVRAb, 2005	339
Table 323	NWH Relevance Test in Small Hospitals versus RVRAa, 2007	339
Table 324	NWH Relevance Test in Community Hospitals versus RVRAa, 2007	339
Table 325	NWH Relevance Test in Teaching Hospitals versus RVRAb, 2007	339
Table 326	NWH Relevance Test in Small Hospitals versus RVRAb, 2007	340
Table 327	NWH Relevance Test in Community Hospitals vs. XRRAFIPc, 2007	340
Table 328	Correlation Between NWH and RLD	341

LIST OF TABLES CONTINUED

Table 329 NWH Relevance Test in Teaching Hospitals versus RLD, 2005	341
Table 330 NWH Relevance Test in Teaching Hospitals versus RLD, 2007	341
Table 331 NWH Relevance Test in Community Hospitals versus RLD, 2007	341
Table 332 Correlation Between NWH and AELAD	342
Table 333 NWH Relevance Test in Teaching Hospitals versus AELAD, 2005	342
Table 334 NWH Relevance Test in Small Hospitals versus AELAD, 2005	343
Table 335 NWH Relevance Test in Community Hospitals versus AELAD, 2005	343
Table 336 NWH Relevance Test in Teaching Hospitals versus AELAD, 2007	343
Table 337 NWH Relevance Test in Small Hospitals versus AELAD, 2007	343
Table 338 Correlation Between NWH and HSMR.....	344
Table 339 NWH Relevance Test in Teaching Hospitals versus HSMR, 2005.....	344
Table 340 NWH Relevance Test in Community Hospitals versus HSMR, 2005	344
Table 341 NWH Relevance Test in Teaching Hospitals versus HSMR, 2007.....	345
Table 342 NWH Relevance Test in Community Hospitals versus HSMR, 2007	345
Table 343 Correlation Between NWH and CR.....	346
Table 344 NWH Relevance Test in Teaching Hospitals versus CR, 2005.....	346
Table 345 NWH Relevance Test in Community Hospitals versus CR, 2005	346
Table 346 NWH Relevance Test in Teaching Hospitals versus CR, 2007.....	346
Table 347 NWH Relevance Test in Community Hospitals versus CR, 2007	347
Table 348 Correlation Between NWH and PST	347
Table 349 NWH Relevance Test in Community Hospitals versus PST, 2005	348
Table 350 RNH Emergency Department Based Upon Size/Type, 2005	348

LIST OF TABLES CONTINUED

Table 351 RNH in Emergency Department Based Upon Size/Type, 2007	348
Table 352 Correlation RNH and Emergency Performance, 2005	349
Table 353 Correlation Between RNH and Emergency Performance, 2007	349
Table 354 RNH Relevance Test in Teaching Hospitals versus RVRAa, 2007	349
Table 355 RNH Relevance Test in Small Hospitals versus RVRAa, 2007.....	350
Table 356 Correlation Between RNH and RLD	350
Table 357 RNH Relevance Test in Small Hospitals versus RLD, 2005.....	350
Table 358 RNH Relevance Test in Small Hospitals versus RLD, 2007.....	351
Table 359 RNH Relevance Test in Community Hospitals versus RLD, 2007.....	351
Table 360 Correlation Between RNH and AELAD	351
Table 361 RNH Relevance Test in Teaching Hospitals versus AELAD, 2005.....	352
Table 362 Correlation Between RNH and HSMR.....	352
Table 363 RNH Relevance Test in Teaching Hospitals versus HSMR, 2005.....	352
Table 364 RNH Relevance Test in Teaching Hospitals versus HSMR, 2007.....	353
Table 365 Correlation Between RNH and CR.....	353
Table 366 RNH Relevance Test in Teaching Hospitals versus CR, 2005.....	353
Table 367 Correlation Between RNH and PST	354
Table 368 RNH Relevance Test in Teaching Hospitals versus PST, 2007	354
Table 369 Correlation Between RNH and RNHH.....	355
Table 370 RNH Relevance Test in Teaching Hospitals versus RNHH, 2007.....	355
Table 371 PEE Based Upon Size/Type, 2005	356
Table 372 PEE Based Upon Size/Type, 2007	356

LIST OF TABLES CONTINUED

Table 373	Correlation Between PEE and Emergency Performance, 2005.....	357
Table 374	Correlation Between PEE and Emergency Performance, 2007.....	357
Table 375	PEE Relevance Test in Teaching Hospitals versus RVRAa, 2005.....	357
Table 376	PEE Relevance Test in Small Hospitals versus RVRAa, 2005	358
Table 377	PEE Relevance Test in Teaching Hospitals versus RVRAa, 2007.....	358
Table 378	PEE Relevance Test in Small Hospitals versus RVRAa, 2007	358
Table 379	PEE Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007.....	358
Table 380	Correlation Between PEE and RLD	359
Table 381	PEE Relevance Test in Teaching Hospitals versus RLD, 2005	359
Table 382	PEE Relevance Test in Small Hospitals versus RLD, 2005	359
Table 383	Correlation Between PEE and AELAD	360
Table 384	PEE Relevance Test in Small Hospitals versus AELAD, 2005	360
Table 385	PEE Relevance Test in Teaching Hospitals versus AELAD, 2007	360
Table 386	Correlation Between PEE and HSMR.....	361
Table 387	PEE Relevance Test in Community Hospitals versus HSMR, 2007	361
Table 388	Correlation Between PEE and CR.....	362
Table 389	PEE Relevance Test in Community Hospitals versus CR, 2007.....	362
Table 390	Correlation Between PEE and PST	363
Table 391	PEE Relevance Test in Teaching Hospitals versus PST, 2007.....	363
Table 392	Board Composition Comparison, BS by Hospital Size/Type.....	374
Table 393	Correlation BS and Critical Skills	374
Table 394	BS Relevance Test in Teaching Hospitals versus CDCD, 2007.....	374

LIST OF TABLES CONTINUED

Table 395	BS Relevance Test in Small Hospitals versus CDCD, 2007	375
Table 396	BS Relevance Test in Community Hospitals versus CDCD, 2007	375
Table 397	Correlation BS and Outcomes	375
Table 398	BS Relevance Test in Teaching Hospitals versus RVRAa, 2007.....	376
Table 399	BS Relevance Test in Teaching Hospitals versus RLD, 2007.....	376
Table 400	BS Relevance Test in Small Hospitals versus RLD, 2007	376
Table 401	BS Relevance Test in Teaching Hospitals versus CR, 2007	376
Table 402	Board Composition Comparison, PID by Hospital Size/Type	377
Table 403	Correlation PID and Critical Skills.....	377
Table 404	PID Relevance Test in Small Hospitals versus SOP, 2007	378
Table 405	PID Relevance Test in Community Hospitals versus SOP, 2007.....	378
Table 406	PID Relevance Test in Small Hospitals versus ICC, 2007.....	378
Table 407	Correlation PID and Outcomes.....	379
Table 408	PID Relevance Test in Teaching Hospitals versus RVRAa, 2007	379
Table 409	PID Relevance Test in Small Hospitals versus RVRAa, 2007.....	379
Table 410	PID Relevance Test in Teaching Hospitals versus RLD, 2007	380
Table 411	PID Relevance Test in Small Hospitals versus RLD, 2007.....	380
Table 412	PID Relevance Test in Small Hospitals versus CR, 2007	380
Table 413	Board Composition Comparison, PMPB by Hospital Size/Type.....	382
Table 414	Correlation PMPB and Critical Activities	383
Table 415	PMPB Relevance Test in Teaching Hospitals versus SOP, 2007.....	383
Table 416	PMPB Relevance Test in Small Hospitals versus SOP, 2007	383

LIST OF TABLES CONTINUED

Table 417 PMPB Relevance Test in Teaching Hospitals versus CDCD, 2007.....	384
Table 418 PMPB Relevance Test in Small Hospitals versus CDCD, 2007	384
Table 419 PMPB Relevance Test in Teaching Hospitals versus ICC, 2007	384
Table 420 Correlation PMPB and Outcomes.....	386
Table 421 PMPB Relevance Test in Teaching Hospitals versus RVRAa, 2007	386
Table 422 PMPB Relevance Test in Small Hospitals versus RVRAa, 2007.....	386
Table 423 PMPB Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007	387
Table 424 PMPB Relevance Test in Community Hospitals versus XRRAFIPc, 2007 ..	387
Table 425 PMPB Relevance Test in All Hospitals versus XRRAFIPc, 2007	387
Table 426 PMPB Relevance Test in Small Hospitals versus RLD, 2007	387
Table 427 PMPB Relevance Test in Teaching Hospitals versus CR, 2007.....	388
Table 428 Board Composition Comparison, PPB by Hospital Size/Type.....	388
Table 429 Correlation PPB and Critical Activities.....	390
Table 430 PPB Relevance Test in Small Hospitals versus SOP, 2007.....	390
Table 431 PPB Relevance Test in All Hospitals versus SOP, 2007	390
Table 432 PPB Relevance Test in Small Hospitals versus CDCD, 2007	390
Table 433 PPB Relevance Test in Teaching Hospitals versus ICC, 2007.....	391
Table 434 PPB Relevance Test in Small Hospitals versus ICC, 2007	391
Table 435 PPB Relevance Test in All Hospitals versus ICC, 2007.....	391
Table 436 Correlation PPB and Outcomes	393
Table 437 PPB Relevance Test in Teaching Hospitals versus RVRAa, 2007.....	393
Table 438 PPB Relevance Test in Small Hospitals versus RVRAa, 2007	393

LIST OF TABLES CONTINUED

Table 439	PPB Relevance Test in All Hospitals versus RVRAa, 2007	393
Table 440	PPB Relevance Test in Small Hospitals versus RLD, 2007	394
Table 441	PPB Relevance Test in All Hospitals versus RLD, 2007	394
Table 442	PPB Relevance Test in Teaching Hospitals versus CR, 2007	394
Table 443	Board Composition Comparison, PBB by Hospital Size/Type	395
Table 444	Correlation PBB and Critical Activities	395
Table 445	PBB Relevance Test in Teaching Hospitals versus CDCD, 2007	396
Table 446	PBB Relevance Test in Small Hospitals versus CDCD, 2007	396
Table 447	PBB Relevance Test in Teaching Hospitals versus ICC, 2007	396
Table 448	Correlation PBB and Outcomes.....	397
Table 449	PBB Relevance Test in Small Hospitals versus RVRAa, 2007	398
Table 450	PBB Relevance Test in Teaching Hospitals versus RLD, 2007	398
Table 451	PBB Relevance Test in Small Hospitals versus RLD, 2007.....	398
Table 452	PBB Relevance Test in Community Hospitals versus RLD, 2007.....	398
Table 453	Board Composition Comparison, PEB by Hospital Size/Type	399
Table 454	Correlation PEB and Critical Activities.....	400
Table 455	PEB Relevance Test in Teaching Hospitals versus SOP, 2007.....	400
Table 456	PEB Relevance Test in Small Hospitals versus SOP, 2007	400
Table 457	PEB Relevance Test in Teaching Hospitals versus CDCD, 2007	400
Table 458	PEB Relevance Test in Small Hospitals versus ICC, 2007	401
Table 459	Correlation PEB and Outcomes.....	401
Table 460	PEB Relevance Test in Small Hospitals versus XRRAFIPc, 2007	402

LIST OF TABLES CONTINUED

Table 461	PEB Relevance Test in Small Hospitals versus RLD, 2007.....	402
Table 462	Board Composition Comparison, PENB by Hospital Size/Type	402
Table 463	Correlation PENB and Critical Activities.....	403
Table 464	PENB Relevance Test in Teaching Hospitals versus SOP, 2007	404
Table 465	PENB Relevance Test in Small Hospitals versus CDCD, 2007.....	404
Table 466	PENB Relevance Test in Teaching Hospitals versus ICC, 2007.....	404
Table 467	PENB Relevance Test in Small Hospitals versus ICC, 2007	404
Table 468	Correlation PENB and Outcomes.....	405
Table 469	PENB Relevance Test in Teaching Hospitals versus RVRAa, 2007	406
Table 470	PENB Relevance Test in Small Hospitals versus XRRAFIPc, 2007	406
Table 471	PENB Relevance Test in Teaching Hospitals versus CR, 2007	406
Table 472	PENB Relevance Test in Small Hospitals versus CR, 2007.....	406
Table 473	PENB Relevance Test in Community Hospitals versus CR, 2007.....	407
Table 474	Board Composition Comparison, PCMB by Hospital Size/Type.....	407
Table 475	Correlation PCMB and Critical Activities.....	409
Table 476	PCMB Relevance Test in Small Hospitals versus SOP, 2007.....	409
Table 477	PCMB Relevance Test in Community Hospitals versus SOP, 2007.....	409
Table 478	PCMB Relevance Test in All Hospitals versus SOP, 2007	410
Table 479	PCMB Relevance Test in Teaching Hospitals versus CDCD, 2007	410
Table 480	PCMB Relevance Test in Small Hospitals versus CDCD, 2007	410
Table 481	PCMB Relevance Test in All Hospitals versus CDCD, 2007	410
Table 482	PCMB Relevance Test in Small Hospitals versus ICC, 2007	411

LIST OF TABLES CONTINUED

Table 483	PCMB Relevance Test in All Hospitals versus ICC, 2007.....	411
Table 484	Correlation PCMB and Outcomes	412
Table 485	PCMB Relevance Test in Small Hospitals versus RVRAa, 2007	413
Table 486	PCMB Relevance Test in All Hospitals versus RVRAa, 2007	413
Table 487	PCMB Relevance Test in All Hospitals versus XRRAFIPc, 2007.....	413
Table 488	PCMB Relevance Test in Teaching Hospitals versus RLD, 2007	413
Table 489	PCMB Relevance Test in Small Hospitals versus RLD, 2007	414
Table 490	PCMB Relevance Test in All Hospitals versus RLD, 2007	414

LIST OF FIGURES

Figure 1	Deciding on the Type of Operating Turnaround Strategy to Follow	79
Figure 2	Stages in the Turnaround Process.....	80
Figure 3	Assessing Current Strategic Market Position.....	85
Figure 4	A Turnaround Process Model.....	89
Figure 5	Level of Strategic Change Required in a Turnaround.....	91
Figure 6	Likert's Paradigm	107
Figure 7	Ohio State Leadership Quadrants.....	108
Figure 8	Relationships Between Basic Characteristics of Theory Z	109
Figure 9	The Managerial Grid	110
Figure 10	Stakeholder Typology	128
Figure 11	Organizational Capabilities Model.....	134

Problem Statement

Health care is a major government expenditure, with hospitals consuming the single biggest proportion of that spending at 36% for 2009 for the province of Ontario, and it is predicted to rise to over 40% (Ontario Association of Community Care Access Centres). The public health care system in most Western countries is stressed due to the ever growing demand for it (McGlynn, 2004). The average age of Western democratic populations is increasing as is the lifespan of people in those populations (Agrisano et al., 2007). In the Province of Ontario, Canada, life expectancy has grown in the past 10 years from 75 years of age to 78 years of age for men with women experiencing an increase from 80 years of age to 82 years of age (Ontario Hospital Association, 2006). In Western democracies, the inflow of immigrants with their own unique healthcare problems adds an additional burden to the system, particularly in public hospitals (McGlynn, 2004). To address this stress, public hospitals, which are the primary delivery point of the Western democratic healthcare system, have to be effective, providing the best healthcare possible, as efficiently as possible so that the society can afford to pay for it. The consequence of the stress is reflected in declining levels of service by the public healthcare system (Walshe, Shortell, 2004). In 2004 the Province of Ontario, Canada re-engineered the funding formula for public hospitals, negatively impacting available resources (Dr. Maurice, Head of Surgery, Grand River Hospital, personal communication, Dec. 2 and Dec. 15, 2006; Ministry of Health and Long Term Care, 2005). This further increased the stress on Ontario public hospitals.

In 2006 9.4% of the population in Ontario did not have a family doctor, almost 50% more than 10 years previous (Ontario Hospital Association, 2006). This is resulting in more primary medical treatment occurring in Emergency Departments of hospitals because this is where people go when the system is failing, further stressing the hospital system (Canadian Institute for Health Information, 2007).

Emergency Department performance is seen as the key initial indicator of failing public hospitals and the symptoms in Emergency Departments are reflective of problems in hospital performance and of the health care system (Closson, 2007). This is why examination of how to improve the performance of an Emergency Department has implications for improving hospital performance and potentially the health care system.

Government intervention into poorly performing public hospitals and a two tiered, private hospital system have been attempted without broad and sustainable success (Walshe, Shortell, 2004). In fact, in the case of Grand River Hospital in Kitchener, Ontario, government has intervened three times in the past five years with only limited success (Canadian Institute for Health Information, 2007).

Citizens in Western democracies expect high quality health care to be available to them when it is needed (Flower, 2006; Ontario Hospital Association, 2007). The ability to meet this expectation is limited by the high cost of satisfying this expectation using traditional delivery methods (Flower, 2006).

Government has employed two alternative approaches in an attempt to satisfy citizens' expectations (Dr. Maurice, Head of Surgery, Grand River Hospital, personal communication, Dec. 2 and Dec. 15, 2006; Walshe, Shortell, 2004).

First, higher levels of government officials have directly intervened to assume temporary management responsibility for hospitals in distress (Closson, 2007).

Second, a change in government policy has occurred to allow private facilities to supplement those of the public health care system (Agrisano et al., 2007).

Neither approach has provided the desired results (Dr. Maurice, Head of Surgery, Grand River Hospital, personal communication, Dec. 2 and Dec. 15, 2006; Walshe, Shortell, 2004). In fact, Ontario citizen satisfaction with hospital performance has fallen from 80% in 2005 to 75% in 2007 (Ontario Hospital Association, 2007).

This dissertation seeks to resolve the hospital Emergency Department performance problem by proposing a new governance model which is more activity-based (Porter, 1996) rather than the current governance model which is resource-based (Center for Health Design, 2007). Traditional activity-based strategy and governance has not been considered for public hospitals because public hospitals have no apparent strategic flexibility (Walshe, Shortell, 2004).

This dissertation will attempt to develop this new governance model based upon the presence of for-profit activity-based turnaround competencies in resource deficient environments. This may allow Ontario public hospitals to deliver the Emergency Department health care citizens expect (Flower, 2006) in this challenging environment on a sustainable basis through superior activity fit.

The objective is to investigate if there is a relationship between Emergency Department performance and the existence of for-profit operational turnaround skills at the individual hospital board level. Successful application of for-profit operational turnaround methodologies would result in a high order fit of critical activities.

Consequently a public hospital's limited resources would be applied more efficiently to meet stakeholder expectations, demonstrated by superior Emergency Department performance.

It is expected this new governance model will identify the significant trade-offs that stakeholders, including the existing boards, will have to make to achieve superior performance. It is anticipated that the results will allow Ontario public hospitals to re-configure their boards to deliver superior performance in a resource deficient environment.

Research Field and Disciplines

The field of research for this dissertation proposal is strategy. Given the complexity of a public health care environment, a thorough review of strategy, strategy implementation, and organizational behaviour literature will be performed to focus the research.

Significant research has been performed on for-profit resource-based view and model strategy (Drucker, 1954; Day, Reibstein, 1997; Stern, Deimler, 1997; Barney, 2007) as well as strategic positioning (Porter, 1996).

A subset of strategy that has been researched in detail is the literature available on turnaround strategies and methodologies (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982). This research crossed over into operations management and organizational behaviour to understand the implications for achieving performance improvement (Gordon, 1960; Likert, 1967; Blake, Mouton, 1978; Prahalad, Hamel, 1990; Kotter, 1995; Kanter, 2003). The final policy area researched is board composition literature,

predominantly literature associated with not-for-profit hospitals (Fama, Jensen, 1983; Hermalin, Weisbach, 1988; Shortell, 1989; Callen, 1994; Callen, Falk, 1993, Callen et al., 2003).

Because Ontario public hospitals are all not-for-profit there has been a thorough review of literature associated with the culture of non-for-profit organizations, particularly hospitals (Freeman, 1984; Drucker, 1990; Mitchell et al. 1997; Walshe, Shortell, 2004).

Literature Review

Strategy Literature Review

Introduction

The definition of strategy has been a source of constant argument by academics and practitioners (Ahlstrand, et al., 2005). Even the Oxford Dictionary (Oxford Dictionary, 2008) has two definitions; “the art of planning and directing military activity in a war or battle, often contrasted with tactics” or “a plan designed to achieve a particular long-term aim”. Academics and practitioners have struggled with the difference between war and business as well as strategy and tactics, often blurring the difference them (Ahlstrand et al., 2005).

Most academics and practitioners agree that there have been two giants in business strategy research, Dr. Peter Drucker and Dr. Michael Porter (Peters, 1993). In spite of his often fractious relationship with academia, at the time of his death Dr. Drucker had 1,762 citations, cited one or more times by researchers, over twice that of the nearest business academic in the ISI citation database (Brown, Seeman, 2006). Dr. Porter has

authored 17 books on strategy and over 125 articles at the time of this dissertation proposal (Harvard Business School, 2008) and is still contributing.

Upon initial analysis, the approaches that these individuals have taken to guide management and academia to improved strategies appear quite different. Dr. Drucker focused on the organization and psychology of leadership and strategy (Micklethwait, Wooldridge, 1996). Dr. Porter took an economist's view of view of business, guiding management through comprehensive structural analysis (Argyres, McGahan, 2002). Yet, both of these apparently different approaches have been deemed successful by management and have been embraced by business leadership (Bell, et al., 1999).

In spite of their different approaches, the goal of Dr. Drucker and Dr. Porter has been the same, to seek to guide managers to improve the performance or value of the firm for which they are responsible (Micklethwait, Wooldridge, 1996). Consequently, their definition of firm strategy has been the same, "a handful of guidelines that largely or entirely drive most of the subsequent decisions and actions of an organization, are not easily changed once made, and have the greatest impact on whether the objective will be achieved" (Couturier, 2007). For the purposes of this dissertation, this is the definition which will be used for strategy.

Another reason that this definition will be used for this proposal is that, unlike their contemporaries, both Drucker and Porter wrestled with the unique difficulties and complexities of healthcare in the later part of their careers. Both scholars have believed that public sector managers face a harder challenge than their business counterparts (Drucker, 1993; Porter, Teisberg, 2006).

Academics and practitioners generally agree that the evolution of strategic research involved five phases; budgetary planning and control, corporate planning, competitive advantage, positioning, and strategic and organizational innovation (Ahlstrand, et al., 2005; Couturier, 2007).

Budgetary Planning and Control Systems

Budgetary planning and control systems, which academics and practitioners take for granted in today's environment, grew out of the work of Frederick Taylor, arguably the first modern pioneer of the "science of business" (Bell, 1999). He founded many modern principles of management, including the time study. Fundamentally, he proposed that management analyze each job, set new levels of higher production, and then help workers to achieve them. This mechanistic approach was revolutionary for the time and has indeed set the tone for much of modern management and accounting.

This mechanistic approach is the basis of value stream mapping, a technique used in modern Lean management to uncover the sources of waste and improvement (Jones, Roos, Womack, 1990). The identification and elimination of non-value added activities in the execution of any task invariably reduces cost and/or frees up resources. This measurement and control technique has allowed Japanese firms like Toyota to produce cheaper vehicles, of higher quality, using fewer resources, in less time, than core competitors like General Motors (Jones, Roos, Womack, 1990).

While value stream mapping is a well known, researched, and taught management tool in the for-profit sector, its use and comprehension by public sector leadership, particularly in public hospital management is poor at this time (Savary, Crawford-

Mason, 2006, Canadian Institute for Health Information, 2007). Since public hospitals do not exercise the same control over revenue as business, due to government or donor restrictions, a research question exists of why they would not embrace proven management control strategies which reduce cost, enhance value/quality, are more resource efficient, and result in faster cycle time surfaces. Only recently has preliminary research been published that has begun to examine why doctors, who are trained to diagnosis medical problems using data analysis and a statistical approach, fail to embrace a similar approach in optimizing their system efficiency (Ettinger, Kooy, 2003).

The mechanistic approach developed by Frederick Taylor led to the next revolutionary management control strategy, the assembly line. While Henry Ford has been awarded the credit by management historians, Charles Sorensen, invented the concept of assembly, or a system where workers are stationary and the work moves (Bell, 1999). Ford was an effective enough manager to see the promise in this approach and supported the concept. The result was the creation and implementation of a disruptive technology that changed the automotive industry.

The literature review has uncovered that there is a gap in the strategic concept of the implementation of an assembly line for healthcare, particularly Emergency Departments. Drucker (1988) launched the concept in his discussion of health care professionals being knowledge workers and therefore being similar to specialists on an assembly line but no scholar has continued to explore this concept.

Drucker correctly pointed out the major flaw of the scientific approach of the assembly line, which is that an assembly line was as slow as its slowest worker or process. In

addition, he discussed the implications of the fact that assembly line workers do not get to see the final product (Drucker, 1946). This flaw is one that management continues to fail to recognize when attempting to put an assembly line process in a service operation (Jones, Roos, Womack, 1990).

Perhaps healthcare researchers have discounted an assembly line execution strategy because of their belief that it is only useful for a homogenous product or service strategy. However, firms like Toyota have demonstrated that they are able to deliver a non-homogenous product efficiently, quickly, and in a high customization environment in the for-profit business world (Jones, Roos, Womack, 1990).

Corporate and Business Unit Strategy

Alfred Sloan is important to scholars and practitioners as he invented the concept of corporate and business unit strategy (Bell, 1999). When General Motors (GM) implemented the Ford concept of the assembly line, this productivity improvement actually led GM to poorer financial performance due to a confused product line and no means of controlling operations and finance due to its large, non-homogenous product lines (Bell, 1999). To get control of operations and finances, Sloan divisionalized GM, creating the first modern corporation and the concept of corporate strategy.

Drucker was able to research Sloan's innovations, resulting in Drucker's seminal work, *Concept of the Corporation* (Drucker, 1946) which separated corporate strategy questions from business unit strategy issues. Drucker (1946) initiated the concept that corporate strategy created value in a multi-business corporation above the sum of its individual business unit value creation, resulting in a parenting advantage for corporate

control of the different business units. Drucker (1946) stated that each business unit had to create and execute a strategy which addressed the needs of its own individual product market. This concept of the linkage between corporate and business unit strategy has been well researched in the for-profit environment (Stern, Deimler, 1997).

However, there appears to be a gap in the literature of the strategic concept of a not-for-profit public hospital developing a corporate strategy and its individual operating units, who offer and serve different products and clients, developing business unit strategies, and how the corporate hospital, using this strategic structure, might be able to offer parenting advantages to the operating units. Areas of overlap between the corporate and business unit level, such as strategic information sharing, effective portfolio management, and a resource-based view to strengthen existing operating units are well researched techniques that businesses use to improve their performance (Stern, Deimler, 1997). Use of these approaches in public hospital management has not been significantly researched (Cazale et al., 1996; Walshe et al., 2004). Ontario's public hospital system operates much like a corporation with the Local Health Integration Networks (LHIN), of which there are 14 in the Province, functioning much like "parents" or corporate level entities.

In his research on corporate and business unit strategy Drucker (1946) was the first academic that mixed economics with social sciences by arguing that companies had a social dimension as well as an economic purpose. Drucker's major concern was with the dignity and status of the individual employee and the role of the corporation in satisfying the industrial citizenship and social community. This philosophy fits with the

purpose and objectives of public hospitals, particularly considering the large and diverse number of stakeholders.

Another outcome of this corporate strategy research was that Drucker uncovered that Sloan believed that GM was not a finished product after its turnaround and each generation must make changes that will allow the corporation to grow (Bell, 1999). This continuous renewal philosophy is echoed by Porter in his seminal work (Porter, 1980). Recently, scholars researching this topic from the perspective of public hospitals have uncovered that the board of directors configuration is critical in terms of whether the organization will pursue a continuous renewal path or not. Boards with a corporate model, versus a philanthropic board, (Table 1) have been demonstrated to not only be more adaptive to a changing environment but also operate more efficiently (Alexander, Lee, 2006).

Table 1

<u>Philanthropic and Corporate Models of Hospital Governing Boards</u>	
<u>Philanthropic Model</u>	<u>Corporate Model</u>
Large board size	Small board size
Wide range of perspectives and backgrounds	Narrow, more focused perspectives and backgrounds
Small number of inside directors	Large number of inside directors
Little management participation on board	Active management participation on board
No formal management accountability to board	Direct management accountability to board
No limit to consecutive terms for board members	Limit to consecutive terms for board members
No compensation for board service	Compensation provided for board service
Emphasis on asset preservation	Emphasis on strategic activity

Source: Alexander, Morlock, & Gifford, The Effects of Corporate Restructuring on Hospital Policymaking, Health Services Research 23 (2) 1988, pp. 311

Two interesting foundation concepts that Drucker articulated in his seminal work were the ideas of the corporation as a social institution and the corporation as a human effort. He found the way people worked together interesting in its own right rather than just as a means to make profits. In his work, he discussed the conflict between humanist and scientific management (Drucker, 1946). A potential gap in the literature is determining

if this conflict is one that confuses hospital medical staff in the daily function of their duties, resulting in lower performance.

The research into corporate and business unit strategy resulted in the development of the concept that structure should follow strategy (Drucker, 1946). Drucker believed that how an organization was structured should be determined by what the organization seeks to achieve. Since companies are social and humanistic entities he believed that the human potential would only be unlocked by organizing in a manner that unlocked that human potential.

If an organization organized themselves with their objectives in mind he hypothesized that the firm was more likely to achieve those goals. He also hypothesized that an organization's objectives change over time, necessitating organizational structural changes in order to enhance the probability of successfully delivering those objectives. Later research validated these core concepts in for-profit environments (Ahlstrand, et al., 2005). While research exists in terms of how public hospitals change their structure when faced with competition (Porter, Teisberg, 2006), Ontario does not have a two-tiered health care system. Exploration of board configuration and structural changes due to changing objectives may help to provide some insight into the difference between the organization and performance of the different Emergency Departments in Ontario hospitals.

A key concept that Drucker introduced in his discussion of corporate versus business unit strategy (Drucker, 1946), which was ignored for decades, was the idea that effectiveness was more important than efficiency. In other words, it is more important to do the right thing than to it is to be doing things right. Even today, management is

consumed with operational efficiency versus making sure that they are competing in the right markets with the right products (Drucker, 2005). Perhaps it is because operational efficiency is much easier to measure and manage versus strategy therefore it receives far more management attention (Porter, 1996).

This concept was similar to that published by Ansoff (1965). Both Drucker and Ansoff argued that being effective but inefficient can be addressed, but being efficiently ineffective means that the company will go out of business quickly and smoothly. Both Ansoff and Drucker stressed that management should ask strategy effectiveness questions before exploring operational efficiency problems. This fundamental question is the basis of successful turnaround management (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982).

This may be a significant concept to explore as the apparent strategy for Ontario public hospitals overall is to be able to do everything well, particularly Emergency Departments (Waterloo Wellington Local Health Integration Network, 2007). However, there is significant literature published outside of Canada questioning this approach (Walshe et al., 2004).

Drucker attempted to resolve his internal conflict between the humanist and scientific management approaches with his work on Management By Objectives (MBO), (Greenwood, 1981). This management innovation emphasized clear objectives, both for the corporation and manager, translating long term strategy into short term goals, linking corporate strategy with business unit strategy.

MBO forced management to focus on goals or results rather than processes or activities.

This rational approach to management was revolutionary when it was introduced in

1954 and is still in commonplace use to this day, half a century later. While one might argue that MBO is not a humanist approach, acknowledged experts such as Rosabeth Moss Kanter (Micklethwait, Wooldridge, 1996) believe that the clarity that this process brings results in superior human performance through uncertainty reduction. MBO allows teams in a business to be aligned and focused, with its human capital directed to a common outcome that will allow achievement of strategy.

This MBO approach has been embraced by healthcare (Brown, Seeman, 2006) but raises the question “is there a different set of objectives being pursued in a high performing hospital and its Emergency Department versus a low performing one?” This may be an example of “doing things right” versus “doing the right thing”. This has not been researched in the literature.

The strategy concept of separate corporate and business units also created the argument of decentralization (Drucker, 1954). Centralized organizations tend to be less organic or adaptable to rapidly changing environments, such as those that business faces today. The difficulty in implementing this concept in a regulated environment such as healthcare is that traditional management controls are not up to the task of successfully co-ordinating the assets of the business (Ahlstrand et al., 2005).

This focus on decentralization led to the development of the concept of empowerment of the workers or creating the self-governing plant community in his own words and the rise of the knowledge worker, the worker whose value lies in what he has in his head not what he can do with his hands (Drucker, 2002).

Edward Deming was able to take this worker “liberation” concept and embed it into his famed “Fourteen Points”, empowering workers, breaking down inter-department

barriers, combining it with rigorous statistical analysis, with the result that the Japanese companies, which embraced these philosophies, became world leaders in their respective categories (Bell et al, 1999). Japanese leaders took this concept one step further by inventing the Lean management process, which revolutionized their business across all industry (Jones, Roos, Womack, 1990). Primary healthcare, certainly in Ontario, has not yet embraced or significantly researched this resource optimization methodology (Canadian Institute for Health Information, 2007). In fact, research has demonstrated that it is not taught in any of the curricula in Ontario medical schools (Ms. Taylor, President, St. Mary's Hospital, personal communication, Jan. 15, 2009, Ms Bowers, RN, Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010).

Competitive Analysis

The architect of positioning was Dr. Michael Porter. Understanding Porter's work begins with understanding his initial curiosity. Although he was trained as a Harvard economist, Porter took a course in industrial organization by Dr. Richard Caves. He observed that although business policy and industrial organization literature both talked about industries, and in spite of many common issues, there was no researched connection between the fields. At that point he identified a gap in academic literature by bringing industrial organization thinking into the study of strategy (Argyres, McGahan, 2002).

Harvard was dominated by Structure-Conduct-Performance (SCP) and Dr. Joe Bain's work of entry barriers when Porter came to the above realization. He found that SCP

and Bain's work was incomplete when he examined many case studies from an entry barrier perspective (Argyres, McGahan, 2002).

Examining this issue from an industrial organization perspective, he attempted to create a model that would better explain firm behaviour in an industry context. Porter used a classical statistical approach and was not successful with this single dimensional approach. At this point he concluded that a model would be too restrictive and that a purely statistical approach was too narrow.

He decided, not unlike Drucker, that he had to take a big leap because the classical approach was not working. Instead of having the resources of a GM, Porter was able to use the rich tradition of Harvard's case studies, in combination with basic statistical analysis, to create a framework, rather than a model, because "managers must consider everything" (Argyres, McGahan, 2002). Like Drucker, even in spite of using the Harvard tradition of case studies, he was attacked by academia for being too general, not using extensive statistical tests.

This framework and supporting considerations was published in his seminal book, *Competitive Strategy* (Porter, 1980). The Five Forces Framework has become the manager's standard tool for evaluating the attractiveness of any given industry. The Five Forces include; Supplier Power, New Entrant Power, Buyer Power, Substitute Power, and Firm Rivalry. It is incredibly useful because it depicts the whole vertical chain of economic activity running from suppliers through businesses and on to customers.

This vertical chain of economic activity highlights the central role of business in creating value, a central theme of Porter's work, but it also emphasises how businesses

are reliant or interdependent on suppliers and customers. Brandenburger has extended this concept of value by proving that Porter's framework can give a firm an image of a "value pie" (Brandenburger, 2002). Not surprisingly, Brandenburger also proposes that the Five Forces Framework works well in game theory analysis (Brandenburger, 2002) since firm behaviour can be predicted by the Five Forces and associated signalling.

While the Five Forces Framework has proven to be effective in for-profit hospital strategy development, its use in the not-for-profit sector has been discounted in socialized medicine environments because of the belief that several of the forces, such as New Entrant Power and Firm Rivalry, have no impact (Walshe et al., 2004). However, a broader view of Porter's model, including macro-economics, technology, demand, and government regulation, viewing New Entrant Power as new construction or alternative health care methods and Firm Rivalry as competition for fixed government resources, results in some relevance as these forces all impact a public hospital and its strategy decision process (Porter, Teisberg, 2006).

From the Five Forces Framework, Porter was able to develop a number of groundbreaking fundamental concepts that have been critical for management to understand. The first concept that he developed was that of competitive advantage. Competitive advantage is a value proposition that is important to customers, different from competitors, and hard for competitors to match.

He theorized that strategy is not aspiration, action, deals, importance, vision, mission, learning, values, change, agility, growth, price, best practices, operations, acquisitions, or structure. He hypothesized that strategy is what makes a firm unique, giving that firm a distinct competitive advantage. Without a distinct competitive advantage he stated that

his research had proven that firms which carved out a compelling and unique value proposition significantly out-performed those firms which had not (Porter, 1985).

Since not-for-profit hospitals in Ontario all access the same sources of funding, which are largely fixed, there is the question that arises of “are higher performing hospitals able to achieve a larger slice of the pie and why?” Additionally, how do they use this “larger slice of the pie” and does it relate to their performance or some other factor? There is no literature addressing these questions.

Porter further clarified that strategy provides direction, builds brand reputation, sets the right goals, creates superior performance, defines a market position, creating this unique value proposition. He notes that in formulating strategy, managers have to choose what to do, what not to do, what customers to serve, and what needs to meet at what price. This position is eerily similar to that of Drucker’s fundamental theory, being that it is more important to do the right thing than to do things well. In spite of taking an economist versus humanist view, Porter reinforces Drucker’s perspective by stating that strategy often requires a different value chain with a potentially different reinforcing structure and systems to provide a level of sustainability (Porter, 1985).

Porter extended this concept of strategy under the context of his Five Forces Framework and developed three generic strategies which firms could use in order to compete successfully in any given industry and environment. Those three generic strategies have formed the basis of creating competitive advantage for a generation (Porter, 1980). These generic strategies are cost, differentiation, and focus (niche). For-profit hospitals have employed this approach successfully (Porter, Teisberg, 2006).

Porter postulates that a firm must choose one of these strategies or risk being “stuck in-between”. If a firm is “stuck in-between” his research has determined that the company will not be able to make the best decisions to maximize value (Porter, 1985). This issue of being “stuck in-between” is a major problem for management today, particularly given the major market forces of disruptive technology and globalization because a firm may have to compete using all three generic strategies at different times in order to maximize the value of its products and capital. This “stuck in-between” position has been difficult for Ontario public hospitals as government policy conflicts with choice (Closson, 2007).

Choosing the timing of what strategy to employ while matching different structures and systems, is a difficult and continual management problem. Porter theorizes that strategy is a continuous process therefore management must constantly be re-cycling his framework to determine what strategy might be the most optimal for a firm or its products (Porter, 1980).

In spite of Porter’s work on the Five Forces Framework, western management was consumed in the 1980’s and 1990’s with mimicking the success of Japanese firms by copying their operational effectiveness methodologies (Porter, 1996). The lessons of both Porter and Drucker were forgotten by many companies during this period, that lesson being “do the right thing before you do things well”. Careful review of the literature on Japanese management techniques reveals that the first step in a Lean implementation is “doing the right thing” (Jones, Roos, Womack, 1990). It appears that management found it easier to execute versus think (Porter, 1996).

A review of hospital strategy literature reveals that most academics and practitioners are focused on “doing things well”, employing for-profit operational improvement techniques without considering whether they are doing the “right things” (Porter, Teisberg, 2006). Drucker cautioned management about this danger several decades ago; he stated “The single most important thing to remember about any enterprise is that results exist only on the outside, the result of a business is a satisfied customer” (Drucker, 1988). Furthermore, “A hospital is a service institution, hospitals do not need to be more business-like, in other words, they need to think through their own specific functions, purposes, and missions” (Drucker, 1973).

Porter attacked this behaviour in his landmark article “What is Strategy?” (Porter, 1996), arguing that both globalization and disruptive technologies were forcing managers to play by new rules. These influences were forcing companies to have much more flexibility to respond to market and competitive changes. Technology has impacted hospitals but there are large questions in the literature as to whether hospitals have embraced new information technologies and methodologies as well as for-profit business (Fredenberger et al., 1997; Walshe, Shortell, 2004). The research question of do higher performing hospitals and their Emergency Departments have more effective information systems has not been significantly researched by scholars.

While Porter applauded management for benchmarking continuously to achieve best practices and aggressively outsourcing to achieve efficiencies he noted that the more companies in an industry did this the more they looked and functioned alike. The consequence of this, he argued, was “hyper-competition” or zero-sum gain for companies in these categories. If they all looked and functioned alike then it would be

difficult for them to each have unique value propositions therefore the companies would compete on a price versus value position which would drive industry profits down.

He argued that this was a self-inflicted wound in management's efforts to improve efficiency, stating that diffusible management tools have taken the place of strategy. He postulated that the root of the problem was management's failure to distinguish between operational effectiveness and strategy. He further argued that as managers push to improve on all fronts they move farther away from viable competitive positions. The basis of this argument was that management was focusing on doing things well versus making sure that they were doing the right things.

In an effort to explain the importance of what to do versus doing things well Porter developed an activity-based approach to strategy. He argued, like Drucker (1954), that everything was important to management. He further argued that a company can outperform rivals only if it can establish a difference that it can preserve for a sustainable period of time.

However, management has to make choices. He stated that strategy and operational effectiveness are both essential to creating superior value. Management's choice was delivering greater value or the same value as competitors but at a lower price. The essence of this argument is simple economics; greater value allows a company to charge higher prices, greater efficiency results in lower average unit costs. Porter stated that the ideal position is one where the company has products that the customer perceives have greater value and the company is efficient in producing those products at low total delivered cost (Porter, 1996).

The key that Porter pointed out to management was the concept of activities. He stated that cost advantage arises from performing particular activities better than competitors and differentiation arises from the choice of activities and how they are performed (Porter, 1996). Therefore, extending this perspective to competitive advantage, overall advantage for a firm results from all of a company's activities, not just a few. Again this is strangely similar to Drucker's theories, in spite of coming from an economist versus humanist approach.

Using this perspective, Porter argued that it is difficult for a firm to compete on operational efficiency only over the long term because best practices diffuse in any industry. The generic best practices and technical solutions diffuse the fastest due to the role that consultants play in modern industry. This results in competitive convergence, particularly if benchmarking is used extensively in the industry.

A consideration of major insight is that Porter pointed out the risk of focusing only on greater efficiency, particularly when it results in hyper-competition, is that productivity gains are captured by customers and suppliers. This is zero-sum competition for the industry, not boding well for its long term health.

Public hospitals in Ontario are not "competitive" in that they seek to gather the most market share or profit, these metrics are not relevant. Competitive convergence is what is sought, at least from a government or citizen perspective, with all hospitals performing equally well. The question of why some hospitals like Grand River in Kitchener perform very poorly in an environment where competitive convergence is sought has not been answered. Porter's work examined from the different perspective of why there is no convergence may provide some insight.

Porter noted that the more that rivals outsource activities to efficient third parties, usually the same outsourcing companies, the more generic those activities become. In addition he observed that merger and acquisition consolidation makes sense in the context of operational effectiveness competition, but management is often exhibiting a severe lack of vision because they are seeking the operational efficiency advantages of economies of scale and customer when that capital could be better used to do the right things at significantly less risk. Therefore, he concluded that competition based upon operational effectiveness only is mutually destructive (Porter, 1996). A question that scholars have not yet answered for not-for-profit public hospitals is does outsourcing improve performance and if so, what type of outsourcing produces the best overall hospital and Emergency Department performance?

Porter (1996) states in this seminal article that Japanese companies rarely have strategies as they focus on exclusively on operational effectiveness activities such as total quality management and continuous improvement. Porter's research misses discussing a defining activity that can lead to sustainable competitive advantage and that is product development. Most large Japanese firms are noted for producing products that customers value because these products meet their needs and function well. While the diffusion of operational effectiveness activities may allow other firms to copy these products, a continual focus on product development can and has created a sustainable competitive advantage for many Japanese firms. Researchers have not answered the question of how innovative have public hospitals been in creating and defining "new products" and whether that capability relates directly to hospital performance.

Positioning

Porter was keen (Porter, 1996) about reinforcing his perspective that competitive strategy is about being different, which means deliberately choosing a different set of activities to deliver a unique mix of value, thereby avoiding hyper-competition. He further clarified that strategic positioning meant performing different activities from rivals or performing similar activities in different ways. He believes that management has rejected the concept of strategic positioning because management believes that it is easy to copy a position (Porter, 1996). However, public hospitals, at least from a user and government standpoint, should embrace a “copied” strategic position that results in overall hospital system high performance.

Porter challenged management by defining three basic strategic positions or varieties (Porter, 1996). These positions are variety-based, needs-based, and access-based. Variety-based positions are ones where the firm offers a choice or menu of product and/or services varieties rather than serving specific customer segments. This position is particularly valuable when a firm can best produce particular products and/or services. The needs-based position is focused on serving all or most of the needs of a particular segment of customers. This is a very traditional approach, working best when there are groups of customers with differing needs and a tailored set of activities can serve those needs best. The final position is access-based or segmenting customers who are accessible in different ways such as geography and scale.

For-profit hospitals have moved to variety-based positions where most public hospitals in Western democracies are driven to serve all needs in their geographic area, an access based position (Porter, Teisberg, 2006). Academics have started to challenge whether

this is the right position for public hospitals to take but there has been no definitive answer (Walshe et al., 2004).

Porter was very specific in his work indicating that firms can mix and match strategic positions in order to create unique strategies. He believes that management does not understand the essence of strategic positioning, which is to choose activities that are different from rivals. If the same set of activities were best to produce all varieties, meet all needs, and access all customers, companies could easily shift among them and operations excellence would determine performance, leading to hyper-competition.

Instead, he asks management to choose the company's strategic position before choosing activities because his research has shown that activities are determined by position. A strategic position can either be broad or narrow, further defining the critical activities. Porter again informs management that strategy is a unique and valuable position. If there was only one position in any industry then there would be no need for strategy.

Porter states that the key decision that management has to make, to create a sustainable strategy, is to decide what the trade-offs will be that allow the firm to create a unique strategic position that has a competitive advantage. A valuable position will attract imitation. A competitor will attempt to copy the strategy or straddle it, grafting features of the new position but keeping its own as well. He postulates that it is difficult, if not impossible, for two firms that are not exactly alike to make the same trade-offs.

This concept of choosing a unique strategic position may have merit for Ontario public hospitals and their Emergency Departments. Given the constraint of fixed resources, geography, and public expectations, a provincial "corporate" strategy for hospitals and

their Emergency Departments, which revolves around unique hospital strategic positions that mesh together, may provide the performance which stakeholders desire (Porter, Teisberg, 2006).

Porter is clear in that the salient difference between operational excellence and strategy is the existence of trade-offs. From an operational excellence perspective, management always seeks perfection, trying to accomplish every task with no waste. Alternatively, strategy is about doing the right thing, which may mean choosing not to do other things in order to do the right thing. One could argue that a sustainable competitive position has trade-offs which rival companies are not in a position to make. Therefore, if a strategy does not have trade-offs then it is likely not very sustainable.

As stated above, trade-offs occur when activities are incompatible. Trade-offs can exist for three reasons; inconsistencies in image or reputation, the fact that different positions require different activities and resources, and limits on internal co-ordination and control. Trade-offs forces the need for choice and purposefully limits what a company offers. Porter correctly notes that compromises will kill a company by having the company execute an “in-between” strategy.

The concept of the Productivity Frontier (Porter, 1996) forces choices or trade-offs. A company cannot compete in two ways at the same point in time without risking the consequences of attempting to compete with no trade-offs. A company attempting this will find itself running faster and faster just to stay in place while its competitors carve out unique positions for themselves. The difficult choice for management is choosing what not to do, again a familiar Drucker theme.

To further direct management, Porter extended this theory of competitive advantage through strategic positioning and unique activities to the concept of fit. He suggests that real competitive advantage can be achieved by combining critical activities that are defined by the strategic position. If the activities are combined efficiently and reinforce each other Porter theorizes that this fit will block out competitors.

Porter argues that managers today focus on “core competencies”, “critical resources”, and “key success factors” rather than defining a unique strategic position and managing the fit of the needed activities to deliver that position. He argues that what managers focus on today can be easily copied, resulting in hyper-competition. This theory is not unlike that proposed in Kim’s and Mauborgne’s “Blue Ocean Strategy” (Kim, Mauborgne, 2005) where the authors recommend carving out a market space where competitors are irrelevant.

This concept has merit for hospital management and performance because, if a hospital does not make tradeoffs, expending resources on activities that do not support its core strategy, then it may jeopardize or sub-optimize its goal performance.

Porter defines three types of fit that managers should be aware of and seek to imbed into the activities that they choose to implement in their strategy. First order fit or simple consistency is ensuring that the activities chosen are cumulative and do not erode or cancel each other out. Second order fit is having one set of activities reinforce another set. Finally, third order fit is activities which drive a cost or other advantage in addition to differentiation.

Porter theorizes that these interlocked activities driven by higher levels of fit are really very difficult for a competitor to attack. He postulates that strategic positions built upon

these systems of activities which are interlocked are far more difficult for a competitor to mimic versus positions built upon individual activities. One reason for this is because the higher order levels of fit are not apparent on first analysis of a company's strategic position. In-depth analysis of a company's strategy and operations is required to unlock the existence of these activities and their interlocked relationships. Few managers have this training and patience (Porter, 1996). Additionally, to copy each of these interlocked activities a competitor can assign a probability of being able to do so, when one multiplies the chances of success of performing each of these activities successfully it is clear that the overall probability is quite low.

If this is so then the more a company's positioning rests upon activities with second and third order fit, then the more sustainable its competitive advantage will be. Therefore, fit among a company's activities creates pressures and incentives to improve operational effectiveness, which makes imitation even harder to achieve. Further, fit means poor performance in one activity will impact the performance of other activities; the advantage with this visibility is that weaknesses become very evident and can be attacked on a priority basis. Alternatively, improvement in one activity will help all activities, further tightening fit and advantage.

The overall implication for management with respect to fit is that it will enhance a strategic position's uniqueness and amplify the trade-offs that a competitor must overcome to duplicate the strategy. Since fit between activities is an effort that requires time to develop, a strategic position should be chosen so that it is ideally stable for a period of time as too many changes can be very costly.

The implication of fit for Ontario public hospitals is that resources could be used more efficiently, resulting in better performance and potentially the ability to handle more capacity.

Other key insights from Porter's work on strategic position and fit are that management, when choosing the right thing to do, should consider deepening their strategy before broadening it, when considering growth. Deepening strategy usually involves taking advantage of the core activities that define the current strategy. Leveraging the existing activity system reinforces fit, defining an even more unique strategic position. Broadening strategy should be considered very carefully. Usually a company cannot take full advantage of the interlocked fit of core activities by broadening; therefore it may need to develop a stand-alone business unit in order to broaden the business without diluting the uniqueness of its core operations.

Porter argues that the essence of good strategy is the need to make many choices that are all consistent, choices about production, service, design, etc. Companies cannot randomly make a lot of choices that all turn out to be consistent. This is not statistically possible. It means that leaders need to grasp at least a part of the whole; someone needs to have the insight in how choices fit together. Like Mintzberg (Lampel, Mintzberg, 1999), he agrees that there is an element of emergent strategy in every company but someone has to start with some level of choice and fit.

Further to this, Porter states that management must be disciplined, not being distracted or compromising on the company's strategic position, continuously searching for ways to reinforce and extend the company's position. Leaders from Porter's perspective must be able to set clear limits while striving to achieve perfection with respect to operational

excellence. Managers need to continually be working to tighten fit, making clear trade-offs that employees understand, in order to define a unique and profitable competitive position.

In his more recent work on strategic positioning and competitive advantage Porter is concerned that management is failing to deliver this strategic performance due to barriers created by capital markets with prevailing emphasis on shareholder value, severe pressure to grow, development deals in a more networked environment, wrong goals, wrong performance metrics, and cost versus profit accounting (Argyres, McGahan, 2002).

He suggests that management is simply forgetting the basics. In spite of a more complex environment as time moves on, he stresses the basics of developing strategy is to establish a unique market position and gain a competitive advantage. As his work theorizes, he states that strategic growth is about becoming more distinctive, expanding geography, hiring and developing the right people, and heading in the right direction (Brandenburger, 2002).

Porter validates this perspective with his work on the *United Kingdom Report on Competitiveness* (Porter, 2003). Porter and his peers found three problems which impacted the success of firms in the United Kingdom; the low rate of investment in capital assets and innovation, competing less on unique value than advanced peer countries, and lower use of modern management techniques. The common denominator in all three problems is management skill. He therefore called for a better strategy in training advanced management skills. Management skills and competency are a known concern in Ontario not-for-profit hospitals (Closson, 2007).

Porter noted specifically that the largest challenge is to move management from a traditional investment driven strategy to an innovation driven strategy. Shorter product life cycles, disruptive technology, and global competition are forces that managers cannot ignore in crafting strategy and must therefore insure that innovation activities must be part of their strategy in order to overcome and take advantage of these environmental forces.

Interestingly, like Drucker, in this later work Porter pointed out that there are broader implications for government and education given these environmental forces (Porter, 2003). He noted that governmental policies and education had to be re-thought to support companies competing in this environment.

Porter's perspective on innovation is very clear, "innovation is only good if it produces a distinctive position in the marketplace" (Argyres, McGahan, 2002). Therefore, the value of innovation is in delivering the strategy. He takes an interesting approach with government and innovation, as validated by the *United Kingdom Report on Competitiveness*; he states that a government's goal priority should be supporting industrial innovation followed by technical efficiency to minimize cost. He believes that this approach positions a country's industry for profit maximization while having effective services for citizens at low cost. Research by noted healthcare scholars in the United Kingdom substantiates this concept (Walshe et al., 2004).

Porter's later research has shown that location matters in fostering innovation, with clustering there is a concentration of resources and effective university-industry linkages (Porter, Stern, 2001). He believes the way that government can support innovation is by funding the initial creation of these clusters, then letting industry carry

on once they have been initiated. A point of interest is that the poorly performing Grand River Hospital is located in Canada's "Technology Triangle", the country's largest cluster of research, theoretical and applied, and is the home for Toyota's manufacturing operations for Canada and much of the United States.

As Porter has matured, like Drucker, he has taken a very public stance for achieving improved education. Porter correctly points out in the Council on Competitiveness Report for the United States (Porter, 2006), that the index shows signs of jobs shifting from low-tech, low-skill positions to higher-tech, higher-skill levels. While every country seeks to move to higher-skilled jobs, the loss of low-skilled jobs can be a harmful thing if the education system does not help to upgrade the population to be able to perform at a higher skill level. Research has demonstrated that hospital performance is directly linked to the skill of its employees (Walshe et al., 2004).

Strategic and Organizational Innovation

Porter's work set up the next cycle of research, that based upon innovation and learning. According to Mintzberg (Lampel, Mintzberg, 1999), strategy explorers have been searching for the source of strategy, looking for first principles to explain the nature of the process. These explorers have been rooted in basic disciplines, like economics, sociology, or biology, or focusing on a central concept like organization culture. Mintzberg's concern is that Porter depicts the strategy process as deliberate and deductive, disregarding the concept of strategic learning.

Mintzberg suggests that the reality is that strategy evolves, not passively but creatively, and so unpredictably. He believes simply because organizations seek to be unique, the

ingenuity of those who practice strategy should therefore constantly surprise those who study it. Mintzberg believes that because of this a deliberate and deductive approach is not possible.

Furthermore, Mintzberg believes that Porter is wrong about the Japanese and their lack of strategy. Mintzberg suggests that the Japanese are experts at strategic learning (Lampel, Mintzberg, 1999, Ghemawat, 2002). The Japanese focus on product development may be the activity that delivers this strategic learning. Porter may have simply missed the strategic importance of certain innovation-based activities such as product development in his assessment of Japanese companies (Porter et al., 2000).

Chandler noted that there is a cycle of innovation in strategy, spurts of innovation followed by imitation and consolidation (Ghemawat, 2004). He has tried to explain Mintzberg's position that strategy cannot be developed by such a deliberate and deductive approach as Porter theorizes. Chandler suggests that one really has to look at strategy as it moves through these phases. He theorizes that history tends to repeat, older strategy schools still influence newer ones under various guises, and consequently the evolution of strategic management and formation obeys differing principles because it is driven by ideas and practices that originate from qualitatively different sources.

Mintzberg then took Chandler's work further by postulating that there were four different sources of influence in strategy formation (Lampel, Mintzberg, 1999). First, Mintzberg suggested that new kinds of strategies emerge from collaborative contacts between organizations. Reality confirms that firms cannot avoid learning and borrowing from each other when they trade and work together. Second, the evolution of strategy is pushed along by competition and confrontation. Managers know that "necessity is the

mother of invention”, new ideas and practices arise when a manager tries to outwit or beat back powerful rivals. Third, new strategies are often a recasting of the old. Organizations have collective memory, old strategic ideas never disappear completely, they go underground and infiltrate new practices covertly, resulting in a blend of old and new. Finally, strategy is pushed along by the sheer creativity of managers because they explore new ways of doing things. Human beings are never satisfied.

Mintzberg classified Porter’s work as coming from the school of Positioning, an analytical process where there is a focus on generic positions, game theory, and value chains. Mintzberg called this school prescriptive because strategy can be relatively well defined, growth can be managed, with clear and consistent rules, making discussion and transmission of ideas easier but potentially leading to sterile thinking and application.

Conversely, Mintzberg classified Drucker’s work as coming from the Cultural school. He calls this school descriptive, being fuller and richer, with more room for experimentation and innovation, with natural growth but having the drawback of potentially being confusing as caused by multiple perspectives trying solve one problem.

Regardless of whose work he has examined, Mintzberg says management should ask better questions and generate fewer hypotheses. He believes that management should focus on real life concerns rather than rarefied concepts, arguing that better practice is needed, not theory (Ahlstrand, et al., 2005). While Mintzberg’s perspective is imminently practical in terms of focusing on practice, communication still needs to be facilitated between managers in an organized fashion so that managers can solve

problems. Frameworks and models, regardless of their perceived limitations, at least provide an organized basis for problem identification and resolution.

While Mintzberg has challenged Porter, other scholars have taken different positions. Ever since Porter's initial work in 1980, competition has occupied the centre of strategic thinking. Paul Auerback (Auerback, 1988) and George Day (Day, Reibstein, 1997) have taken positions that are similar to Porter. Even Peter Drucker (Drucker, 1985) observed that companies are tending to race against each other by looking at what competitors do. Gary Hamel and C.K. Prahalad (Hamel, Prahalad, 1994) along with James Moore (Beckham, 1997) observed that competition was intensifying and commoditization of business was accelerating because of managers' failures to carve out unique positions. They postulated that market creation was essential if firms were to grow.

Kim and Mauborgne (Kim, Mauborgne, 1997) argue that a focus on benchmarking and beating the competition leads to imitative, not innovative, approaches to the market. They theorized that this often results in price pressure and further commoditization. Their argument was that companies should strive to make the competition irrelevant by offering the buyers a leap in value. This invariably meant carving out new market space, something which Porter's tools could be used to create. The challenge for Ontario public hospitals, since they do not compete in a commercial environment, might be to become both imitative and innovative at the same time.

Gary Hamel (Hamel, 1998) supported this argument by stating that success for both newcomers and industry incumbents hinged upon their capacity to avoid the competition and to re-invent the existing industry model. Again, this approach is fundamentally similar to Porter in that Porter argues that firms must create unique

positions to have a sustainable strategy. Furthermore, Hamel argued (Hamel, 1999) that the formula for success is not to position against the competition but rather to go around it. Again, this is a validation of Porter's fundamental work.

Kim and Mauborgne (Kim, Mauborgne, 2006) refined this perspective by considering that the concept of value creation as a goal of strategy was very broad. They observed that companies can create value by reducing cost 2% but asked if that was enough for that company to stand out in the market place. Their research said no, an incremental approach did not create enough value for the company to stand out. They believed that value innovation was about redefining the core problem that an industry is focused upon rather than finding solutions to existing typical problems.

They extended this concept by articulating two distinct views on how industry structure is related to the strategic actions of industry players. The two views were structuralist and reconstructuralist.

Kim and Mauborgne saw Joe Bain (Bain, 1956) as the forerunner of the structuralist view. They say this view was rooted in the field of industrial economics, with the structure-conduct-performance paradigm driving actions. This suggested that there was a causal flow from market structure to conduct and performance. Porter, with his Five Forces Framework, extended this structuralist view by stating that market structure, with its attendant supply and demand conditions, would shape buyer and seller conduct, ultimately determining performance. Fundamental changes in basic economic conditions and technological breakthroughs could cause system-wide changes in the industry. However, regardless of conditions, the industry was focused on competition based strategic thinking. This is fundamentally defensive based thinking.

Kim and Mauborgne proposed an alternative view, that of the reconstructuralist. This is built upon the theory of endogenous growth from Joseph A. Schumpeter (McCraw, 2007). His work suggested that forces that change economic structure and industry landscapes can come from within the system. He argued that innovation can happen endogenously and that its main source is the creative entrepreneur, which cannot be reproduced systematically. This approach is somewhat similar to Mintzberg's ultimate summary on strategy.

Recently, the new growth theory has demonstrated that innovation can be made replicable endogenously by understanding the patterns or recipes behind innovation (Kim, Mauborgne, 2006). This theory essentially separated the recipe for innovation from Schumpeter's lone entrepreneur, clearing the way for systematic reproduction of innovation. However, academia has not come to any consensus as to what these patterns or recipes are, especially for public hospitals.

In spite of this barrier, the reconstructuralist view builds on the new growth theory by suggesting how knowledge and ideas are deployed in the process of creation to enable endogenous growth for the firm. Specifically, the reconstructuralist view can occur in any company at any time when the existing market elements and data are reconstructed in a fundamentally new way. This means that things like market structure and boundaries are artificial boundaries that constrain strategy.

Therefore, a reconstructuralist view would be demand oriented. Extra demand is out in the market. The issue is how to create it or through value innovation how to develop a means to capture it. Competition becomes irrelevant because the firm is creating a new

space. By stimulating the demand side of the economy, the strategy of value innovation expands existing markets and creates new ones.

The basic building blocks are buyer value elements that reside across existing industry boundaries, not technologies or methods of production. Porter's fundamental work is focused upon creating a unique value proposition that leads to competitive advantage. He proposes a structured method to reach that point. Kim and Mauborgne propose the same unique value proposition which leads to the same competitive advantage. The key difference is that Kim and Mauborgne are suggesting expanding Porter's work across industries rather than constraining management to focusing on just their current industry in order to develop strategies which will maximize profits while minimizing competition. While this approach is extremely useful in this age of disruptive change, the manager needs to be especially aware of the consequences of entering the space or awakening a formidable competitor in an industry where the firm has not competed before.

These new academic perspectives have not invalidated Porter's work; they have merely polished and refined it. Because Porter's basic premise is economics, his theories have longevity. Like Drucker, he understands and focuses on industry evolution. However, to enjoy the effectiveness of his theories management has to constantly re-cycle their analysis. Disruptive technologies, globalization, and ineffective legal barriers mean that the sustainability of strategic plans can be somewhat temporary. Increased industry fragmentation, leap-frogging technologies, product life cycles that miss the maturity stage and go from growth to decline, and the diffusion of technology through the Internet are all problems that do not invalidate his work. They just force management to

not be complacent by driving continuous assessment of their strategic position. Unfortunately there is little research regarding how not-for-profit hospitals are dealing with this disruptive environment.

Summary of Strategy Literature Review

Pioneers like Drucker and Porter have provided a practical foundation for the professional study of management. Without the existence of such grounded theory, academics would continue to postulate on various theories, many of which have no practical application (Ahlstrand et al., 2005). Instead, there is a base of both humanist and economist frameworks and theories from which both the academic and practitioner can draw upon to build their own knowledge and frameworks. As this paper has demonstrated it is astonishing how similar these two different perspectives actually are, giving credibility to the validity of their work.

Current noted academics such as Brandenburger, Prahalad, Hamel, Mintzberg, Weick, Senge, and Peters all use the work of these two men to base their own theories upon. Many business academics and practitioners believe that the true source of business knowledge comes from military science. However, business is fundamentally different from war because victory is negotiated through the customer, companies do not fight each other directly, only through the customer. The brilliance of Drucker and Porter is that they have recognized this fundamental difference and constructed practical frameworks, while not perfect, further the knowledge of academics and practitioners by ensuring that the customer is considered in all elements of business strategy.

Academic work (Mintzberg, 1994) has recognized that the “hard data” which academics seek to develop strategy may seriously distort the entire process. Mintzberg argues that hard information is often lacking in scope and richness, may be too aggregated to be useful, may be available too late in the strategy formation process to be of practical use, and is often unreliable. This seems to validate the work of Drucker and Porter which does not rely exclusively upon “hard data”. Yet this was one of the key criticisms that academics had of their work at the time of publication. Their foresight in recognizing the limitations of “hard data” and the value of “soft data” is an important lesson for management, one which will increase in importance due to the increasing impact of globalization and emergence of disruptive technologies.

This perspective is further supported by even more recent work (Ahlstrand et al., 2005) which quotes Walter Kiechel at *Fortune* magazine as saying only 10% of strategies were ever successfully implemented. Tom Peters (Ahlstrand et al., 2005) was quoted as saying that even this number was “wildly exaggerated”. The authors argue that the real problem is separating the formation of strategy from its implementation. “Hard data” and organizations do not stand motionless, they live in a dynamic environment so true strategy is a work-in-progress. Executives cannot just hand over a plan for people for implementation, this plan must be managed, tuned, and optimized constantly with the involvement of real customers, real suppliers, and evolving technologies. Again, this approach of constant re-cycling and re-validation of data is a key element of the approaches that both Drucker and Porter have advocated in all of their work.

The same authors use a model developed by Jeanne Liedtka (Ahlstrand et al., 2005) which compares optimal strategy to the “Little Black Dress” (LBD). She argues that the

key point of the LBD is that it lacks nothing essential and contains nothing extraneous. The design itself is parsimonious in that elegant design is not about stopping when nothing else can be added but when nothing else can be taken away. This is very similar to the work of Drucker and Porter which hypothesizes that optimal strategy can only be achieved by figuring out what not to do.

Liedtka argues that strategy should be designed using the LBD model, in a simple but elegant way, disregarding the faddish and focusing on the basic elements of an enduring nature, incorporating versatility which will allow the “wearers” to add ornaments, etc. for whatever occasion. This fits with both Drucker and Porter in terms of their work on the reality of optimizing strategy to an ever changing environment. Additionally Liedtka hypothesizes that the strategy should make the organization feel good about itself when executing, ideally in a way which emphasizes positives while acknowledging the organization’s flaws. She believes that this will result is a team that is confident, open to new adventures, and therefore ready to find something special right around the corner. This argument fits with both Drucker’s and Porter’s work on implementation and innovation. It also might fit for not-for-profit hospitals but has not been validated.

Validation that “doing the right things” is most critical to success has been supported by recent work (Ahlstrand et al., 2005) where Byrne argues that operational efficiency is no longer a method where firms can achieve advantage because companies have wrung as much as they can through operational efficiency improvements. This is a validation of Porter’s Productivity Curve (Porter, 1996).

Byrne argues that firms need to rise above the day-to-day optimization of business to develop competitive advantage, focusing on competitive positioning and the creation of

future markets, not the operating and financial details that they used to be consumed with in the past. Byrne has defined strategy as Drucker and Porter have with this statement. Byrne further argues that companies need to democratize the strategic planning process, getting multi-disciplinary teams to develop strategy, including line managers who have to deal with day-to-day realities, including their customers and suppliers. He argues that openness is needed, not just a small group of high level executives working in seclusion, in order to develop sustainable strategies. Again, this approach is a re-statement and refinement of Drucker's and Porter's basic work on strategy development and implementation.

The major weakness of the strategy literature is that it is incomplete in the application of these for-profit frameworks and models to the not-for-profit environment (Porter, Teisberg, 2006). Large numbers of case studies have been developed and published but academics have not significantly tested or refined this research in the not-for-profit arena, particularly on public policy as it pertains to hospitals and their Emergency Departments (Walshe, Shortell, 2004).

Turnaround Literature Review

Introduction

A business lifecycle is a roller coaster that all organizations ride through the course of their existence (Burbank, 2005). While each organization's lifecycle may differ incrementally in terms of its level of success and/or distress, few organizations are exempt from experiencing severe distress at some point in their existence (Bibeault, 1982).

Global competition, technological innovations, high costs of capital, changing culture, and other environmental factors are exerting significant forces on the length and amplitude of a business's lifecycle (Hambrick, Schechter, 1983).

When financial or operating distress is experienced management and ownership is faced with three strategic alternatives:

Closure, either through bankruptcy or wind down;

Acquisition or merger with a competitor;

Turnaround; a turnaround being defined as a reversal of historically low financial performance or a significant change in policy or practice that brings an organization back from near financial collapse (Hofer, 1980). Turnarounds have also been defined as a specific type of strategic adaptation (Ginn, 1990).

Research has demonstrated that the agency theory of management prefers turnaround to the other alternatives (D'Aveni, 1989). Research and literature on public hospital re-engineering, sustainability, and stakeholder management is limited (Walshe, Shortell, 2004).

Turnaround Pioneer Theory

Turnarounds have been studied in industrial organizations intensively since the late 1970's, with the pioneers being Schendel, Patten, and Riggs (1975), Hofer (1980), and Bibeault (1982).

Schendel et al. (1975) studied 54 firms that had suffered 4 consecutive years of earnings decline and then 4 years of earnings improvement. The authors then subjectively rated

the causes of the declines using information gathered from business periodicals. Using this same database they also subjectively rated the actions accountable for the improvements and classified them as either “strategic” or “operational” in nature. In spite of their “soft” data the authors generally found support for their theory; that declines caused by operating problems (i.e., production bottlenecks or labour problems) tend to be followed by operating cures (i.e., plant modernization or training and development of employees) while declines caused by strategic factors (i.e., obsolete products or intense price competition) tend to be followed by strategic cures (i.e., new products or redefining the business). Operating problems may be classified as internal factors where strategic problems may be classified as external factors.

The difficulty in clearly diagnosing an operating or strategic cause was blurred by research conducted at the same time by organizational theorists, who, using case study analysis, modeled firm decline as a pathology in organizational decision making and adaptation processes (Hedberg et al., 1976; Starbuck, Hedberg, 1977; Starbuck et al., 1978, Grinyer, Spender, 1979).

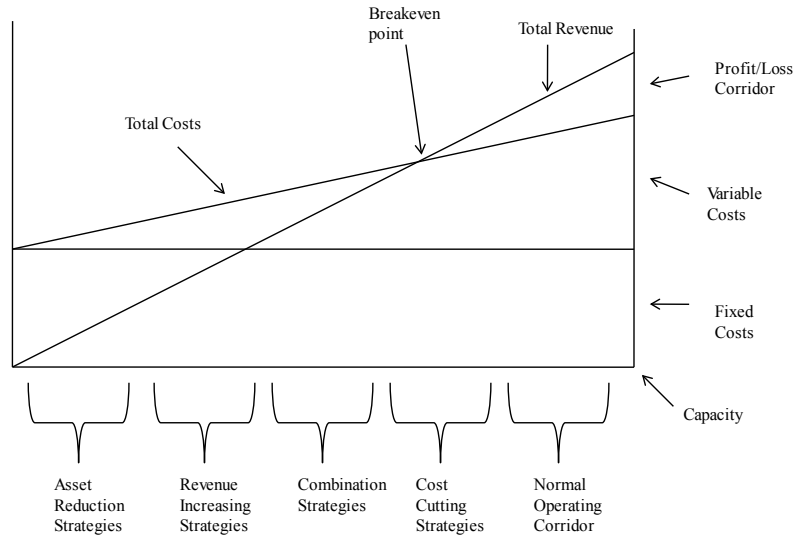
These researchers proposed that organizational crises that were firm threatening were an inevitable consequence of organizational stagnation over time. They postulated that managers failed to maintain the alignment of the firm’s strategy, structure, and ideology with the demands of an evolving and changing environment. Therefore, a successful turnaround from a stagnation caused crisis would generally involve an organizational metamorphosis that would drastically alter the firm’s strategy, structure, and ideology to better fit with an evolving environment.

This recognition of a relationship between cause and response was a primary contribution to practitioners because Schendel et al. stressed the importance of properly assessing the cause of the turnaround situation so that it could be the focus of the recovery response.

Schendel et al. (1975) is unique among the pioneers of turnaround research in that they have been the only researchers to be precise about what constitutes poor performance (warranting a turnaround) or good performance (a successful turnaround). Neither Hofer nor Bibault specified criteria for "decline" or "success". Schendel et al.'s definition of a downturn (four consecutive years of declining profits) and of an upturn (four consecutive years of increasing profits) was the only specific measure proposed by the pioneers, in spite of its weakness of lacking an absolute anchor.

Hofer (1980) also classified turnarounds as "strategic" or "operating". Hofer analyzed written cases on 12 poorly performing firms, finding support for his theory that the appropriateness of choosing a strategic or operating turnaround depends on whether the firm's "illness" stems from poor strategy or poor operations. He developed a framework for choosing among different operating turnarounds based upon the firm's current proximity to breakeven performance. He found that firms operating close to breakeven tended to turn around successfully if they pursued a cost-cutting strategy while firms operating well below breakeven required more aggressive revenue increasing or asset reduction strategies (Figure 1).

Figure 1
Deciding on the Type of Operating Turnaround Strategy to Follow



Source: Hofer, 1980, Turnaround Strategies, Journal of Business Strategy, 1 (1)

Bibeault (1982) focused on practitioners, conducting a survey of 81 CEOs who had encountered turnaround situations. His analysis focused on why failures occur, as well as the characteristics of successful and unsuccessful turnarounds. Bibeault emphasized the organizational and human issues that have to be resolved and managed in a turnaround situation.

His major contribution to practitioners was the development of a five stage model that most turnarounds follow (Bibeault, 1982):

Management change stage, most practitioners and Hofer (Hofer, 1980) agree that a change in top management is almost always required;

Evaluation stage, this is usually a matter of several weeks, conducted by the new management and/or consultants;

Emergency stage, this is the “stop the bleeding” stage or aggressive actions taken to reverse the downward slide of the business;

Stabilization stage, the emphasis here is usually on rebuilding the organization after executing the emergency stage;

Return to Normal Growth stage, with the emphasis on new products or other entrepreneurial activity.

Bibeault’s five stage model has formed the basis of all subsequent research into the execution of a turnaround. This model can be summarized into two macro phases, retrenchment to survive and achieve a positive cash flow, followed by an entrepreneurial phase of growth (Figure 2). Bibeault argued that this retrenchment phase was separate from the entrepreneurial phase, the role of the retrenchment phase being to provide a stable base from which to launch the recovery phase (Bibeault, 1982).

Figure 2
Stages in the Turnaround Process

Turnaround Response: The Turnaround Response refers to actions taken by a firm in response to the occurrence of a turnaround situation. The overall response is considered to consist of two overlapping stages; the Retrenchment Stage and the Recovery Stage

Retrenchment Stage: The initial response to turnaround situations for many firms consists of reductions in costs and assets. The primary objective for these reductions is to stabilize the performance decline. The Retrenchment response, if persistent, is observable as changes in income and balance sheet accounts.

Objectives:

Survival
Positive Cash Flow

Strategies:

Liquidation
Divestment
Improve Operational Efficiency
Product Elimination
Head Count Cuts

Recovery Stage: As a firm Achieves stability it begins to emphasize a set of activities that represent the implementation of the firm’s long term strategy. The intensity of the recovery response relates to the degree of strategy change present in the overall recovery response.

Objectives:

Long Term Profitability
Growth in Market (often objectives designed to earn an acceptable ROI and achieve product improvement)

Strategies:

Market Penetration
Re-concentration/Segmentation
New Markets
Acquisitions
New Products (often with operating strategies designed to continue cost control and maximize asset utilization)

Source: Bibeault, 1982, *Corporate Turnaround: How Managers Turn Losers Into Winners!* Maryland: Beard Books

The validity of executing a retrenchment stage first has been questioned by every researcher since Bibeault proposed his model. Practitioners are aware that economic decline reduces the firm's resource slack (Hummel, 2005). Cost retrenchment helps to preserve the resources that remain. The time generated through retrenchment allows the practitioner to innovate by creating resource flexibility which provides needed slack and opportunity to re-deploy assets in an entrepreneurial fashion. Without this resource slack a firm may financially achieve breakeven but find itself unable to move to the entrepreneurial stage due to lack of resources.

Schendel et al. and Hofer stressed the distinction between strategic and operating turnarounds. This distinction is the difference is between "doing different things" (strategic) and "doing things differently" (operating). At first glance, this distinction fits well with Porter's activity-based approach on strategy (Porter, 1996).

However, Schendel et al. and Hofer would define improved cost controls or the purchase of new automation as operating moves but these could be the major actions taken by a firm to achieve a "cost leadership" (Porter, 1996) or "defender" strategy (Miles, Snow, 1978). Therefore, one must take care to understand are the operating actions taken are part of a larger strategic turnaround or are they just standalone operating actions to achieve improved performance.

Alternatively, many strategic actions advocated by Schendel et al. and Hofer have limited, if any, applicability in public hospitals. Divestiture, diversification, and vertical integration are difficult, if not impossible actions to achieve for a public not-for-profit hospital.

The strategic turnaround, as defined by Hofer, may be unrealistic for most for-profit mature businesses. It could be argued that a public not-for-profit hospital is also a mature business. Hofer offers three strategic options, product/market refocusing, “one-level” and “two-level” increases in market share. The market share options have been proven to be at odds with findings by other researchers (Hambrick et al., 1982) whom analyzed large samples of mature businesses in the PIMS database. They found that 90% of all year-to-year market share changes were less than five share points.

This research is validated by Henderson (1979) and Porter (1996) whom have noted that market shares in mature businesses were relatively fixed. This might account for Hofer’s own finding that 10 of the 12 firms he studied pursued operating versus strategic turnarounds. Bibeault’s finding that only 4% of the firms he studied were revived by strategic “new product breakthroughs” appears to substantiate this conclusion for mature businesses.

Mature firms are generally in mature industries where the productivity curve is both known and disseminated throughout the industry (Porter, 1996). A “turnaround”, can be achieved by reaching the productivity curve but temporary competitive advantage can only be achieved through innovation beyond the productivity curve (Porter, 1996). Sustainable competitive advantage, or a strategic turnaround, for mature firms could be achieved by producing products that the customer perceives have greater value (product/market re-focusing) and efficiently producing those products at low total delivered cost (Porter, 1996).

Hofer was able to further classify turnarounds in terms of the focus of activities. His views on this classification fit with both Schendel et al. and Bibeault in that they are a

series of co-ordinated actions or patterns, rather than moves executed in isolation. In this sense they are “strategies” (Hambrick, Schechter, 1983).

Hofer classified strategic turnarounds as “revenue generating” or “product/market refocusing”. A revenue generating strategy is an attempt to increase sales by some combination of product (re-)introductions, increased advertising, increased selling effort, and lower prices. A product/market refocusing strategy involves a shifting into defensible or lucrative niches. These strategies could be considered entrepreneurial in nature (Hambrick, Schechter, 1983).

Hofer’s operational turnarounds revolved around two strategies of an efficiency nature, “cost cutting” and “asset reduction”. A cost cutting strategy typically involves reductions in administration, research & development, marketing, and other “discretionary” expenses. The asset reduction approach revolved around the disposal of primarily fixed assets and the costs associated with operating those fixed assets. Hofer noted that combinations of these strategies may be needed in any given turnaround due to unique nature of each distress situation.

Bibeault implied that that cost cutting and/or asset reduction are done before any entrepreneurial activity is taken (Bibeault, 1982). Hofer did not directly agree with Bibeault but Hofer did state that, in general, efficiency-oriented moves tend to produce the quickest, most dramatic results (Hofer, 1980). Therefore, one could expect that in the short run the most prevalent and effective turnaround moves are of an efficiency nature.

Hofer’s main argument in what turnaround strategy to select depended upon the firm’s proximity to breakeven. If a business was far below breakeven then an asset reduction

strategy would be warranted. His argument was that such a firm needs to recognize that it should be far smaller than it currently is. If a business was only moderately below breakeven then a revenue generating strategy should be pursued. The option of asset reduction may not exist for Ontario not-for-profit public hospitals (Closson, 2007).

In this situation, Hofer argued that the firm likely does not have enough idle capacity to allow for a major asset disposal, nor is it close enough to breakeven to simply prosper by cutting costs. The turnaround focus must be a concerted push to increase volume.

If a business is very close to breakeven then a cost cutting strategy would be appropriate. He argues that this strategy will often be sufficient to push the firm to acceptable profit levels without exposing it to undue risks.

Strategic Market Position

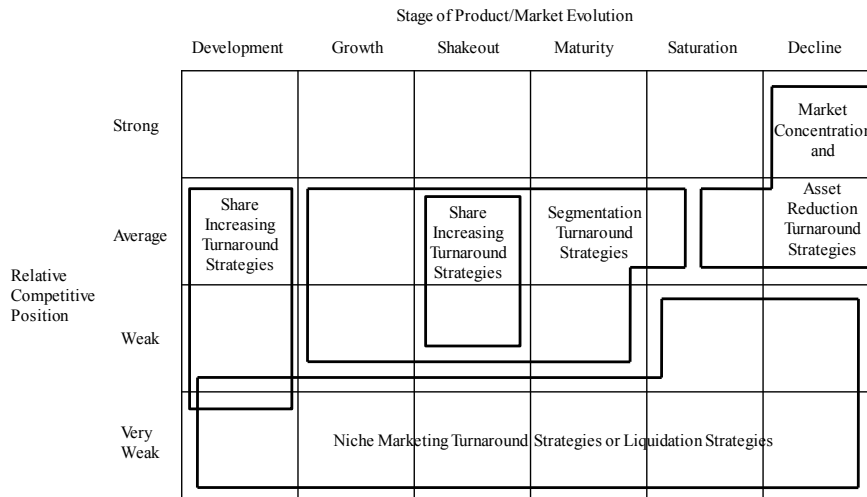
Hambrick and Schechter (1983) were able to refine Hofer's model further by postulating that market share was another force that often determined the turnaround strategy chosen. They argued that businesses with high market share tended to avoid the strategies of asset reduction and cost cutting because of the negative impact on their people. Rather, high market share firms tended to rely on their ability to exert their relative market power (Porter, 1980) by following the more offensive strategies of revenue generation and product/market focusing.

They argued that the premise of using brand recognition, strong channels of distribution, a belief that they already had low costs, and their economies of scale in

marketing could allow high market share firms to achieve profitability at less human and organizational cost than low market share firms.

Hambrick and Schechter (1983) were also influenced by Hofer’s (1980) Strategic Market Position model (Figure 3). Hofer postulated that the firm’s current strategic market position may influence the type of turnaround chosen. Hambrick and Schechter’s (1983) analysis reinforced that proposition.

Figure 3
Assessing Current Strategic Market Position



Source: Hambrick, Schechter, 1983, Turnaround Strategies for Mature Industrial Product Business Units, Academy of Management Journal, Vol. 26 (2)

Hambrick and Schechter’s work was able to validate Hofer’s theory that capacity utilization was a major factor in choosing the appropriate turnaround strategy. The interesting outcome of Hambrick & Schechter’s work was that high market share firms tended to have a “piecemeal” strategy or a focus on executing operational turnaround strategies, perhaps in the belief that they were strategically sound (Hambrick, Schechter,

1983). This needs to be investigated in the context of Ontario not-for-profit public hospitals as they dominate the market.

Another salient outcome was that the regression analysis proved, regardless of the asset utilization or market share, the major avenue towards improved profits was efficiency related measures. Hambrick and Schecter were able to prove that market share increase resulted in increased profits but they were not able to prove how those market share increases were achieved. This cast doubt on the current assumption at that time that the funding of market share increase would result in the reduction of profits.

For the mature industry sample studied, Hambrick and Schecter (1983) were able to validate both Hofer (1980) and Bibeault (1982) in that successful firms first retrench or focus on efficiency or operating recovery strategies, disproving their own hypothesis that high market share firms will avoid the “nastiness” of cost cutting and asset reduction.

An important conclusion that Hambrick and Schecter were able to demonstrate was that firms who did not follow this basic Hofer model of efficiency above all tended to have “unsuccessful” turnarounds, indicating that there is some “real world” relationship to success, capacity, and breakeven proximity (Hambrick, Schecter, 1983).

The weakness of all of their research was that they had no data on the causes of the performance degradation of the firms. This meant that they were unable to test the theory postulated by Schendel et al. (1975) that turnaround attempts must address the source of the problem.

Additionally, the long time series of the data prevented any examination of the immediate effects of any short term actions. Do certain types of “quick fixes” result in

failure or are certain “quick fixes” a sign of resilient and strong management? Unfortunately no conclusions were possible.

The reliance on Return on Investment (ROI) as the performance measure means measurement resolution is somewhat suspect. ROI is a limited, one-dimensional, and suspect of manipulation, even though it is a common industrial measure of effectiveness. A multidimensional view of performance would have been more desirable but not possible with the data base analyzed.

Another weakness was that the human element or organizational or managerial characteristics were not studied. This, like ROI, was a shortcoming of the PIMS database. Bibeault placed major emphasis on the human components of leadership, style, teamwork, and other "soft" factors in turnarounds in terms of executing a successful turnaround. Both Kotter (1995) and Kanter (2003) have validated Bibeault's perspective of the importance of the human element in the execution phase through case studies of leadership in several large international corporations.

Finally, from a for-profit perspective, the sample studied was fairly narrow in that only mature industries were studied. However, from the perspective of analyzing hospitals, their work is likely to have some validity because public not-for-profit hospitals in Ontario, Canada are mature.

Both Hofer and Bibeault studied the amount of time required for a turnaround. In Hofer's successful turnarounds, the average elapsed time from peak to trough was three years with the range being from one to four years (Hofer, 1980). Bibeault's successful turnarounds noted that the average time from trough to peak was four years, no range data was given (Bibeault, 1982). Bibeault made an observation that the time required for

a turnaround was a function of the organization (Bibeault, 1982). Bibeault studied entire corporations so one can assume that the time for business unit to turnaround would be less than that for the entire corporation. Both were in agreement that the degree and duration of the retrenchment stage should be based upon the firm's financial health.

Turnaround Macro Research

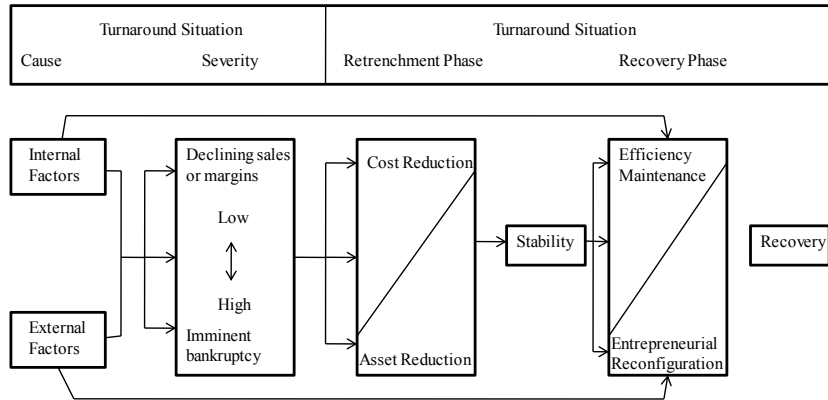
Grinyer, Mayes, and McKiernan (1988, 1990) and Grinyer and McKiernan (1990) were the first researchers that attempted to further the work of these pioneers by taking a comprehensive look at the entire turnaround environment and process. They studied the causes of decline, events triggering change, actions taken, and performance characteristics of 25 U.K. companies that achieved significantly improved performance. Their work validated the notion of stages in the turnaround process but they did not objectively measure turnaround situation severity or retrenchment strategies.

The work of Pearce and Robbins (1992) was focused on 32 publicly held textile manufacturing firms in the economic chaos of the 1980's. They validated Bibeault (1982) and Hofer (1980) in that retrenchment was a critical first stage for the companies that achieved successful turnarounds. They further validated the work of these pioneers in that the severity of the turnaround situation was the best indicator of the type and extent of retrenchment needed. Like Hambrick and Schechter (1983), they were able to prove that an immediate cost cutting response to financial decline, both absolute and relative to the industry, were consistently found to be of value.

Pearce and Robbins (1993) were able to develop a model of the turnaround process which depicts the inter-relationships between causes and severity of the turnaround

situation, and between the retrenchment and recovery stages of the turnaround response. This model shows three principal ways by which the turnaround situation and turnaround response are likely to be linked (see Figure 4).

Figure 4
A Turnaround Process Model



Source: Pearce, Robbins, 1993, Towards Improved Theory and Research on Business Turnaround, Journal of Management, 19 (3)

This model is based upon analysis of firms successfully turning around and is compilation of the work of the pioneers, depicted pictorially, showing the various stages and factors associated with managing a turnaround. It demonstrates several characteristics proven by the pioneers' research, validated by Pearce and Robbins (1993) such as:

External factors tend to cause more severe downturns in performance (Bibeault, 1982);

Regardless of the situation, cost reduction is an effective strategy, (Hofer 1980; Bibeault 1982; Hambrick, Schechter, 1983);

Severe situations require asset reduction, (Hofer 1980; Bibeault 1982);

Turnarounds caused by internal factors can be dealt with effectively through pursuit of operating efficiency strategies, (Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983);

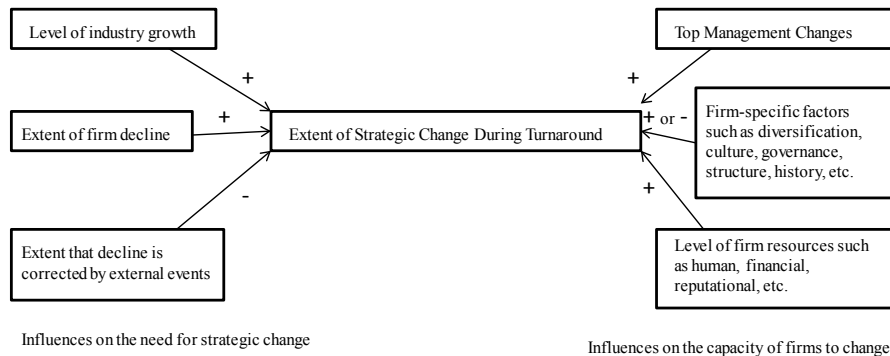
A stability stage must be reached before proceeding to grow or recover the business, (Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983);

Externally driven turnarounds require both efficiency and entrepreneurial reconfiguration, (Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983);

Internally driven turnarounds should not ignore entrepreneurial opportunities, (Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983).

Barker and DuHaime (1997) were able to further validate the theories of the pioneers of turnarounds through their research into the level of strategic versus operational change executed by firms in a crisis situation. They studied 120 manufacturing firms that successfully turned around from 1974 to 1988, using success criteria similar to Schendel et al. (1975). They proposed that the level of strategic change in a successful turnaround will vary with the model they developed (Figure 5).

Figure 5
Level of Strategic Change Required in a Turnaround



Source: Barker, DuHaime, 1997, Strategic Change in the Turnaround Process: Theory and Empirical Evidence, Strategic Management Journal, Vol. 18

Their theory is very similar to Hofer (1980), Bibault (1982), and Hambrick and Schechter (1983) in that they determined that several factors independently determine the level of need and extent for strategic change in a declining firm. Because the sample was relatively large and over a long period of time Barker and DuHaime (1997) were able to substantiate that there were specific influences on a firm's capacity to change successfully. Through analysis of their sample they were able to prove that that:

When a declining firm's performance downturn is severe more strategic versus operational change is required for a successful turnaround;

Top management changes and the firm's resource levels affect the capacity to implement strategic change;

Firm specific attributes such as history, governance structure, culture, size, and diversity may impact the capacity to change negatively or positively;

Operational or cost cutting actions play a major role in freeing resources to execute strategic change;

External events that help to address the decline may assist the turnaround in the short run but core performance issues still exist and re-surface after the favourable events have passed;

A growing industry assists firms because it provides for more financial resources to execute a successful turnaround.

These conclusions are almost identical to those developed by Hofer (1980), Bibault (1982), and Hambrick, Schechter (1983) almost two decades previously. Pearce and Robbins (1992) substantiated Barker and DuHaime (1997) regarding unsuccessful firms relying upon external events to address their performance deficiencies. In these unsuccessful firms management did not lead the organization through a retrenchment phase, making the difficult cost reductions and cultural/organizational changes to enhance the probability of success.

Turnaround Organizational Behavioural Research

Organizational behaviour specialists such as Kotter (1995) have attacked this lack of a definitive turnaround model from a change management perspective. Their research is valuable in terms of how to execute change successfully in terms of people management but is weak in terms of what to change technically. Kotter (1995) studied 100 companies attempting to significantly transform their business results. It is important to note that few of the companies that he studied would qualify as being in a “turnaround”

situation. However, the change process that he developed, while not telling management what to do, has been proven helpful in almost any organizational environment in assisting management in figuring out how to do it.

The process that Kotter (1995) developed, validated by later scholars such as Kanter (2003), can be summarized as follows:

Establish a sense of urgency;

Form a powerful guiding coalition;

Create a vision;

Communicate the vision;

Empowering others to act on the vision;

Plan for and create short-term wins;

Consolidate improvements and produce more change;

Institutionalize the new approaches.

In a turnaround situation one would expect that it is relatively easy to establish a sense of urgency, especially if the firm is far from breakeven and the employees are well aware of that position. However, Kotter (1995) indicated that well over 50% of the companies that he studied failed this first phase and consequently were not successful in transforming their organization to better results. This fact and action may important for successful turnaround leaders, particularly if different stakeholders in the turnaround process have significantly different levels of urgency.

In analyzing how this sense of urgency was initiated Kotter (1995) validated the turnaround pioneers (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982) in that his research uncovered successful transformation generally required new leadership. Another interesting fact that Kotter (1995) uncovered was that at least 75% of management had to be honestly convinced that “business as usual” was totally unacceptable in order to successfully manage organization performance improvement. Unfortunately, neither Kotter (1995) or other behavioural scientists have examined the impact of stakeholder sense urgency versus successful transformation.

While Kotter (1995) indicated that winning transformations began with a single leader, most often a new one, his research also uncovered that a strong and powerful leader cannot manage change alone successfully. He found that successful firms transform with a coalition which represents not just senior management but other influential stakeholders, such as a key supplier, critical customer, union leaders, etc. Kotter (1995) indicated that this is quite awkward because this guiding coalition often operated outside the normal hierarchy. This coalition approach has not been significantly researched for not-for-profit hospitals.

Kotter’s rationale for existence of this guiding coalition was that if the existing hierarchy were performing well then there would be no need for a major transformation, but since the current system is not working then the transformation requires activity outside of formal boundaries, expectations, and protocol. Kotter’s research revealed that if this guiding coalition was not powerful enough, the negative forces of change would stop progress. This conclusion is similar to that reached by Bibeault (1982) in his study of turnaround leadership.

The next step that Kotter (1995) and other organizational behaviourists (Kanter, 2003) advocate is the creation of a vision. This vision is a picture of the future that the guiding coalition creates, is easy to communicate, and has real appeal to all stakeholders. The purpose of this vision is to guide the actions and activities of the organization. Organizations fail at this step by creating a vision which is complex, hard to understand, and without appeal to stakeholders (Kotter, 1995).

Kotter states that this vision can often take 12 months to create. While the organizational benefit of creating a unifying vision which focuses stakeholders on the future is obvious, it is also apparent that turnaround firms, when they are in the retrenchment phase, may not have the time for this task as they have not yet earned the right to survive (Hofer, 1980).

Creation of this vision usually requires “slack” time from the organization, during the retrenchment phase “slack” is most often used in a short-term, versus long-term fashion to get the organization to a breakeven point. In fact, the pioneers (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982) all agree that the set of actions and activities required to achieve breakeven or stabilization may be replaced by a completely different set of actions and activities in the recovery or growth phase.

The recovery or growth phase is often much longer than the time that it takes to achieve breakeven. Hambrick, Schechter (1983) suggest that once the organization is close to breakeven it can spend increasing amounts of time spent to prepare for the development of the plan needed for the recovery phase, this is in line with Kotter’s conclusion (Kotter, 1995).

The fourth step that Kotter advocates through his research is communication of the vision by management consistently “walking the talk” in every action that they take. He found that management in firms who imbedded the vision in every action were invariably successful in aligning the organization behind the vision, enhancing the successful transformation of the business.

The objective of this step is to empower others to act upon the vision. Kotter (1995) states that this empowerment through communication is reinforced by eliminating obstacles to change, while encouraging risk-taking and development of non-traditional ideas. This fits well with the Pearce and Robbins (1993) turnaround model in that most turnarounds require "doing different things" (strategic) and "doing things differently" (operating), often at the same time (Bibeault, 1982). This organizational perspective fits well with Porter’s activity-based approach on strategy (Porter, 1996).

It is important to note that Kotter (1995) recognizes that no organization has the momentum, power, or time to get rid of all the obstacles. However, he is adamant that the large barriers must be dealt with and removed in order to empower others and maintain the credibility of the improvement effort. Porter (1996) understands this too in his research on management failing to make trade-offs to progress.

Kotter (1995) and all of the turnaround pioneers agree that turnarounds take time, often several years, depending upon the size of the organization (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983). Kotter’s conclusion of the consequence of this is that leadership needs to systematically plan for and create short-term wins. His rationale is that most people will not go on the “long march” unless they

see compelling evidence in the short-term that the journey is producing the expected results. Kanter's perspective is identical to this (Kanter, 2003).

Kotter (1995) notes that the pressure to produce short-term results can be very useful, it keeps the urgency level high, and forces detailed analytical thinking that can clarify or revise visions. He notes that these wins must be unambiguous and clearly understood and shared by all stakeholders.

Since turnarounds are often multi-year journeys, Kotter (1995) warns management that declaring victory too early is often a guarantee that the change effort will fail. His research showed that successful firms experienced the most success due to transformation efforts five years after the initiation of those efforts. All of the turnaround pioneers have a similar warning for management (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983).

A lesson for management is that Kotter (1995) found that the early declaration of victory was most often sponsored by the key change initiators, who wanted to be enthusiastic about progress, and key change resisters, who are quick to spot any opportunity to stop change.

Kotter's advice to avoid early victory declaration is to consolidate the improvements and use these to drive more change. The increased credibility of having some winning traction can be used to change those systems, structures, and policies that do not fit the vision that management was unable to change in the beginning of the effort. Management must further consolidate the vision by hiring, promoting, and developing employees who can implement the vision.

The final step Kotter (1995) advocates is to institutionalize the transformation by anchoring the changes in the organization's culture, it must become "the way we do things around here". Leadership must continually reinforce that the new approaches, behaviours, and attitudes have help to improve performance otherwise, if people are left to their own to make connections they can sometimes create inaccurate links. Kotter also states that management succession must be consistent with the behaviours developed in the transformation process and be a champion of those behaviours, otherwise new leadership could undermine the progress achieved. This is consistent with Bibeault (1982) and his interviews with CEOs.

Kotter's organizational behaviour work is the basis that others have used for organizational change (Kanter, 2003). While his work is different from the turnaround pioneers (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982; Hambrick, Schecter, 1983) in that that he does not tell management what to change, he and other organizational behaviour scientists (Kanter, 2003) are able to add value to the turnaround process by advising management on how to change.

Summary of Turnaround Literature Review

The research conducted by the pioneers, Schendel et al. (1975), Hofer (1980), and Bibeault (1982) several decades ago, while challenged constantly, has stood the test of validation. The basic concepts that appear to be consistent across this research include:

There are two macro phases in a turnaround, retrenchment and recovery, in every successful turnaround;

Retrenchment, particularly focusing on internal financial efficiency and operational excellence activities, is required in every successful turnaround, regardless of market position, industry forces, or proximity to breakeven;

Management change is usually required to lead a successful turnaround;

Distance from breakeven is proportional to the strategic change required;

The time that it takes to turnaround a company is proportional to its size.

Recent research from scholars such as Furman and McGahan (2002) and Kow (2004) consistently continue to validate these original concepts. However, research from the pioneers and those that have followed have not answered consistently answered several questions. These questions include:

A precise definition of a failing company and a successful turnaround;

A definitive examination of stakeholder analysis and how that may affect the success of a turnaround;

In an era of continuous disruptive technology, the relationship between a failing firm's learning ability and turnaround success;

Definitive proof that the causes of the turnaround were addressed by the turnaround;

A detailed model that will guide managers' actions through the turnaround process.

Definitions of what constitutes a failing company and successful turnaround have been proposed and argued since Schendel et al. (1975), with each new scholar putting their own twist on the definitions (Furman, McGahan, 2002). Most academics agree that a failing company is one that has exhibited negative financial performance for several accounting periods, be that quarters or years. Most academics agree that this negative

financial performance is usually accompanied by negative operating performance. However, there is not agreement that this accompanied by negative operating health characteristics such as employee turnover. Industry norms may drive unusual operating health characteristics and as such may not be a relevant determinant.

Alternatively, the definition of a successful turnaround is not precise either. Most academics agree that a successful turnaround is one where the firm exhibits positive financial performance for several accounting periods, whether that be quarters or years. Stakeholder perspective of a successful turnaround varies based upon the time frame expectation of the stakeholder. A long term investor may view a turnaround as successful if it sustains itself through an economic cycle, at least a decade in length. A short term investor or “hired gun” turnaround manager may view a turnaround as successful if the firm exhibits positive financial performance for a much shorter period, such as two years.

Given the wide variety of industries and environments, accompanied by different stakeholder groups, the concept of one definition of failing and success is unrealistic. The adage of “beauty is in the eye of the beholder” would certainly apply for this complex mix of expectations. The large and diverse number of stakeholders in a not-for-profit public hospital ensures that turnaround management will have to likely make difficult trade-off decisions. Management will also have to develop performance metrics that most stakeholders can understand and support in order to ideally declare victory at some point.

Stakeholders’ power, influence, and desires for firms have not been significantly studied. Their ability to enforce, enhance, or prevent change has only been studied in

relatively narrow environments. The increased transparency of management actions through legislation and the internet have increased the ability of all stakeholders, regardless of apparent power, to understand and influence the operations of any organization. While a firm undergoing turnaround does not have significant slack resources, it may have to devote a certain amount of these resources to communicating with its stakeholders to stave off negative actions.

Learning organizations have been studied extensively, however the question of turnaround success versus the ability of an organization to learn has not been answered. When an organization is in crisis does it really have the time to experiment, teach, and explore? Certainly if a learning organization is close to breakeven with results not degrading too quickly it may be entirely possible as there may be slack resources. However, a learning organization far from breakeven may have to radically change its behaviour in order to survive as there are likely not any resources available to learn. Perhaps, if the firm is competing in an industry where disruptive technologies are rampant, it has to be a learning organization in order to adapt and change in order to survive, regardless of its distance to breakeven.

Proving that the definitive causes of a turnaround have been addressed, or even drive the choice of turnaround response in each successful turnaround has been attempted by several academics. However, stakeholder perception of cause, lack of broad data, and limited time scale data have prevented academics from being able to prove, on a broad scale, that successful turnarounds always address the cause of the turnaround and/or that root cause will drive the response required. There are several case studies in the literature that are able to demonstrate root causes have been addressed in successful

turnarounds but the sample sizes are extremely small and industry specific, making generalizations inappropriate.

Organizational theorists would argue that if the organizational decision making has been improved then the causes have been addressed and the firm is no longer “stagnating” in terms of leadership so a strategic victory can be declared (Hedberg et al., 1976; Starbuck, Hedberg, 1977; Starbuck, Greve, Hedberg, 1978; Grinyer, Spender, 1979). However, these same theorists state that successful movement out of the stagnation phase is temporary at best as the organization must continually renew itself to avoid stagnating again in a changing environment (Kotter, 1995).

Just as there is no precise definition of a failing organization and a successful turnaround, there is no definitive turnaround model for management. Academics largely agree that there are two macro phases to every successful turnaround, retrenchment and recovery. However, given that each situation has a level of uniqueness associated with stakeholders, industry, environment, culture, and distance from breakeven, no academic has been able to develop a “one size fits all model” to guide management through each step. Even the pioneers (Bibeault, 1982) suggest that management may have to execute more than one tactical step at the same time in order to reach stability. Given the uniqueness of each situation it is unlikely that one definitive model can be developed to guide management, however, it may be possible to develop a model for a specific industry sector.

Therefore, the pioneering research on turnarounds occurred 25 to 30 years ago, with following researchers only filling in the gaps and not developing the theory substantially further (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982; Hambrick,

Schechter, 1983). There are significant gaps in the research as discussed, particularly in terms of a turnaround model that can guide managers, across industries and environments.

Organizational behaviour scientists (Kotter, 1995) have made valuable contributions through development of techniques to change positively and profitably but their studies have largely been focused on changing firms before they reach the “turnaround” stage (Kanter, 2003). Their work has largely been focused on qualitative case studies for turnaround environments versus more rigorous quantitative analysis that they have been able to accomplish across greater transformation environments. It may be that obtaining industry data to quantitatively analyze over time has been difficult to procure. However, the lessons from broad quantitative analysis appear to have general convergence with the research of the turnaround pioneers.

The major gaps in turnaround literature are exploration of the linkage between “what to do” and “how to do it” and the lack of turnaround research in not-for-profit entities. Turnaround strategists and organizational behaviour scientists have developed general models and frameworks to guide management. Unfortunately, these models are focused on for-profit organizations. Only recently has research been focused on the development of turnaround strategies for not-for-profit enterprises (Walshe, Shortell, 2004). Additionally, the turnaround strategists and organizational behaviour scientists have not consolidated their knowledge to build turnaround frameworks and models which converge their theories. Management must be knowledgeable with both perspectives in order to be able to lead a turnaround successfully.

Leadership of Not-For-Profit Organization Literature Review

Introduction

Research and literature on crisis and performance management skills as they pertain to public hospital management is limited (Flower 2006). Public hospitals have struggled with defining “good management” (Baker, 2001).

However, research into for-profit corporate and business unit management has been extensive essentially starting with the work of Dr. Peter Drucker. Drucker defined good management by doing the decent thing for workers and consumers, not just amassing profits for the bosses. He stated that “an organization is a human, a social, indeed moral phenomenon” (Drucker, 1946). He argued that the best managers are driven by the desire to create value for customers and the best way to do that is to treat workers not only as production costs but also as resources, capable of making a sustained and valued contribution. Note that even more recent academics such as Rosabeth Moss Kanter subscribe to this same philosophy (Micklethwait, Wooldridge, 1996). The Japanese came to an identical conclusion in their approach to Lean management (Jones, Roos, Womack, 1990).

The classical definition of leadership by scholars has been “the process of facilitating the solution of group problems, this process involves the control or co-ordination of the behaviour of members of the group” (Hemphill, 1949). The concept of moving toward organizational goals was added by Hersey and Blanchard (1972) as a dimension of their definition “a process of influencing the activities of an individual or group in efforts toward accomplishing goals in a given situation”.

The important conclusions with these definitions are that leadership is a process, that an individual does influence one or more people, and that the resulting actions of those individual(s) move the organization toward the accomplishment of a desired goal. Therefore the definition of leadership that will be used in this dissertation proposal is the process of influencing individual(s) actions toward the accomplishment of a desired goal (Hersey, Blanchard, 1972).

Leadership and Organizational Behaviour

Organizational scientists have shown that research of for-profit enterprises has demonstrated that a critical dimension in leadership is understanding the basic view of how and why workers deal with work (McGregor, 1960; Likert, 1967; Ouchi, 1981). McGregor (1960) proposed an important factor in how leaders viewed subordinates determined subordinate behaviour. He proposed that there were two opposite views of human nature and that a person's perspective fell in the range of those views. These views were Theory X and Theory Y.

Theory X was based upon the belief that the average employee was lazy and would avoid work when possible, evading responsibility. Therefore, leaders had to structure, control and closely supervise these people, using a management system of reward and punishment (McGregor, 1960). Management had no consideration for the individual goals of employees.

Theory Y was based upon the belief that the employee sought responsibility and preferred to be self-directed and self-controlled. McGregor stated that once the employee was committed to objectives, they would exhibit a high degree of innovation

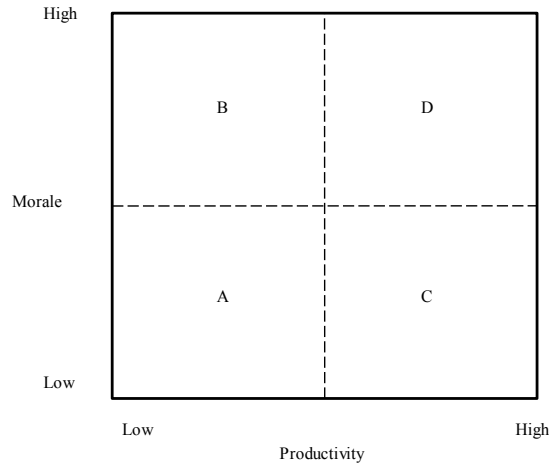
in moving the organization towards its goals. McGregor supported the notion of Theory Y, believing that industry had not tapped the wealth of human potential, not understanding that an organization “pays for the hands and gets the head for free” (Hummel, 2005). The management system used in Theory Y is not mechanistic but humanistic, focused on providing people with the opportunity to develop their potential.

Likert (1967) broke McGregor’s continuum of into 4 specific stages or systems. System 1 was defined as the authoritarian position on a range of authoritarian to democratic. System 1 was characterized by the use of fear, punishments, threats, and rewards as motivating and controlling factors. Communication was in one direction only, downwards through the hierarchy and trust did not exist anywhere. In System 1 all decisions are made by the top leadership. This System is very similar to Theory X.

System 4 was similar to Theory Y. Here leadership is participative and all members of the organization support each other. Trust is very high with communication between all levels in the hierarchy. Decisions are mostly participative resulting in a focus or convergence on mutually established goals.

System 2 and 3 were transitional points between System 1 and 4, moving towards more participation with less authoritarian behaviour from leadership. As McGregor (1960), Likert advocated the use of System 4 management, stating that performance and satisfaction are both high in groups that have supportive relationships, group decision making, and high performance goals. Likert (1967) was able to model this theorem where use of System 4 resulted in high morale and high performance (Figure 6).

Figure 6
Likert's Paradigm

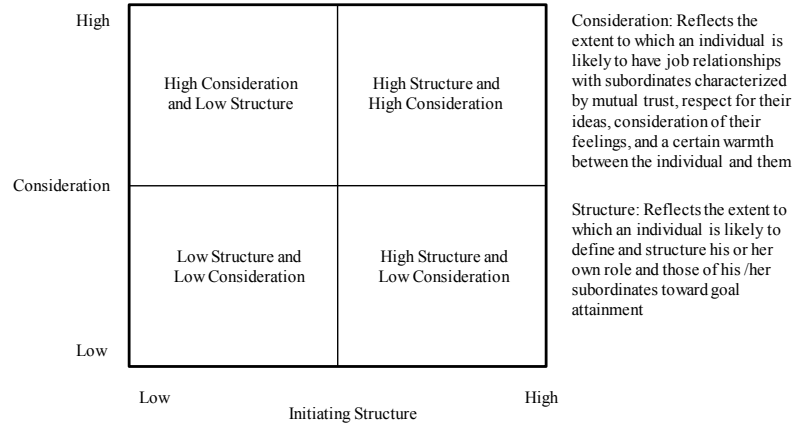


Source: Likert, 1967, *The Human Organization: Its Management and Values*, New York: McGraw-Hill, pp. 33

McGregor's and Likert's approach was substantiated by Fleishman's (1969) research that resulted in his model which described the leadership style necessary to drive leadership behaviour to achieve optimal performance (Figure 7).

This practical research was further validated by Ouchi (1981) who developed Theory Z. Ouchi proposed that people in an organization possess the characteristics of Theory X and Theory Y simultaneously. Therefore the challenge for management was to make sure that the members of the organization understood that for them to reach their personal goals the organization had to achieve its goals. Ouchi realized, like McGregor and Likert, that individual involvement and commitment was the key to performance gains.

Figure 7
Ohio State Leadership Quadrants



Source: Hersey, Blanchard, 1972, Management of Organizational Behaviour, New Jersey: Prentice-Hall, pp. 89

Ouchi (1981) was able to take this research further by detailing 5 attributes of Theory Z organizations:

Lifetime employment relationships;

Investment in organization specific skills;

Balancing explicit and implicit decision criteria;

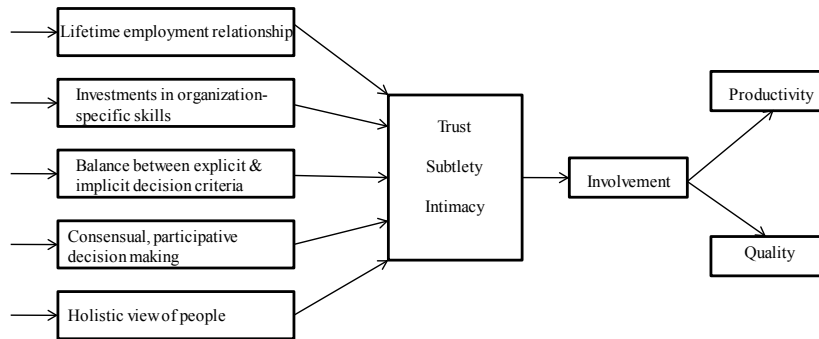
Participative decision making;

A holistic view of people.

The Japanese, as part of their Lean management approach, have developed these attributes into behaviour which has created competitive advantage in several industries (Jones, Roos, Womack 1990). Healthcare researchers have attempted to apply this model to that environment (Figure 8). All of these researchers and practitioners were

able to prove that leadership style was a major determinant in the performance of an organization.

Figure 8
Relationships Between Basic Characteristics of Theory Z

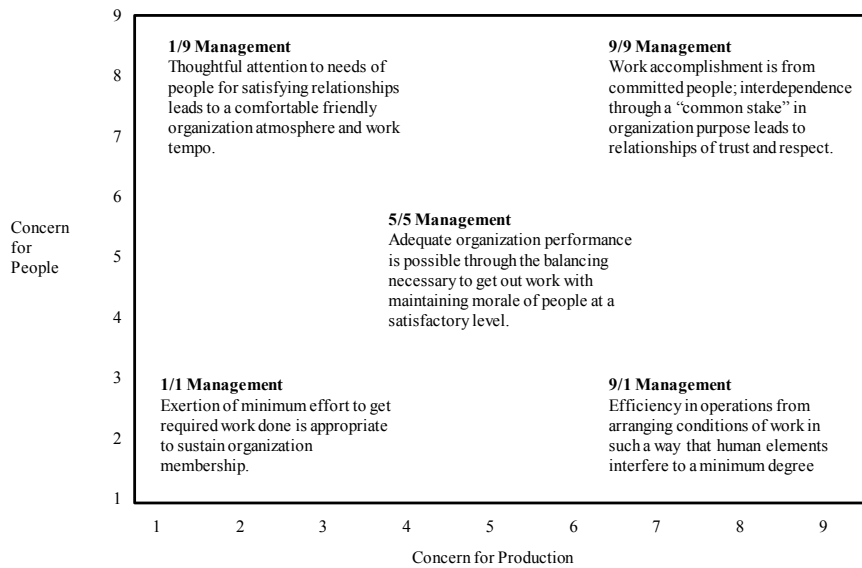


Source: Shortell, 1982, Theory Z: Implications and Relevance for Health Care Management, Health Care Management Review, 7 (4), pp. 9

It is noteworthy to understand that this research was presaged by the work of Blake and Mouton (1964) who advocated an understanding of leadership in terms of the task and relationship orientations of the leader. They developed a managerial grid identifying 5 divisions of leadership behaviour based upon these factors of task and relationship (Figure 9).

The horizontal axis indicates the level of the leader's concern for the task while the vertical axis indicates the leader's concern for people. The interrelationship of these two dimensions defines the basic leadership style of the individual leader. For example, a 1/1 leader avoids both the task and the people. This leader is clearly a failure in any organization as they offer little to the employee in terms of direction or support.

Figure 9
The Managerial Grid



Source: Hall, Williams, 1964, The Style of Management Inventory, Texas: Telemetrics International

A 1/9 leader focuses on meeting the employees' goals in the belief that the organizations goal(s) will be met once the people have been satisfied. A 9/1 leader is an authoritarian who would focus exclusively on the task, disregarding any needs of the employees. The 5/5 leader is "stuck in the middle", compromising to try to meet both the needs of the employees and the organization. Research has shown that these kinds of leaders usually do not satisfy either the people or the organization. The 9/9 leader is team oriented, balancing the needs of the organization and team members through the use of team decision making. This approach develops the commitment necessary so that all goals are met.

Interestingly, in their later research Blake and Mouton (1978) stated that unique situations may require the use of management styles that are not 9/9 in order to get results in a more timely fashion. This fits with turnaround research which indicates that leadership usually must change to get results (Schendel et al., 1975; Hofer, 1980;

Bibeault, 1982; Hambrick, Schechter, 1983) and might be the basis of the “chameleon” nature of effective turnaround leaders (Hummel,2005).

This fundamental research led to Gordon (1977) proposing that conflict resolution styles fell into similar categories, with the goal being to seek “win-win” scenarios. Levin (1979) re-named Blake and Mouton’s grid model for conflict resolution and negotiating into the following categories:

Failure, 1/1

Dominating, 9/1

Dominating, 9/1

Compromise, 5/5

Mutual gain, 9/9

Levin (1979) concluded that the preferable style for any form of conflict resolution was mutual gain, which also means mutual problem solving. In a multi-stakeholder environment such as a public hospital, the goals and objectives of the organization and its stakeholders must be met, with winning on all fronts, if the organization is to be deemed as being successful. Clearly the level of mutual problem solving needs to be probed in Ontario public hospital emergency departments in an effort to see if it is linked to performance.

Other researchers such as Reddin (1982) added further dimensions to Blake and Mouton’s model by attempting to add effectiveness as a 3rd dimension. Basically this just resulted in more classifications of management, without changing the core model.

Hersey and Blanchard (1974) tried to link leadership behaviour with organization

results and employee maturity using a life cycle approach. They came to the conclusion that leadership behaviour must change as employees mature in their skills. This conclusion is mimicked by later practitioners (Hummel, 2005).

This fits earlier research done by Fiedler (1967) who was able to specify the type of leader required given the business situation. He concluded that relationship oriented leaders only did well when the business situation was moderately favourable. Alternatively, when the business situation was either very favourable or very unfavourable, task oriented leaders achieved great success. This meshes with research done by the turnaround pioneers (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982; Hambrick, Schechter, 1983) who learned that most successful turnarounds required a change in leadership.

This organizational research approach is substantiated by humanists such as Drucker. In his later work, Drucker argued that all effective executives follow eight common practices (Drucker, 2004). He further postulated that personalities, attitudes, values, strengths, and weaknesses do not matter so much. The eight practices that he identified were:

They asked, “What needs to be done?”

They asked. “What is right for the enterprise?”

They developed action plans.

They took responsibility for decisions.

They took responsibility for communicating.

They were focused on opportunities rather than problems.

They ran productive meetings.

They thought and said “we” rather than “I”.

Drucker further detailed a ninth practice based upon the belief that executives only have authority because they have trust. This practice was “listen first, speak last”. Drucker’s advice is markedly similar to modern process models that organizational behaviourists who study transformational management have recently developed (Kotter, 1995).

Not-For-Profit Hospital Leadership Implications

Research from a variety of scientists has demonstrated that 9/9 leadership has proven to be effective in healthcare and hospital environments (Grunfeld, Kassum, 1973; Herrod, 1978; Deines, 1981; Margulies, Duval, 1984). Herrod in particular reported that 2 critical benefits resulted from this leadership. The first was that frank and open discussions became possible between staff of different grades and disciplines. The second was that inviting staff to give input through ideas and problem solving helped to relieve frustrations and resulted in greater staff job satisfaction and motivation. He noted that this created more commitment, helped working relationships, and improved productivity within the hospital.

The need for “chameleon” leadership behaviour was substantiated by Taylor (1978) in his studies of nursing departments, he noted that different situations required different leadership behaviour in order to produce required results. Bruhn (1990) reviewed manager indecisiveness and its impact on employee behaviours. He was able to

conclude that management indecisiveness was most commonly found in 3 managerial functions:

Promoting and dismissing;

Delegating authority and responsibility;

Creating and managing organizational change.

Bruhn noted that when managerial indecisiveness exists, employees learn techniques for circumventing management or forcing decision making. Additionally, he concluded that that indecisive manager usually does not recognize a relationship between their leadership style and the unproductive and potentially destructive behaviour among their subordinates.

This performance can be particularly destructive in not-for-profit hospital organizations because they face various types of accountability, including legal, professional, fiduciary, and an obligation to serve the public good (Hammack, 1995). Consequently leaders are subject not only to the expectations of the formal authorities but also stakeholders such as the media, general public, associated agencies, and donors (Kearns, 1996).

While some of these expectations are clear and specific, serving the public good can be interpreted in many ways (Mansbridge, 1998). Therefore, a key ability of leadership is interpreting the nature of stakeholders' expectations and weighing the appropriateness of these expectations against the values and mission of the hospital, the leadership's professional norms, and the hospital's own interpretation of public good. While hospital leadership may have some degrees of freedom in addressing these expectations the

reality is that leadership effectiveness is judged by the responsiveness of the not-for-profit hospital to stakeholder concerns (Herman, Renz, 1997).

Fortunately, there is research in both profit (Kotter, 1982) and not-for-profit (Eastwood, Ritchie, 2006) which links leadership functional experience and expertise to organization performance and stakeholder management. Because a leader's functional experience and expertise creates "a lens through which they view the world" it is expected that leaders will gravitate towards certain styles based upon that experience (Rajagopalan, Datta, 1996). Research has demonstrated that:

Leaders with operations backgrounds have been found to be best at organizational restructuring (Useem, 1993).

Functional backgrounds influence strategic orientation (Chaganti, Sambharya, 1987) and strategies pursued (Thomas, Litschert, Ramaswamy, 1991).

Strategic decision making processes are impacted by leadership experience and expertise (Hitt, Tyler, 1991).

Performance attainment is directly related to leadership functional experience and competency (Gupta, Govindarajan, 1984).

Competency management is directly related to leadership experience, particularly if it is in the functional areas which need improvement (Prahalad, Hamel, 1990).

Ability to cultivate stakeholder relationships is directly related to leadership negotiation experience and is considered a best practice for the non-profit sector (Drucker, 1990).

However, there is no research that links a leader's functional experience and expertise to the ability to turn around an organization, particularly a not-for-profit hospital and its Emergency Department.

Leadership, Transformation and Innovation

Drucker theorized that the advanced world is moving from an economy of goods to a knowledge economy and that management is getting transformed as a result (Drucker, 2002). Managers now have to learn how to engage workers' minds as well as their hands just to stay even with the evolving environment. This directly challenged Taylor's theories and places managers who subscribed to Taylorism in a difficult position given that this is true. Japanese managers have demonstrated the effectiveness of engaging workers as part of their Lean management strategy (Jones, Roos, Womack, 1990).

There are significant political implications of movement to a knowledge economy. As raw materials such as oil and minerals diminish, a country's resources become its educated workers. Therefore the importance of education and training of the population becomes a strategic issue, leading to a strategy of not defending industries that need less educated knowledgeable workers who generate less on a GNP per capita basis.

Canada is undergoing this metamorphosis, with Ontario leading the change as manufacturing industries are being replaced by a service economy, driven by knowledge workers, particularly in the Kitchener area which is the home of Canada's primary advanced technology cluster. A more educated worker is likely to have higher performance expectations of their public healthcare system (Waterloo Wellington Local Health Integration Network, 2007).

A concern with a knowledge economy that Drucker revealed is that knowledge workers may tend to “company hop” in search of the best paying or most interesting jobs. This could lead to a level of economic destabilization as well as innovation through diffusion of knowledge. This “company hopping” is a critical issue for Ontario public hospitals who are dealing with medical staff turnover because they are leaving the country for more lucrative privately paid positions abroad (Dr. Maurice, 2006).

Scholars have attempted to understand the relationship between leadership and innovation in an effort to determine if certain leadership styles are appropriate for fostering innovation. Some authors suggest that supportive, participative, vision setting, democratic, and collaborative styles are effective in encouraging innovation (Quinn, 1988; Schin, McClomb, 1998). Others suggest a transformational style built upon a future orientation, open-mindedness, and focus on planning (Harris, 1985, Howell, Higgins, 1990).

Transformational leaders may not be unlike successful turnaround leaders in practice. They renew employee commitment to the organization by re-defining organizational mission and vision (Roberts, 1985), and expect employees to think beyond themselves, becoming high performers and leaders in their own right (Bass, 1985). Transformational leaders use charisma, individualized consideration, inspiration, and intellectual stimulation to affect creativity and enhance employees’ capacity to innovate. These leaders seek to unite employees and encourage them to make the organization’s vision a reality (Bryman, 1992).

Kouzes and Posner (1987) defined transformational leadership as a set of 5 observable and learnable practices:

Challenge familiar organizational processes;

Inspire a shared vision among employees;

Enable employees to act in accordance with their vision;

Model the way for employees to perform;

Encourage employees through recognition and celebration of success.

There has been no research in determining if a successful hospital turnaround leader has the characteristics of transformational leader. If Drucker is correct, this also means that successful ongoing hospital leadership must have these same characteristics given the movement of the West to a knowledge economy (Drucker, 2002) or else the hospital will fall into a failing performance zone again.

Leadership and Organization Considerations

Drucker argues that countries that have made the breakthrough into sustained growth have done so by inventing new organizations, not discovering new technologies (Bryan, Joyce, 2005). His premise is that new organizations unlock the creativity of people, which enable a country, or a business, to unlock their capability to perform. This premise may be validated by the growth of industrial techniques which are transforming industries and countries (Jones, Roos, Womack, 1990; Ettinger, 2001).

Drucker's most recent work (Drucker, 2002) resonates particularly well with the issues that management has today. He postulates that there are three major problems that management faces in the current environment.

The first challenge that Drucker articulates is the sheer scale of managerial complexity. Globalization, de-centralization, concepts such as core competency, and competitive advantage have resulted in the traditional vertically integrated companies giving way to networked companies. He states that management must have a broader skill set to be able to negotiate and make effective decisions in this complex and information intensive environment. He argues that today's management is not trained with the skills to succeed. His argument, from the perspective of modern scholars, has some merit (Furman, McGahan, 2002).

The second challenge is overcoming the frequency of managerial failure as managers fail to understand what it means to manage in revolutionary times (Drucker, 2002). Drucker theorizes that managers spend their time tinkering with their businesses when they should be rethinking the whole theory on which the business is based. This is a return to his original concept of doing the right things first before doing things well. In spite of approaching strategy and management from the perspective of an economist, Porter (1995) reached the same conclusion.

Drucker's third challenge is the growing tension between business and its environment (Drucker, 2002). There is an eternal conflict in that business needs perpetual innovation while the community needs stability. Additionally there is the rapidly changing nature of knowledge in conflict with the limited capacity of the human mind. Finally there is business's need to compete internationally versus society's interest in the common good. These conflicts, which are relevant to Ontario public hospitals, are just beginning to be researched in modern literature (Barney, 2007).

Drucker is strong on culture and the impact that this has on business performance. This focus may be important in having a successful public hospital. Any research into sustainability has shown that firms with strong cultures tend to be more resilient and profitable than those that are weak (Kotter, Heskett, 1992). The core theme throughout his work is that good management brings about good economics and social harmony.

Drucker has not traditionally been supportive of small organizations; he calls them inefficient, “we know today that in modern industrial production, particularly in modern mass production, the small unit is not only inefficient it cannot produce at all” (Drucker, 1983). However, just before his death he recanted, saying that the Fortune 500 is over and has written increasingly about the importance of entrepreneurship (Drucker, 2002). Interestingly, recent research has shown that smaller hospitals which have high capacity utilization tend to have higher performing Emergency Departments (Finkler, Ward, 2003).

Drucker, throughout his life, argued that developing a company’s talent is a major component of a management job, something that management has not been very effective at (Drucker, 2002). He has recently integrated his perspective on decentralization and the movement to a knowledge economy by suggesting Professional Employee Organizations (PEO) share the development of talent with managers. These PEOs in a hospital context could be the doctor, nurse, and other specialist provincially recognized associations. There has been no research examining the integrated role that these organizations might play in influencing the performance of a not-for-profit public hospital.

He states that this is particularly important today because many people who work for organizations are not employees and many companies have outsourced Human Resources (HR). Ontario public hospitals, particularly Grand River Hospital in Kitchener, have followed this trend (Closson, 2007). Drucker was concerned with this trend because “if by off-loading HR organizations also lose their capacity to develop people they have made a devil’s bargain indeed” (Drucker, 2002). The question of outsourcing versus performance has not been examined in the literature with respect to not-for-profit public hospitals.

The reason Drucker states for this trend in the increased use of temporary employees is not only do they give the employer apparent flexibility but also reduces the cost of government regulations, paperwork, and tax compliance. He notes that employment laws have grown from 38 to 60 during the period from 1980 to 2000 in the United States alone (Drucker, 2002). He argues that because business is spending too much time on paperwork and not enough on innovation, their only alternative is to outsource, “people are not our greatest asset, they are our greatest liability” (Drucker, 2002).

Drucker further states that managing knowledge experts is hard and might best be left to specialist organizations. A statistic that he uses is that 90% of United States workforce was non-exempt or blue collar 50 years ago, today less than one fifth is blue collar (Drucker, 2002). At the time of the article knowledge workers were 40%+ of workforce in the United States.

He further argues that knowledge workers are not homogenous, they are specialized and this means splintering in a large corporation. He used the example of a hospital in his example, discussing the issues of training, career advancement, and promotion. He

postulates that a PEO can fill the gap by balancing a company's need with an individual needs. The challenge is to free management to develop people, nurture their skills, while losing the administrative tasks.

This theory, well unproven and worth investigating, may be appropriate for not-for-profit enterprises or government, is questionable in for-profit situations. If he indeed postulates that modern workers are indeed capital, not cost, then it is the productivity of capital which leads to competitive advantage (Drucker, 2002).

Diffusion of unique capital across an industry will destroy competitive advantage, forcing the firm that is the source of initial capital investment to be at a cost disadvantage because they are the "trainers of the industry". This would be compounded because, while the initiating firm has the "first mover" advantage, it is likely that product life cycles would shorten due to rapid diffusion and the possibility that the initiating firm would be "leap-frogged" by a competitor who can capitalize on the initiating firm's learning curve. This would lead to zero-sum competition and over the long term, firms exiting industries where capital that drives competitive advantage is mobile.

Alternatively, in not-for-profit or government categories, diffusion of best practices and knowledge is critical to driving down cost while increasing services. The "industry" as a whole would benefit by being more efficient. This is somewhat in conflict with Drucker's beliefs that government should stay away from anything that private industry can do. However, government may have a role given the diffusion of resources to other countries due to economic policy decisions (Waterloo Wellington Local Health Integration Network, 2007).

Summary of Leadership of Not-For-Profit Literature Review

There are a number of gaps in the literature which encompass leadership of not-for-profit organizations. There has been no consensus on what the best leadership style for these organizations, and in fact there is evidence that leaders need to change their styles based upon the situation at the time (Taylor, 1978). There is no research on what makes a good turnaround leader, do they need strong functional skills and be transformational or is it more important to have transformational versus functional skills. These questions have not been answered.

It does appear that leaders who have strong negotiating skills are effective in a not-for-profit environment, likely due to their ability to manage diverse stakeholders, generating consensus and converge, resulting in action. However there is no research which indicates how these leaders ensure that they are “doing the right thing” before they “do things well”.

While there is research which suggests how important innovation is to sustainability there is no research which discusses how leaders manage the trade-off between innovation and administration. Hospitals are regulated environments, literally a life and death event for most people, particularly in Emergency Departments, so process and structure may inhibit the ability to innovate. Alternatively, the question arises is should Emergency Departments innovate given that the innovation process inevitably involves failure? This has not been researched in the literature.

The role of technology and benchmarking with respect to organization change and leadership has been researched extensively in for-profit organizations but there is limited research in their role and impact on leadership in not-for-profit public hospitals.

Hospital leaders might consider the value of Drucker's leadership mantra, which continues to be validated across for-profit and not-for-profit environments; "What is your business?, Who is your customer?, and What does the customer value?" (Micklethwait, Wooldridge, 1996; Brown, Seeman, 2006). A question of whether hospitals which have high performing Emergency Departments use this guidance or not needs to be answered in this dissertation. This direct focus may provide strategy and leadership guidance to not-for-profit public hospitals.

Porter, in spite of taking the perspective of an economist, is quite similar to the humanist perspective of Drucker in his views on leadership in this seminal article "What is Strategy?". Porter defines a leader's role in business to be one where the leader must define and communicate the company's unique position, guiding employees to make the right choices with respect to trade-offs that they will make every day. This is similar to Drucker's perspective on values, one could argue that having unique values that clearly define the trade-offs to be made will make a company fairly consistent in delivering its strategy regardless of the environment. Perhaps a leadership problem in poorly performing Emergency Departments is that values are unclear resulting sub-optimal trade-offs. This is a question which needs to be investigated.

The Purpose, Mission, Culture, and Environment of Not-For-Profit Organizations

Introduction

As stated earlier, not-for-profit organizations exist to deliver a mission or goal, unlike for-profit organizations where the usual primary goal is profit maximization. Not-for-profit organizations typically have many stakeholders whose interests are usually far

more diverging than typical for-profit organizations. However, given the current non-financial focus that many stakeholder groups are taking in for-profit organizations, such as environmental and child labour, one could argue that stakeholder management in for-profit organizations is becoming as complex as not-for-profit organizations. Consequently, one could make an argument that in both organizations management attempts to optimize value for stakeholders in an effort to be perceived as being successful (Porter, 1996).

There are other similarities. The financial model of a non-for-profit organization is that it cannot pay dividends. However, like the stakeholders in a for-profit organization, special interest groups can lobby for access to a surplus, if there is one, or a bigger piece of the budget to use for their needs (Zaleski, Esposto, 2007). No research has been done to determine if there is a linkage between high performing Emergency Departments and which stakeholder group has the most power, and if it has been able to re-direct resources that result in sustained improvement.

Stakeholder Theory

Understanding and maximizing organizational performance and social responsibility have been central concerns for managers and researchers since the inception of organizational studies. One important issue in gaining a better understanding of the organization's performance has been how management accounts for and manages the interests or "stakes" of key players inside and outside of the organization. This difficulty has given rise to the study of the stakeholder perspective and underscored its importance in accounting for and incorporating into any organizational analyses.

Stakeholder management is the idea that tasks of managers are to manage the stakeholders in a way that achieves the purposes of the organization. Differences in, and conflict among various stakeholders can have a dramatic effect on the ability of any organization to perform efficiently and in socially responsible ways. Consequently understanding stakeholder management is essential to organizational success (Savage et al., 1991).

A dilemma for researchers is that there is no consolidated definition of what a stakeholder is. Freeman (1984) in his seminal work offers the definition; “a stakeholder in an organization is by definition any group or individual who can affect or is affected by the achievement of the organization’s objective”. Clarkson (1994) offers a much narrower definition of stakeholders as voluntary or involuntary risk-takers, so that only those with risk appear to have a legitimate claim. In other literature stakeholders have been defined in a variety of ways, from individuals to groups, to organizations and the business environment (Becker, Potter, 2002). For the purposes of this dissertation Freeman’s definition (Freeman, 1984) will be used.

It can be argued, and has been proven that an organization’s structure, processes, and environmental setting puts limits on or influences in some way the extent to which managers can respond to stakeholder pressure. Becker and Potter (2002) studied 4,705 hospitals, both for-profit and not-for-profit, arriving at the following stakeholder four conclusions relevant to the not-for-profit hospital environment in Ontario:

Teaching hospitals inject a new stakeholder, the education system, which significantly raises the costs of the hospital overall, without raising the performance of the care.

Larger hospitals are less engaged in the community, negatively impacting community stakeholders.

Teaching hospitals are less engaged in the community, negatively impacting community stakeholders.

Multi hospital systems (managed by the same management team) were more efficient but less engaged in the community, to the detriment of the community stakeholders.

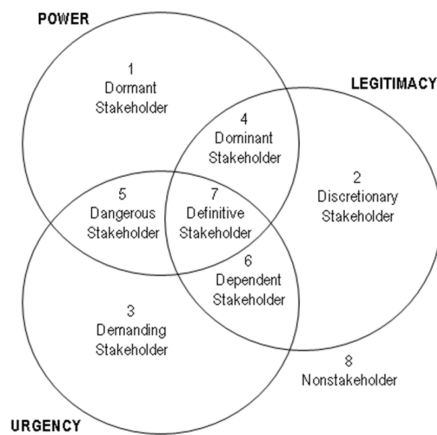
Their conclusions also indicated that hospital efficiency, as calculated financially, was inversely proportional to social responsibility, in terms of community stakeholder satisfaction, in not-for-profit hospitals. This is being challenged in recent research which indicates that stakeholders can have both (Walshe et al., 2004). The dilemma for practitioners is that most current professional medical staff believes that quality of care conflicts with cost (Walshe et al., 2004).

Interestingly, this is the argument that medical staff at Grand River Hospital in Kitchener, Ontario has made to hospital stakeholders, including the Ministry of Health and Long Term Care (Dr. Maurice, 2006). This hospital has the worst care overall and especially in its Emergency Departments on any existing metric. Medical professionals argue that the quality of care cannot improve without more financial resources. Discussion with these professionals indicates that more resources are required, there is little belief that the existing resources can be used in a more optimal fashion. This belief pervades through to the Board of Directors for the hospital (Board of Directors, 2008). Investigation of these beliefs may provide some insight between high and low performing Emergency Departments in Ontario.

Ontario is unique in that the not-for-profit public hospitals are the only organizations offering Emergency Departments and most of the other general healthcare. There is significant research on stakeholder behaviour when both for-profit and not-for-profit hospitals exist but there is none in an environment where not-for-profit has complete market dominance. Identification and classification of stakeholders may provide some insight into differences between high and low performing Emergency Departments in Ontario.

Given the lack of literature to address this research question the stakeholder typology developed by Mitchell, Agle, Wood (1997) could be used in an effort to classify the relative importance of each stakeholder (Figure 10).

Figure 10
Stakeholder Typology



Source: Mitchell, Agle, & Wood, 1997, *Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts*, *The Academy of Management Review*, Vol. 22, no. 4, pp. 874

This typology is similar to Freeman's (1984) in that there are three key attributes of the stakeholder; the stakeholder's power to influence the firm, the legitimacy of the

stakeholder's relationship with the firm and the urgency of the stakeholder's claim on the firm. Mitchell, et al. (1997) classifies a non-stakeholder as anyone without power, legitimacy, or urgency. Stakeholders having only one attribute will have low priority with management whereas stakeholders with all three attributes will have high priority with management.

Dormant stakeholders in a hospital context could be dismissed employees. Discretionary stakeholders could be the beneficiaries of corporate or individual philanthropy. They do not have power or urgency but are legitimate. Demanding stakeholders present a sense of urgency through their demands but have no legitimacy or power. These stakeholders may be special interest groups external to the hospital. They present more of a nuisance to management but are not particularly dangerous unless they gain power or legitimacy.

Stakeholders who possess two of the three attributes fall into a class of "expectant stakeholders". Dominant stakeholders have both legitimacy and power and tend to have formal mechanisms to exercise them such as a hospital board of directors. Dangerous stakeholders have power and urgency but no legitimacy. Often desperate moves are characteristic of their position such as wildcat strikes, employee sabotage, and political terrorism. While dependent stakeholders do not possess power, they have legitimacy and urgency. Perhaps this is where Emergency Department customers lie.

Definitive stakeholders possess all three attributes. Government is a typical member, usually government operates as a dominant stakeholder but when they want to press an urgent claim, such as budget compliance, they move into the definitive category.

It should not be ignored that the various stakeholders can influence each other, causing movement from one category to another. A key question to answer is who are the stakeholders, what is their typology, and are their interests aligned to the strategy and goals of the hospital.

Culture

Organization culture, both in for-profit and not-for-profit has been extensively studied. Research and literature into the ability of not-for-profit public hospitals to focus on improvement in crisis and the impact that failure has on culture and the environment is limited (Meyer, 1999; Walshe, Shortell, 2004).

The traditional definition of culture has been “the shared beliefs and expectations that managers have about the way the organization should operate” (Crossan, et al., 2005). However, in a hospital, the definition of culture has to go beyond management because of the role that medical staff plays.

The irony of the healthcare environment is that the culture can be defined as risk-adverse, perhaps even inflexible. While there is little hard data to substantiate this (Waldman, 2003) the first rule taught to doctors and RN’s is *primum non nocere*; “first, do no harm”. This culture discourages original thinking, risk-taking, and entrepreneurial behaviours, despite the evidence that effective quality improvement require innovation, flexible implementation, and a supportive culture (Walshe, Shortell, 2004). Even when the need for cultural transformation is recognized, medical staff find it difficult to change (Walshe et al., 2004). This is ironic because the knowledge-centered medical

service industry eschews structured learning while for-profit companies like Toyota embrace it.

This medical culture clashes directly with most professionally trained managers, who are unfortunately partners in pervading this conflict. Medical management tends to focus on one element, cost, which is half of a cost/benefit ratio. There are no long-term cost-effectiveness measures of what medical staff do, just the immediate dollar outlay.

In addition to measuring the wrong outcomes, those that are short-term only, medical management is obsessed with measuring excessively. Management spends too much time collecting, analyzing, and reporting unnecessary, irrelevant, and arcane data, leaving too little time to supervise, manage, and especially coach their people. This results in the behaviour of treating versus eliminating problems (Waldman, 2003). Ackoff (1999) terms it “solving problems versus dissolving them”. Medical management and doctors tend to be reactive rather than proactive. Doctors treat symptoms, rather than preventing or eliminating disease.

Examination of the curriculum for medical doctor training and RN training in Ontario indicates that there is no instruction in operations management or advanced cost/quality systems such as Six Sigma or Lean management (Ms. Taylor, President, St. Mary’s Hospital, personal communication, Jan. 15, 2009, Ms Bowers, RN, Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010). Consequently, even though these systems are very similar to medical training in terms of being data and research intensive, medical staff has no exposure to them. However, recent research evidence indicates that that when medical staff is trained and

supported in Six Sigma or Lean implementations this cultural barrier is overcome (Walshe et al., 2004).

There has been no research, especially in not-for-profit public hospitals, of the competency of management and medical staff in modern problem elimination techniques and whether it relates to the financial and client performance (Walshe et al., 2004). While there have been selected case studies examining Six Sigma or Lean implementations, there has been no broader study examining relationships between these skills and philosophies, management/medical staff competencies, and results.

This clash of cultures becomes more complicated when one factors in the unique cultures of the other stakeholders in a not-for-profit public hospital. A question of “do the cultures of the stakeholders converge in high performing Emergency Departments” and “if so, how did that happen” needs to be investigated as part of this dissertation.

Summary of Purpose, Culture, and Environment of Not-For-Profit Organizations

The reality of today’s environment is that there is convergence between the forces that impact for-profit and not-for-profit organizations (Porter, 1996). These similarities may extend to the financial behaviour of the stakeholders. The question of a relationship between stakeholder power, level of resources applied, and performance with respect to Ontario Emergency Departments needs to be examined as current literature has not investigated linkages like these in not-for-profit environments.

Stakeholders and their ability to influence organizations have been well discussed in the literature. However, academics have not agreed upon a consolidated definition of a

stakeholder. For the purposes of this dissertation Freeman's (1984) definition will be used. While there has been research in not-for-profit hospitals with respect to stakeholder, this research has not happened in an environment where the not-for-profit hospitals have a complete monopoly.

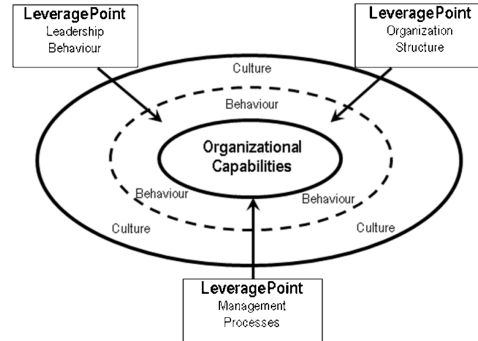
Given that this is the environment in Ontario, a future research effort may be to categorize stakeholders using Mitchell et al.'s (1997) model, seeking to understand if there is a difference in stakeholder typology which may drive Emergency Department performance. It may be useful to compare this outcome to successful for-profit stakeholder typologies.

The culture of the medical community has traditionally clashed with management, whether it be in for-profit or not-for-profit environments (Walshe et al., 2004). This clash is proving to be counter-productive as recent research has uncovered that mutual goals can be achieved, in spite of cultural differences (Walshe et al., 2004). Early research evidence indicates that education and engagement are critical to positive change. However, the impact of stakeholders on culture, and the potential constraints that they may impose on behaviour, may not give management the degrees of freedom needed to effect positive change. There is no literature that has been researched this on issue in the monopolistic not-for-profit that management in Ontario public hospitals has to deal with.

A comparison of high performing and low performing Ontario Emergency Departments will be examined using a classic change lever model (Figure 11). Organizational capabilities are strongly influenced by leadership behaviour, organization structure, and management processes (Crossan et al., 2005). Culture, and the behaviour that culture

encourages, influence not only capabilities but the change levers. A major gap in the literature is the analysis and examination of the leverage points and comparing differences in these leverage points with culture and performance. This may unlock the unique activities which differentiate a high versus low performing Emergency Department.

Figure 11
Organizational Capabilities Model



Source: Crossan, Rouse, Fry, Killing, 2009, Strategic Analysis and Action, Toronto: Pearson, pp. 160

Quantifying the Performance of Public Hospitals.

Introduction

Research into for-profit and not-for-profit hospital performance metrics has been a topic that has attracted increasing interest in the past decade as Western society has become more interested in individual health. However, this research and literature on performance quantification is narrow and focused primarily on cost (Agrisano et al., 2007). Additionally, research and literature on patient or customer performance has

been narrow and focused on individual hospital department performance (Flower, 2006).

In the absence of any agreed upon measurement standards and in response to increasing concerns about quality, a growing number of countries and healthcare institutions are carrying out quality programs and applying quality standards. Dranove et al. (1999) observed that virtually all hospitals in the United States reported that they engaged in efforts to improve quality. He noted that, in 1997, 98% of approximately 2,000 hospitals reported using continuous quality improvement. In the Netherlands, Wagner et al. (2003) reported that 71% of all healthcare organizations train employees in quality management.

Increasing amounts of resources are being devoted to these interventions. Measures on hospital spending on quality activities from a detailed study of 16 hospitals in the United States, performed by Dranove (1999), revealed an expenditure of \$56 per admission. Furthermore, Wagner et al. (2003) noted that their study revealed healthcare systems in the Netherlands spent between 0.8% and 3.5% of their total budget on quality management.

This is beginning to garner attention for government and private donors because managers are under pressure to provide evidence that quality interventions expenditures produce tangible benefits to their organizations, validating quality initiatives. A literature review provides little research evidence as to the effectiveness of quality interventions and quality standards. Reasons for the lack of evaluation research as reflected in the literature review include the methodological challenges of measuring non-financial performance (McKay, Deily, 2005).

Traditional Measurements

Traditionally performance measurement systems in healthcare organizations have been focused exclusively on financial performance. Thus, performance measurement systems did not monitor the process or outcomes of the patient care delivery systems. In the United States, a private health information company, Solucient LLC, uses performance measures in three major areas; financial management, operations, and clinical practices, to publish a list of the top 100 hospitals in the United States in *Modern Healthcare* annually.

Recent academics have attempted to link financial performance to patient outcomes, specifically mortality (McKay, Deily, 2005). Academics such as Finkler & Ward (2003) have argued that evidence-based research on hospital cost control must simultaneously assess effects on health outcomes. Early research results, on small sample sizes, using the Solucient metrics, seem to indicate that:

Mortality rates at for-profit and not-for-profit hospitals are largely the same, studies conflict on this but the consensus is that mortality is largely unchanged.

For-profit hospitals are more cost efficient, perhaps reflecting a different management culture.

High performing hospitals generally have high capacity utilization.

Low performing hospitals tend to be larger facilities, perhaps indicating that a hospital becomes more difficult to manage once it reaches a critical size, perhaps by trying to offer too many medical specialties.

The more skilled the employees are in a hospital, the better its overall performance, particularly hospitals that have a stronger proportion of Registered Nurses (RN) than Nurse Aides (NA).

The better educated the employees were, on average, in the hospital, the better the overall performance, particularly at the RN level.

High performing hospitals had fewer staff labour hours per admission but the staff's average salary was higher.

Patient mix in terms of age, typology, illness, etc., does not seem to determine hospital performance.

These conclusions have not been proven on larger sample sizes but are factors that need to be investigated as part of this dissertation in examining the performance of Ontario hospitals and their Emergency Departments. Weaknesses to date in this type of research, besides the small sample sizes, include no measure of the calibre of hospital management, organizational culture, and characteristics of the local community. A core weakness is that no research into the process that is used in strategy implementation for high performing hospitals and their Emergency Departments has been studied.

In a multi-stakeholder environment, these measures, while better than just a one dimensional measure of financial performance, still do not meet the needs of all stakeholders and management in their quest to manage those stakeholders. Some of these weaknesses are being examined through use of a standard management evaluation tool, the Balanced Scorecard (Kaplan, Norton, 1992).

Performance measurement of not-for-profit hospitals have used the approaches previously discussed, which include financial accountability, program outputs, adherence to quality standards, participant related measures, key performance indicators (KPIs or goal attainment), client satisfaction, resource utilization, etc. These approaches might have been successful in isolation but have not given management and stakeholders the ability to make effective trade-off decisions in an environment of constrained resources (Kaplan, Norton, 2004).

The difficulty in taking this benchmarking methodology with not-for-profit hospitals is that the activities under comparison are not identical. The small sample sizes studied to date may not reflect actual population outcomes. For hospitals, different patient populations are treated, resulting in a different “case mix” so treatment outcomes may not be directly comparable. The literature has little to offer in terms of normalization methodologies that allow direct comparison of results.

The for-profit management arena is focused on survival and growth. Just like the not-for-profit organization, a for-profit firm usually has constrained resources and must make the right trade-off decisions to thrive. A not-for-profit hospital does not operate under the same pressures. Survival is usually not an issue, competition (in Ontario at least) is minimal, and growth is not the primary concern, delivering the mission and goals of the not-for-profit hospital are its priority.

A not-for-profit hospital promises to deliver a service to its community. In the case of the Waterloo-Wellington Local Health Integration Network (WWLHIN), it signs an Accountability Agreement with the Ministry of Health and Long Term Care (MOH) that sets out the mutual understanding between them and the performance obligations

for the period in question (Waterloo Wellington Local Health Integration Network, 2007). The WWLHIN's performance obligations in the 2006-7 fiscal year fell into 5 categories:

Community Engagement, which is an externally led evaluation;

Integrated Health Service Plan, which is a plan specific to the needs of the Waterloo-Wellington area;

Corporate Governance, which is the creation of a governance model and board effectiveness assessment tool;

Local Health System Performance, which is a focus on surgery wait times, diagnostic wait times, long term care, quality of care, alternate level of care, surgical throughput, and critical care capacity development (Emergency Departments);

Funding and Allocation, which means balancing the budget.

The WWLHIN and its constituent hospitals, not unlike other public health organizations, must combine their manpower and resources in such a manner that they can fulfil their mission and goals effectively and ideally efficiently. The main goal of a not-for-profit organization is to attain its goal(s), whatever they may be. Drucker (1990) noted that not-for-profit organizations must acquire the performance management skills of commercial organizations and conversely, commercial organizations must acquire the mission management skills of not-for-profit organizations. Therefore, many not-for-profit healthcare organizations and hospitals have embraced the use of the well known Balanced Scorecard in an effort to acquire these management skills.

Public Hospitals and Balanced Scorecard

The Balanced Scorecard is a conceptual framework for translating an organization's vision into a set of performance indicators distributed among four dimensions:

Customer focus, the specific types of customers the organization serves, the markets it enters, the value or benefit it creates to attract or retain customers.

Internal business process focus, the internal systems that must be in place to manage and measure performance, the competencies, skills and capacities it possesses, and the ways it turns its resources into products and services.

Learning and development focus, the commitment to continuously improve.

Financial focus, the economic consequences of choices and investments in customers, business processes, and learning/gro

Each dimension includes strategic issues, goals, and a measurement index. These dimensions are linked, what happens in one dimension affects what happens in another, consequently requiring sequential focus. For example, customers served and markets entered affect the design of internal business processes, which affect the type of learning and development investments needed, and all of these affect financial performance. For each of the Balanced Scorecard dimensions, a strategy must be formulated, executed, and managed. Results must be measured and used to prompt focused, continuous improvement.

The key to effective use of the Balanced Scorecard is to use both lagging and leading measures that are related. Financial measures are lagging but are directly influenced by "off-the-balance sheet" factors like; skills and competencies, motivation of employees,

customer and supplier relationships, innovative product development, databases and information technologies, efficient and responsive operating processes, customer loyalty and relationships, and political, regulatory, and societal approval (Kaplan, Norton 2001).

The advantage to this approach is that the organization can align and focus all of its resources to delivering the strategy because “everything fits”. It is critical to choose measures that have cause and effect behaviour. There is limited literature that examines the choice of balanced scorecard metrics, particularly for not-for-profit public hospitals. However, there is literature suggesting that the optimum number of metrics to use is approximately 24, not having less than 20 but no more than 30 (Kaplan, Norton, 2004). Effective use of the Balanced Scorecard has been proven to work in not-for-profit organizations (Kaplan, Norton, 1996, 2004, Zelman et al., 2003).

Not-for-profit organizations that have successfully applied the Balanced Scorecard recognize that there are two significant differences from its application in for-profit enterprises. First, vision and mission are usually more important to governments and not-for-profits than to for-profit business, and second, the financial perspective is not the first or most important priority. This allows the priorities to be re-ordered in order to more effectively deliver its mission, usually placing the needs of the client/customer as the top priority (Kaplan, Norton, 2001).

This apparent need to subjugate financial performance to client/customer performance may be in conflict with the management constraints that the MOH places upon Ontario public hospitals. The MOH requires that each hospital not overspend its budget, failure to achieve results in the MOH assuming management control of the public hospital with

the MOH bringing the spending back in line with the committed budget. Therefore, the strategic freedom of replacing financial goals with client goals does not exist for Ontario public hospitals. Therefore, one questions whether the Balanced Scorecard would be the most effective management tool for this environment, in spite of its widespread use in the Ontario healthcare system. An alternative perspective might be that effective use of the Balanced Scorecard would generate stakeholder pressure to change financial resources. This subject has not been researched in the literature. The Balanced Scorecard, its implementation and metrics, and if or how it was used to change apparent constraints needs to be investigated as part of this dissertation.

The literature review indicated that studies of adapting the Balanced Scorecard to not-for-profit organizations usually results in the organization focusing on developing a complete Balanced Scorecard performance index, rather than developing a model which can be easily and effectively implemented. This drive to have a complete model which describes the purpose, responsibility levels, tasks, methods, and performance evaluation methods often results on a focus on the tool rather than making it work (Kaplan, Norton, 2001). This typically results in an unsuccessful implementation (Kaplan, Norton, 2004).

Other research has indicated that many healthcare organizations use the Balanced Scorecard as a “dashboard” or scorecard (Voelker, Rakich, French, 2005) only. This approach does not optimize the use of the Balanced Scorecard as it is a tool that management should use to measure and manage and then measure again. Therefore, the items to be measured must be the major process indicators which reflect the strategy of the organization. Use of the Balanced Scorecard and how it is used needs to be

examined to determine if there is a linkage between that and not-for-profit public hospital performance in Ontario.

Preliminary examination regarding the use of the Balanced Scorecard in Ontario public not-for-profit hospital Emergency Departments indicates that a modified version is used (Canadian Institute for Health Information, 2007). The Canadian Institute for Health Information (CIHI), in their annual report for Emergency Departments in Ontario, does not report an Emergency Department strategy that the system is working towards. Rather, it reports the following:

System Integration and Change (7 measures)

Patient Satisfaction (4 measures)

Clinical Utilization and Outcome (10 measures)

Financial Performance and Conditions (4 measures)

Careful examination of the measures chosen indicate that the Balanced Scorecard developed for Emergency Departments in Ontario may need improvement. Weaknesses identified may include:

RN percentage of nursing hours is a financial measure when research has shown it to be a metric that relates to client satisfaction and improved outcomes.

Staff attendance is a financial measure when research has shown that is a metric that impacts both customer focus and internal processes.

Staff/Management ratios are reported as a financial metric when this is a classic internal process measure.

Clinical Utilization and Outcomes have no measures reflecting utilization of critical assets. The measures in the current Balanced Scorecard reflect whether Standard Operating Procedures (SOP) exist or not.

Patient Satisfaction metrics are on target but there are no metrics reflecting the satisfaction of other key stakeholder groups, like doctors, nurses, etc.

System Integration and Change metrics are difficult to manage as they are very broad and not specific therefore consequently open to interpretation from the differing perspectives of stakeholders.

Since all Emergency Departments in Ontario participate in this scorecard in one form or another (Canadian Institute for Health Information, 2007), examination of how high performing Emergency Departments use and/or modify this template is a question to be investigated. Additionally, comparison of this Balanced Scorecard design to the strategy, goals, and objectives of each hospital and its LHIN is worth investigating to determine if management is consistent and focused. In the case of the WWLHIN, the only goal related to Emergency Departments, in spite of having the worst Emergency Department performance in the system, is to increase capacity. This is in direct contradiction with Drucker's research of first get effective then get efficient (Drucker, 1954). The capacity metric is not accurately measured in the Balanced Scorecard used for the Emergency Departments in Ontario, and while useful, may not be a key success factor.

Summary of Quantifying the Performance of Public Hospitals

The difficulty in measuring hospital and Emergency Department performance is that multiple stakeholders have differing objectives and potentially conflicting measures. Stakeholder objectives have differing levels of impact, for a patient it is living, for a politician it might be getting re-elected.

It is clear that for Ontario, the system measures of performance are weak in terms of delivering strategy. The question of what do high performing hospitals measure or is there a measure that has not yet been discovered that would assist management in creating a high performing Emergency Department?

In the spirit that the mission of an Ontario not-for-profit public hospital is to care for its constituents, most stakeholders would agree that “good, fast, and cheap” would be an ideal situation for Emergency Department performance. Good would define quality, things being done well that would result in patients recovering quickly. There has been much research into the use of modern quality techniques and hospitals however the literature has not agreed on which technique, such as Six Sigma, Lean, or others, is most effective. Quality is only one dimension of performance but it is an important one. This dissertation will examine for Ontario not-for-profit public hospitals which technique appears to work most consistently in high performing hospitals.

Fast would encompass wait times, people would not be forced to wait uncomfortably and in pain to be treated. There is no research which links wait times in an Emergency Department to quality or cost of care. Some case studies have attempted to examine this but their sample sizes are very small. This question will be studied as part of this dissertation to determine if there is a relationship.

Cheap would mean that these services are executed at a price that the funding body accepts. This is an interesting question because, while budgets are frozen by the MOH, are high performing hospitals able to achieve more resources through private/corporate donors, research, and political lobbying? For Ontario not-for-profit hospitals this question has not been answered.

Useful management measures that leadership can use to achieve this “good, fast, cheap” performance have not been agreed upon because many stakeholders, such as doctors and RN’s (Dr. Maurice, 2006), believe that they are disenfranchised with this approach. As the current balanced scorecard for the WWLHIN demonstrates, it does not reflect the need to address the goals and objectives of the wider group of stakeholders. Current literature is weak in terms of providing any real guidance on measures which engage the wider group of stakeholders in the context of high versus low performance. An objective of this dissertation will be to discover how high performing Emergency Departments measure and manage their performance in an effort to build a more useful balanced scorecard or other measurement tool that will allow management to effectively improve the performance of ineffective Emergency Departments.

Board Composition and Effectiveness

Introduction

The notion of an optimal board structure, despite a large body of research, has eluded both for-profit and not-for-profit stakeholders (Boone et al, 2007; Jiang et al., 2009). The link between firm performance and board structure has produced findings which have been mixed and sometimes contradictory resulting in this subject being debated

extensively by both practitioners and researchers. This debate has been complicated in the for-profit environment through legislation in some countries like the United States where the Sarbanes-Oxley Act was passed in an effort to restrict corporate board structure to improve corporate governance.

Board Literature, For-Profit

While many academics have created and expounded theory to explain the purpose of boards, board purpose can largely be summarized using the basic theories of; agency, stewardship, and resource dependence. These theories differ largely in their assumptions about managerial nature and in the basic issues they define for firms. For example, agency theory posits that firm managers tend to behave opportunistically; therefore the basic issue from an agency perspective is how the board can avoid the negative aspects of such opportunistic behaviour. According to the agency academics (Jensen, Meckling, 1976; Fama, Jensen, 1983; Eisenhardt, 1988) the board of directors performs two critical functions, that of monitoring top executives and rewarding them. Stewardship theory assumes that managers generally act in the interest of shareholders; therefore the basic function is to support managers in their strategic activities (Davis et al., 1997, Muth, Donaldson, 1998). The resource dependence theory (Pfeffer, 1972; Pfeffer, Salancik, 1978; Boyd, 1990; Hillman et al., 2000) views boards as boundary spanners, not attributing much relevance to the managers of the firm, instead they propose that the board focuses on the issue of assisting the firm in trying to secure valuable external resources from its environment.

However, none of these theoretical perspectives has achieved any definitive empirical support. Attempts to prove a relationship between board structure and composition using these theories as a basis and firm performance, being defined typically by accounting measures such as return on assets, return on equity, net earnings, and growth in sales, have had weak or contradictory results (Baysinger, Butler, 1985; Bhagat, Black, 2002; Chaganti et al.; 1985, Daily, Dalton, 1992, 1993, 1994; Dalton et al., 1998; Ezzamel, Watson, 1993; Kesner et al., 1986; Pearce, Zahra, 1992; Peng, 2004; Rosenstein, Wyatt, 1990; Schellenger et al., 1989). Consequently, the superiority of a specific board composition is unclear (Raheja, 2005; Boone et al., 2007).

Even though these fundamental theories are all different in their perspective there is a commonality that their approach in that they all focus on one main task to be performed by the board (Hillman, Dalziel 2003). For example, agency theory focuses on the board's task of monitoring managers to avoid opportunistic behaviour. Stewardship theory concerns itself with the board's task of providing support and advice to management. Resource-dependence theory derives the external resources that are crucial to a firm's survival and success, and focuses the board's task of providing access or links to those resources. It has been argued that the inconclusive and mixed results of empirical research on the link between boards and firm performance may in part be due to its theoretical myopia of focusing on one board task only (Daily et al., 2003).

One insightful contribution that adopted a multi-theoretical perspective, combining different theories in their approach to board research, was the approach of Hillman and Dalziel (2003). They integrated agency theory and resource dependence theory to develop a model of how and when directors are likely to engage in effective monitoring

and resource provision. They argued that board composition reflects the task-solution potential of the board, such that financial and social incentives may or may not motivate directors to bring their resources to productive use for the firm. Other researchers, such as Lynall et al. (2003), have used alternative multi-theoretical perspectives to argue how board composition reflects the needs of the firm and predicts the performance of the firm. However they have achieved no definitive results which clearly explain the relationship between board composition and firm results.

This failure to explain the link between board composition and performance has produced research taken from a different perspective that attempts to explain firm performance through metrics such as the proportion of outsiders on the board and firm performance (Raheja, 2005). Zahra and Pearce (1989) advanced a theoretical approach which identified that the three key roles of a board are oversight, strategy and service. Using this theoretical approach, and the typology of Baysinger and Zardkoohi (1986), Markarian and Parbonetti (2007) in a study that spanned many for-profit industries, related firm internal and external environmental complexity to board composition. The typology of Baysinger and Zardkoohi (1986) classified board members as either insiders, business experts, support specialists, or community influentials. Internal complexity referred to the sophistication of internal processes while external complexity related to the external competitive structure, factors such as the number of business and geographic segments and industrial leadership. Insiders are directors who have served or currently serve as managers, employees, or owners of the company. Business experts are active or retired executives whose knowledge is related to strategic decision-making, with expertise that is related to internal issues. Support specialists provide companies with expertise and knowledge that support strategy formulation, providing

expertise in law, capital markets, and insurance as an example. Support specialists differ from business experts in terms of lacking general management expertise. Community influentials are support directors that provide service to the firm in terms of networking and reputation. They supply linkages with the general environment of the firm, examples being retired politicians, academics, members of social organisations, etc.

They found that externally complex firms substitute community influentials for insiders while internally complex firms have fewer community influentials with more insiders and support specialists. A major limitation in their research was that they were unable to arrive at any conclusions regarding the business expert category, hypothesizing that that the business expert variable was not well enough defined. More importantly, they were unable to relate board composition to firm performance, only to internal and external complexities. Chan and Li (2008) attempted to refine the understanding that these independent business expert directors have on firm performance by studying audit committee composition on the value of a sample of Fortune 200 firms. They were able to demonstrate that a narrow definition of independent business experts, combined with their control of the audit committee, resulted in a near five-fold increase in firm value versus firms whose audit committees did not fit those specific criteria. As Markarian and Parbonetti (2007) hypothesized, the definition of the business expert variable was one of the weaknesses of their study and potentially an important determinant with respect to firm performance.

According to agency theory and current governance legislation independent outsiders permit an adequate oversight function of top management (Dedman, 2002; Johnson et al., 1996; Karpoff et al., 1996; Klein, 2002). However this directly conflicts with

organisational theories that predict sub-optimal decisions, perhaps leading to sub-optimal performance, when large information asymmetries prevent effective oversight on the part of outside directors (Baysinger, Hoskisson, 1990; Maug, 1997; Raheja, 2005). The issues may be the conflict of inside versus outside directors and getting inside directors to reveal their superior information to help the board implement higher value decisions. Fama and Jensen (1983) argue that outsiders are more independent of management but less informed about firm projects and issues while inside managers and directors are an important source of firm-specific information. The inclusion of inside managers on the board can lead to more effective decision making but insiders need motivation to reveal their better information. They argue that the lack of personal benefits, perceived or real, as well as the possible lack of independence from the CEO may be reasons why they withhold valuable information from board outsiders. Raheja (2005) advances the notion that future CEOs are often selected from insiders therefore this competition of insiders for a future promotion may improve the information revealed to the board.

A classic situation is one where the CEO proposes a project to the board based on his incentives. Possible private benefits to firm managers may not only cause the CEO to propose an inferior project but he/she will achieve the support of the inside directors because of the private benefits to them. The inside directors know that the CEO has proposed an inferior project but outside directors can determine project quality only if they incur costly verification. This might not be possible due to time or financial constraints. These verification costs to outsiders decrease if insiders reveal their superior information even though the incentives of insiders are distorted by private benefits from inferior projects.

Insiders generally side with the CEO but having many insiders on the board will increase the incentive for any one insider to inform outsiders because doing so may increase his/her chance of succession (Raheja, 2005). A higher number of insiders lowers coordination costs and still maintains competition among insiders but usually requires more insiders to defect from the CEO to validate the inferiority of any given project or decision (Raheja, 2005). Higher numbers of outsiders on the board increases the perception of board independence but increases cost to coordinate their efforts and verify projects or critical decisions. The objective is that the optimal board design maximizes the probability that the majority of the board will vote against inferior projects and/or decisions and replace them with higher value projects and/or decisions. This may not happen because it is possible that external directors do not have the complete and correct information to make an informed decision.

In a for-profit world outside directors will select a successor independent of the current CEO only if they verify that the CEO proposed an inferior project or the firm ends up in a bad state, otherwise the board generally goes along with the CEO's choice (Parrino, 1997). The CEO generally selects a successor from the set of insiders who supported him/her. Parrino (1997) has documented that of CEOs whom are forced out, 49.6% are replaced by outsiders while of CEOs whom leave voluntarily 90.1% are replaced by insiders. This makes an insider's decision to go against his/her CEO a difficult one if they are interested in succeeding the CEO and the CEO has been successful in his/her function. Another factor complicating the cost of verification is that CEO influence with the board has been shown to increase with the time that the person has been with the firm (Hermalin, Weisbach, 1998).

Unfortunately there is very little theoretical research which addresses board structure and the effectiveness of boards with respect to firm performance. In an effort to understand how to extract valuable internal firm information researchers have attempted to study the relationship between the CEO and outside directors. Hermalin and Weisbach (1998) examined the endogenous dynamics of director nominations and CEO entrenchment and the effects on corporate board structure. Warther (1998) considered how a CEO's ability to fire dissenting board members influenced the decision making ability of the board. Adams and Ferreria (2003) studied how to design a board to provide incentives for the CEO to reveal his private information. None of these efforts provided definitive conclusions to lower the cost of verification as demonstrated by the surveys conducted by John and Senbet (1998) and Hermalin and Weisbach (2003).

Several researchers have attempted to relate the size of boards with performance (Raheja, 2005). Smaller boards work well when the incentives of insiders are better aligned with those of shareholders, these tend to be in firms in very competitive industries or firms with a high degree of insider ownership (Raheja, 2005). However, this result was challenged by Juras and Hinson (2008) where they were able to prove for the banking industry that lower levels of firm ownership among directors resulted in superior performance over a five year period. Small boards also save on outsider coordination costs but still have the issue of motivating insiders to reveal their private information. When verification costs are low there tends to be a higher proportion of outsiders, in contrast, when verification costs are high, like high tech firms, there are more insiders. The reason for this is when it is difficult to motivate outsiders to verify projects the firm is better relying more on competition among insiders even though the incentives of insiders may be distorted by private benefits (Audretsch, Lehmann, 2006).

The conclusion would be that the most effective boards are those with low verification costs to outside members and low private benefits to inside board members. However, conclusive results linking board size to performance still prove elusive. Lipton and Lorsch (1992) and Jensen (1993) proved that the difficulty of decision making increased as board size increases, they believed primarily due to the fact that each outside board member incurs a large coordination and communication cost. Hackman (1990) predicted this problem with a study demonstrating the increased costs of group decision making as group size increases. This is conflicted with the needs of the for-profit shareholder activist that has demanded more independent outsider directors and recent regulation in the United States to increase the independence of board through increased use of outside directors. Both of these environmental pressures result in the increase of board size, counter to Hackman's research.

Lynall et al. (2003) attempted to link board composition to firm life cycle. They considered firm life cycle as a reflection of organizational maturity and were able to partially explain board behaviours based upon this model. However, they noted that board composition, regardless of the business issues at the time, tended to persist. Consequently, like other researchers, they were unable to associate board composition with firm performance.

In summary, while the research in corporate governance with respect to for-profit firms has been a growing body of literature, there has been no theory developed that can prove a conclusive proof of the link between board composition and firm performance.

Board Literature, Not-For-Profit

While there is a growing body of work that is attempting to link firm performance in the for-profit environment with board composition, there has been significantly less work accomplished in the not-for-profit sector linking not-for-profit governance with the entity's performance. In contrast to industry the market economy concept for not-for-profit organizations does not work because prices do not regulate demand. Not-for-profit institutions generally derive their tasks through an appointment by government as a result of public policy or tradition. Government will allocate a budget to a not-for-profit institution according to decisions made by the Government bureaucracy. The complexity of large not-for-profit organizations, like hospitals, makes it very difficult to characterize the resource requirements (James, Rose-Ackerman, 1986). Therefore a knowledge gap can exist between the government bureaucracy and the not-for-profit in terms of local requirements, leading to a potential performance failure on behalf of the not-for-profit or large inefficiency due to allocation of more resources than is required. Additionally, in most large not-for-profit organizations, like hospitals, there exists tension between the principals and agents of the organization because of their fundamentally different nature.

The principal or management of the organization, who is usually a professional manager, makes decisions regarding resource allocation. These principals are relative outsiders compared to the agents of the organization who are the professionals that deliver the specialized services provided by the not-for-profit institution. Unlike junior or mid-level managers in a for-profit organization these professionals are not motivated by budget or financial performance but rather some "higher" calling. As a result they

usually consider themselves to be part of some larger group rather than merely part of their own organization. The uniqueness of their professional skills and expertise drives them to maintain a level of autonomy in order to be able to deliver the specialized services in a high quality fashion. Therefore, the principals are often not in a position to evaluate their ability and performance or to assist them in improving the quality of their services (Schneeweiss, 1995). The challenge for the principals is to motivate and assist the agents, or professionals who deliver the services, without monitoring them excessively, while meeting the constraints imposed by government bureaucracy.

There are many universities offering courses in how a not-for-profit board should operate as well as many articles and books but there is little empirical research that examines the impact of not-for-profit board composition and the performance of the organization. The literature that exists falls into two major categories;

Empirical studies using subjective performance measures, such as self reported ratings by organizational members (Miller et al., 1988, Beekun et al., 1992).

Empirical studies using more objective measures of performance with three subcategories;

Measures of board performance in obtaining resources;

Measures of board performance in organizational goal attainment (effectiveness);

Measures of board performance in transforming inputs into outputs (efficiency).

Empirical studies with objective measures of performance, particularly effectiveness, which is the ultimate objective of not-for-profit organizations and is the subject of this dissertation, are relatively few and fewer still have produced conclusive results.

Siciliano (1990) found that the proportion of business support or expert people on YMCA boards was unrelated or in some cases had a negative relationship to organizational performance but she found that board involvement in formal planning improved social performance. Bradshaw et al. (1992) in a study of Canadian not-for-profit organizations found that board effectiveness was unrelated to the size of the board. Green and Griesinger (1996) studied 16 not-for-profit organizations and their qualitative effectiveness measure, based upon ratings by the authors, practitioner-experts, and a government funding source, with data on the board's effectiveness obtained from CEOs and board members. They found a positive relationship between the extent of board activity in various board responsibilities such as strategic planning, resource development, financial management, and conflict resolution. Herman and Renz (1997) investigated the criteria that various stakeholders use to judge not-for-profit effectiveness, using archival data and questionnaire data from individuals associated with 25 disabilities organizations and 34 health and welfare charities. While they were concerned about the validity of their data they found that the stakeholder groups that they identified had low correlation with each other in terms of what constituted effective performance. This conclusion is not surprising as one of the historical challenges of measuring performance in the service industry, whether it is for-profit or not-for-profit, is the subjectivity of performance evaluation of the service.

Little guidance is found as well in the evaluation of efficiency. Callen and Falk (1993) related the efficiency of 73 Canadian health charities to the composition of the board of directors in terms of the level of insiders versus outsiders. Using linear programming methodology they found that there was no significant relationship between board composition and efficiency. Olson (2000) studied the relationship of various aspects of

board characteristics at 43 independent colleges with respect to revenues and endowments. While he found a positive relationship between board size and total number of endowments this did not correlate to revenues. He hypothesized that larger boards had more outside contacts which would make them more effective in helping the organization to obtain resources. A related outcome of this work was that he found board tenure and the number of members with a for-profit executive background to be positively associated with the number of endowments as well. Again, he hypothesized that this was due to the size of their networks. Bradshaw et al. (1992) explored the impact of board size and found that the size of the not-for-profit board and the degree of horizontal complexity (the number of board committees) were not correlated with perceived effectiveness. Brown (2005) found that large boards were correlated with organizations that lack strategic direction and simply react to circumstances.

Callen et al. (2003) made another attempt to connect the composition of a not-for-profit board and its organizational efficiency. They examined not-for-profit charities in the state of New York using fundraising data mandated by regulatory filings maintained by the New York State Department of Law followed by a mail survey of the organizations selected to be examined. Callen et al. (2003) used research by Weisbrod and Dominguez (1986), Posnett and Sandler (1989), Callen (1994), and Tinkelman (1998, 1999) to define organizational efficiency. The measures selected were the log ratio of administrative expenses to total expenses, the log ratio of fundraising expenses to total expenses, and the log ratio of total expenses to program expenses. They found that the proportion of administrative expenses to total expenses tended to decrease with the proportion of major donors on the board of directors. This is consistent with Fama and Jensen (1983) in that major donors in not-for-profit organizations appear to perform the

same monitoring function that large shareholders do in for-profit business. It could be argued that this causality may not be true because major donors might be likely to be drawn to efficient organizations and the proportion of administrative expenses to total expenses is likely to be low when few large donors constitute most of the donations. It may be that large donors penalize administratively inefficient organizations, believing that their donation is best offered to a not-for-profit that has the perception of efficiency. Callen et al. (2003) arrived at mixed conclusions concerning board composition with respect to the other measures but offered a salient caution regarding their research. They were not able to prove that the actions by significant donors to reduce not-for-profit administrative spending were appropriate. They believed that excessive focus by donors on financial efficiency indicator ratios may lead to dysfunctional managerial behaviour. They recommended that management and boards find alternative measures of not-for-profit effectiveness and that they should educate major donors about the problems of over-focusing on narrow ratios. A real danger of this major donor behaviour is if other influential external organizations that are sources of funding for not-for-profit organizations, such as government, share the same beliefs that these ratios are in fact meaningful performance metrics in a not-for-profit environment. This behaviour is predicted by the institutional theory model (D'Aunno, 1992) where widely held beliefs and rules in the environment often influence behaviour. Not-for-profit organizations, whose outputs or outcomes are especially difficult to evaluate, face strong pressures to conform to expectations about how they should behave. Because of these pressures not-for-profits often adopt these measures of organizational efficiency of meaningful performance metrics when in fact there may be no relationship between these metrics and the actual success of the services that they deliver to their customers.

In summary, the little research done with respect to not-for-profit organizations and board composition, like the research examining the for-profit question, has not returned any definitive conclusions.

Hospital Board Literature

The study of hospital boards has been initially focused on their ability to attract resources from the environment under the assumption that resource availability would result in superior organizational performance. Pfeffer (1972) studied 57 hospitals in the U.S. Midwest proving that large private not-for-profit hospitals required large boards while large not-for-profit hospitals primarily funded by the government or a religious order required smaller boards. This outcome supports the argument that the more a hospital requires linkage to the local environment for fund raising and support the larger the board while the opposite is true as well. He was also able to prove that career track of the directors had an impact on fund raising. Specifically, directors with a manufacturing background and local politicians had a positive correlation to fund raising and number of directors with a finance background were correlated to the size of the hospital budget. His study also demonstrated the negative correlation between the proportion of administrators or bureaucrats on the board and the increase in services and health care programs offered by the hospital. These conclusions were reached independent of the type of hospital, for-profit or not-for-profit.

A more recent hospital study by Goodstein et al (1994) indicated that hospital boards with a higher proportion of insiders and business directors made more changes in their mix of services in response to legislative reforms. However, while this relation was

proven to hold true for not-for-profit hospitals it was not true in for-profit hospitals. The evolution of this work has been the clear distinction in hospital literature between the corporate governance model and the philanthropic governance model traditionally associated with not-for-profit hospitals (Delbecq, Gill, 1988; Shortell, 1989; Alexander, Morlock, Gifford, 1988; Weiner, Alexander, 1993). The corporate model tends to have a smaller board than the philanthropic model, in line with Pfeffer (1972). These smaller boards tend to be less diverse than the larger philanthropic boards and have an internal focus. They participate more actively in organizational policy formulation and monitor top management more closely (Pfeffer, 1972). Corporate boards have fewer generalists with more specialists who have specific backgrounds and skills. However, there has been little research into the nature of these skills and which ones have a positive (negative) impact on hospital performance (Alexander, Lee, 2006). The larger number of inside directors combined with direct management accountability to the board and an emphasis on strategic activities suggest that Drucker's (1954) methodology of effectiveness versus efficiency is being pursued by the corporate hospital boards. The larger boards of the philanthropic model, with more outsiders, by definition are not as involved in the day-to-day operations of the hospital and as a result tend to focus more on the organization-environment linkage, efficiency benchmarking and asset preservation, versus the real effectiveness of the organization (Baysinger, Hoskisson, 1990). An unanswered question for not-for-profit hospital boards is what is more important, the composition of the board or its size?

A recent study of U.S. Hospitals by Beekun et al. (1998) suggests that large boards tend to evaluate hospital management performance by financial outcomes. The Ontario LHINs and the Ministry of Health for Ontario, the ultimate government body

overseeing hospital performance, use financial efficiency criteria to evaluate management and board performance. When the financial criteria are not met the government will intervene, dismiss the hospital board and senior management and appoint a government supervisor to return the hospital's efficiency to expected performance norms. This government process has not worked with any sustainability as supervisors are often sent in multiple times in an effort to improve a hospital's efficiency (Canadian Institute for Health Information, 2007). In fact, the Canadian Press reported on Oct. 12, 2009 that 38% of Ontario's public hospitals are failing in their financial efficiency performance and operating on a deficit basis (Babbage, 2009).

The citizens of Ontario have not been satisfied with this efficiency approach as it is not linked to quality of care (Canadian Institute for Health Information, 2007). Due to pressure from citizens regarding the quality of care in hospitals, specifically emergency care and wait times, the Ministry of Health of Ontario has required all emergency care hospitals to publish a standard Balanced Scorecard (Table 2). For hospital boards, especially large boards, an effectively designed Balanced Scorecard could significantly lower the cost of accessing inside information. However, in spite of the requirement to issue a Balanced Scorecard, not all Ontario hospitals participate. They are however, required to meet the financial criteria in order to avoid being "taken over" by a provincial supervisor (Closson, 2007).

There has been no empirical research which examines if there is a relationship between the efficiency and effectiveness of hospitals. However, several case studies have been done which suggest that highly effective hospitals are also efficient (Savary, Crawford-Mason, 2006) but the relationship between effectiveness and efficiency depends greatly upon the specific metrics chosen (Alexander et al., 2006).

Table 2

Ministry of Health Balanced Scorecard for Emergency Care Hospitals

<p><u>System Integration and Change</u> This quadrant describes an emergency department's ability to manage change in a dynamic health care environment. The survey measures the structures, processes and innovations used by emergency departments to support quality improvement. This quadrant evaluates areas such as the development and use of standardized protocols, the involvement with external partners and the use of clinical information technology. [7 indicators]</p>
<p><u>Patient Satisfaction</u> This quadrant examines patients' perceptions of their emergency department experience, including their overall impression of care and their perceptions related to communication, responsiveness and consideration. [4 indicators]</p>
<p><u>Clinical Utilization and Outcomes</u> This quadrant describes clinical performance for care processes and outcomes related to asthma, ankle injury and pneumonia in emergency departments. This year, new paediatric indicators have also been incorporated. [10 indicators]</p>
<p><u>Financial Performance and Condition</u> This quadrant describes the financial performance of emergency departments in terms of human resource productivity indicators. [4 indicators]</p>

Source: Hospital Report 2007, Canadian Institute for Health Information

Ontario citizens are pressing the government for improved performance of the health care system (Closson, 2007). For the health care customer, this means a system which addresses their physical, as well as financial health requirements. This pressure is forcing hospital boards to demonstrate their leadership in improving their performance with respect to the quality of care and safety (Closson, 2007). Very few studies have examined the performance of hospital governing boards in the oversight of patient quality and safety (Jiang et al., 2009) and those that have been done produced conflicting results. Two studies concluded that active engagement in quality by hospital governing boards is lacking (Joshi, Hines, 2006; Levey et al., 2007). Two other studies executed at the same time, based upon different surveys, reported that hospital governing boards appeared to be engaged in quality oversight (Jiang et al., 2009; Vaughn et al. 2006). Jiang et al. (2009) found that the existence of a board quality committee enhanced the board oversight function and was associated with lower

mortality. Vaughn et al. (2006) found better quality scores associated with spending more time on quality issues at board meetings, using quality performance reports, linking senior executives' compensation to quality improvement, and involving medical staff in the quality strategy. However, neither study linked the composition of the board to differences in the hospital's quality performance.

Summary of Board Literature

The body of for-profit board literature that exists today is incomplete and contradictory (Boone et al., 2007, Jiang et al. 2009). The research that exists regarding board composition and its effect on the performance of the firm is even more incomplete, especially in the not-for-profit hospital environment. Attempting to prove a link between firm performance and board structure and composition using the theoretical perspectives of agency, stewardship, and resource dependence has had weak or contradictory results (Baysinger, Butler, 1985; Bhagat, Black, 2002; Chaganti et al., 1985; Daily, Dalton, 1992, 1993, 1994; Dalton et al., 1998; Ezzamel, Watson, 1993; Kesner et al., 1986; Pearce, Zahra, 1992; Peng, 2004; Rosenstein, Wyatt, 1990; Schellenger et al., 1989) perhaps because they all focus on one main task of the board (Hillman, Dalziel, 2003). Attempts to integrate these theories together have also resulted in no definitive results which clearly explain the relationship between board composition and firm performance (Lynall et al., 2003).

Recent research done by Markarian and Parbonetti (2007) made an attempt to classify the composition of the board members by definition as an "insider" or "outsider" and if the board member was an "outsider" then what type of resource/skill they brought to the

board (Baysinger, Zardkoohi, 1986). While they were able to link composition to the complexity of the internal and external environments they were not able to arrive at any conclusions related to firm performance. However, the framework developed by Baysinger and Zardkoohi, enhanced by the subsequent research of Markarian and Parbonetti in its use, may provide a foundation to examine the link between Ontario not-for-profit hospital Emergency Department performance. The opportunity, as Markarian and Parbonetti stated (Markarian, Parbonetti, 2007), is to refine the category of the business expert variable.

Board composition and organization performance in the not-for-profit environment is even more complex because of the performance conflict between efficiency and effectiveness (Drucker, 1993). Efficiency is relatively easy to measure, typically being based upon financial measures whereas effectiveness, particularly in a service environment, is much more difficult to measure because of the definition of what constitutes as effective from the different stakeholder groups. Even physicians have had difficulty defining quality (Larson, 2007). The Ministry of Health in Ontario has largely chosen to base its performance evaluations of hospitals upon efficiency versus effectiveness measures and the effectiveness measures in place are not consistently enforced across the province (Closson, 2007). This conflict between efficiency and effectiveness is exacerbated by the cultural conflict between the doctors and nurses who are trying to deliver high quality services in the Emergency Departments and the hospital administrators who are trying to meet provincial mandates for efficiency.

This conflict or mistrust between the practitioners and the administrators is amplified by the fact that the practice of medicine itself is changing. As value of evidence based

medicine is growing, with its contingent best practices for quality and patient safety, it inevitably comes into conflict with one of medicine's most hallowed traditions, the autonomy of the physician (Larson, 2007). As the practitioners of both the art and science of medicine, physicians have never wanted to be bound by standards, rules, or mandates beyond the Hippocratic Oath (Maurice, 2006). How can moving from clinical judgment and individual decision making to a standardized way based upon the best evidence, including the increased incorporation of Information Technology, reconcile itself with the age-old perception of the physician as the "captain of the ship"?

Hospital best practices have shown that to take advantage of modern operational and informational technologies hospital boards have to demand less variation in physician treatment by getting them to follow the same protocols, particularly in the intense environment of a hospital Emergency Department (Alexander et al., 2006). A real advantage for a board that demands evidence based standards uniformly for patient care is that its cost of getting high quality internal information is low (Fama, Jensen, 1983) and it should be more effective in guiding and coaching management, leading to better hospital performance.

The clear distinction in hospital literature between the corporate governance model and the philanthropic governance model traditionally associated with not-for-profit hospitals has not provided any specific guidance either. Unfortunately, there is no research that would guide a not-for-profit hospital board in terms of optimizing its composition so that it can assist management and the medical staff through the challenges of providing highly effective care in an environment of constrained financial resources full of disruptive technologies and highly effective innovative methodologies.

Literature Summary and Research Questions

This dissertation seeks to resolve the hospital Emergency Department performance problem for Ontario public hospitals by proposing a new governance model which is more activity-based (Porter, 1996) rather than the current governance model which is resource-based (Center for Health Design, 2007). The current resource-based governance model is not broadly working across the province (Maurice, 2006). The resources of an Ontario hospital has are constrained and established by its LHIN and the MOH (Ontario Hospital Association, 2007). The existing literature has not provided the guidance necessary for Ontario public hospitals to deliver superior Emergency Department performance through superior governance or management performance.

This dissertation will attempt to develop this new governance model based upon the presence and influence at the board level of for-profit activity-based turnaround competencies in these resource deficient environments. This may allow Ontario public hospitals to deliver the Emergency Department health care citizens expect (Flower, 2006) in this challenging environment on a sustainable basis through superior activity execution and fit.

The objective is to investigate the critical board competencies that directly and indirectly influence hospital Emergency Department performance. Given that these competencies can be identified they will be investigated to determine if they influence critical activities which in turn directly influence hospital Emergency Department performance. Furthermore, these competencies will be researched to determine if there are relationships between them which result in a higher order of fit (Porter, 2006) in terms of patient outcomes. A high order fit of critical competencies should result in

limited resources being applied more efficiently and effectively to meet stakeholder expectations.

It is expected this strategic position of interlocked critical competencies may identify the significant trade-offs that stakeholders will have to make to achieve their expectations. The literature review has identified many existing gaps that need to be researched to determine if an effective activity-based governance model can be developed. The Ontario hospital situation is unique in that not-for-profit hospitals have a virtual monopoly for all health care, especially Emergency Departments. Therefore, any improvements achieved through this research are likely to have significant impact.

Research questions that have arisen as a result of the gaps in the literature include:

Are there critical activities that determine the effectiveness of an Emergency Department for Ontario public hospitals?

What skill sets on a board of an Ontario public hospital directly influences the performance of those critical activities?

What skill sets on a board of an Ontario public hospital directly influence on the performance of its Emergency Department?

Is there an ideal board composition in terms of skill mix for an Ontario public hospital?

Is there a relationship between the skill composition of the Local Health Integration Networks (LHINs) and public hospital Emergency Department performance?

Are there other governance activities or competencies which influence the performance of public hospital Emergency Departments?

Given the performance management style of the Ministry of Health and Long Term Care (MOH), is there a funding metric which relates directly to high performing public hospital Emergency Departments?

Is there unique technology, such as information systems or other, which consistently appears in higher performing Emergency Departments?

Is there a relationship between Emergency Department performance and financial breakeven (all Ontario public hospitals are mandated to breakeven each year, regardless of hospital activity)?

Evaluation Methodology

In spite of a declared public policy of “open information”, operational performance data by hospital for critical metrics such as mortality rates, accident rates, treatment success ratios, etc. is unattainable by any outsider to the Ontario health system (Nieminen, 2008). However, there is public information available, by hospital and LHIN, on published Balanced Scorecards, which details less controversial operational performance. Given the vast research proving that “if you cannot do the little things well you cannot do the big things well” (Drucker, 2005) it will be proposed that a hospital’s Emergency Department performance on more critical measures is directly related to their performance on the less contentious publicly reported metrics. To insure consistency and credibility with the medical and existing governance community, reported Balanced Scorecard performance on what the Ontario public health system identifies as critical Emergency Department activities will be used as a comparative baseline.

A performance evaluation and activity matrix will be developed for all Ontario public hospitals and Emergency Departments. This matrix will incorporate qualitative and quantitative measures reflecting multiple stakeholder understanding and expectations of actual and desired hospital performance (Boyne, 2004). Control variables such as the size and type of hospital will be examined to ensure that their impact is taken into consideration when evaluating the overall results. This matrix will identify critical activities that relate to hospital Emergency Department performance.

Stakeholders will include patients, doctors, nurses, administrators, support staff, boards, and government. Publicly available survey information from the comprehensive Canadian Institute for Health Information (CIHI) database and each hospital's published community reports will be used to develop and validate the performance evaluation matrix.

Statistical evaluation of the Balanced Scorecards, individual hospital community reports, and CIHI survey data will be used to identify activities that appear to fit together efficiently resulting in performance that meets stakeholder expectations. It is expected that detailed statistical analysis and evaluation of these databases will result in the creation of a new governance model for Ontario public hospitals which will motivate superior Emergency Department performance.

New Approach to the Evaluation Methodology

The evaluation methodology will be enhanced by exploring specific alternative evaluation strategies.

Just comparing board structure and competencies directly to patient and financial outcomes may result in proving that certain structures and board member skills effect outcomes but not explain why. Therefore, a rigorous analysis of the activities mandated by the Ministry of Health (MOH) will be performed to determine which, if any, of those activities influence outcomes. Then, the presence and level of those activities will be compared to board structure and competencies in order to better understand just how the board structure and skills influence performance. The use of more sophisticated software than used in this study would allow this approach to be analysed in the context of a Structural Equation Model (SEM). SEMs are effective in testing complex relationships between variables in an effort to build an overall path diagram depicting the interrelationships between these variables. SEM would allow the researcher to more fully explore direct, indirect, and total effects of these relationships as well as allow for explicit tests of any competing models.

The self reporting Balanced Scorecard mechanism used by Ontario public hospitals will be examined to understand its strengths and weaknesses in order to improve its quality and accuracy.

Research Methodology

Data Sources and Definitions

Introduction

A database of all of Ontario's 109 hospitals will be developed, classifying the hospitals into the three major types; Teaching, Community, and Small. Performance and

organization data for each hospital, as obtained by the published Balanced Scorecard, CIHI database, and each LHIN's own community reports, will be inputted into the database. This data will include measured activities, organizational data, qualitative performance, and quantitative performance as perceived by stakeholders. The most recent data available is that for calendar year 2007. Ontario hospitals did not begin any form of consistent formalized and accessible reporting until 2003. Unfortunately, it was not until 2005 that most Ontario hospitals participated in this consistent reporting. Even for the calendar year 2007 many hospitals do not report on all the metrics legislated by law. This behaviour develops the concern that if the hospitals cannot even collect the data that they are mandated gather how can they evaluate if their improvement programs are working? An attempt will be made to explore the root cause of this data collection failure in this dissertation. The numerical data accessed for this dissertation is based upon the published information available for those years. Hospitals that exhibit gaps in reporting will be analyzed to determine if there are any meaningful patterns.

This data will be supplemented by an additional database detailing the structure of the boards of directors of each hospital and the core competencies of all 1,714 board members using related sources of public information. This results in each hospital Emergency Department having at least 170 reported performance elements that will be analysed, approximately 20,000 data points overall.

Using the published Balanced Scorecard performance attributes, each hospital will be assessed for the quality and accuracy of the data that it has reported through comparison to published CIHI data for that hospital Emergency Department, Acute Care, and overall reported performance data that is publicly available from the MOH.

Control variables for analysis will be identified in each database to ensure that their impact is accounted for in all analysis results. This includes the classification of board member core competencies. Frameworks developed by researchers reviewed in the literature review will be used where possible in order to build upon and validate their work. Common critical performance variables will be identified using comparative data so that Emergency Department performance can be objectively analysed across all LHINs and hospitals. All reported activities and their level of use will be analysed to determine if they positively or negatively impact Emergency Department performance. The existence of these activities and the level of their use will be compared to board structure to determine if the presence of certain board skills and/or structure positively or negatively impacts the degree of critical activity.

By linking activities and their degree of implementation to critical performance metrics it is expected that the research will identify those significant activities which need to be managed well by each hospital Emergency Department in order to perform as best as can be expected given the resources available. By linking these identified vital activities to board structure and composition the hospital will be able to reconfigure itself so that it can support management in the implementation of these vital activities. Using the publicly available data, versus any “insider” data, improves the legitimacy of the data analysis as these public reports are documents that the hospitals are legally bound to submit.

Standard academic statistical tests will be used to determine the level of interaction between variables. Activities will be compared against Emergency Department outcomes initially using correlation analysis. If the correlation result merits further

analysis, regression calculations and statistical F and t tests will be performed in order to determine the relevance of the activity versus the Emergency Department outcome. This same process will be used to identify board composition versus activities and outcomes. It is expected that this approach will present a more complete representation of governance activities and structure that will result in improved performance for Ontario public hospital Emergency Departments.

Hospital Performance Measures, Emergency Department

The following hospital performance measures use standard measures of performance as defined by the Ontario Hospital Association (OHA). These measures are also required to be reported by each Ontario hospital for use in its mandated scorecard. Note that all of these measures are self reported by each hospital and vary between 0 and 100% (Appendix B). The source for this data is Canadian Institute for Health Information publication *Hospital Report, Emergency Department Care 2005 and 2007*.

The hospital Emergency Departments examined in this report vary considerably by size, population served, and overall patient volumes. In recognition of this variability and to allow for meaningful comparisons the analysis uses the classification as defined by the MOH. The three classifications of hospitals are Teaching, Community, and Small.

Teaching hospitals are defined as those acute and paediatric hospitals that have membership in the Council of Academic Hospitals of Ontario (CAHO). Member hospitals provide highly complex patient care, are affiliated with a medical or health sciences school and have significant research activity and post-graduate training.

Community hospitals encompass those hospitals not defined as Small or Teaching.

Small hospitals were defined according to the guidelines set by the Joint Policy and Planning Committee (JPPC). In general, these hospitals are a single community provider and the total inpatient acute, CCC and day surgery weighted cases are under 2,700 as per 2005–2006 data.

For multi-site organizations, the hospital type designation was based on the size of the largest single hospital site in the organization.

Healthy Work Environment (HWE): The extent to which hospitals have mechanisms in place to support and promote a healthy work environment, thereby contributing to employees' physical, social, mental, and emotional well-being.

Use of Standardized Protocols (or Procedures) (SOP): SOP indicates the degree to which the Emergency Department in the hospital is developing and using clinical practice guidelines and medical directives for a broad range of relatively common conditions. The measure indicates the % of patients cared for with SOP (Canadian Institute for Health Information, 2007).

Internal Co-ordination of Care (ICC): ICC indicates the degree to which the Emergency Department is engaging in a variety of strategies that facilitate the internal co-ordination of care. These strategies include Lean methodologies (Canadian Institute for Health Information, 2007).

External Partnerships (EP): EP measures the degree to which an Emergency Department is directly engaged in initiatives with external health care providers and agencies in their communities. This includes outsourcing of health care activities (Canadian Institute for Health Information, 2007).

Management and Support of Human Resources (MSHR): MSHR indicates the degree to which Emergency Departments are supporting staff training and education and are implementing mechanisms that facilitate discussion on issues regarding the quality of work life, recruitment, and retention of staff (Canadian Institute for Health Information, 2007).

Clinical Data Collection and Dissemination (CDCD): CDCD measures the extent to which Emergency Departments collect and disseminate clinical outcomes and appropriateness data related to timing issues, patient care management, and adverse events. Dissemination relates to the sharing of data among selected stakeholders within the hospital and the use of data by committees and other specific staff. The measure indicates the % of patients cared for with CDCD (Canadian Institute for Health Information, 2007).

Use of Clinical Information Technology (UCIT): UCIT is the extent to which Emergency Departments are using or developing electronic tracking systems and electronic records, and performing selected functions online (Canadian Institute for Health Information, 2007).

Patient Overall Impressions (POI): POI is a patient reported assessment, overall, of their hospital stay. The number represents their satisfaction of the overall experience (Canadian Institute for Health Information, 2007).

Patient Communication Assessment (PCA): PCA measures how well patients assessed that the hospital communicated to them or their family during their Emergency Department stay (Canadian Institute for Health Information, 2007).

Proportion of Pneumonia Patients That Have an Inpatient Length of Stay (LOS) of ≤ 2 Days (PPPIS): This indicator measures the proportion of adult patients (20 to 84 years) seen in the Emergency Department with a diagnosis of pneumonia who are admitted as an acute inpatient and who have an inpatient LOS ≤ 2 days. This indicator provides an indication of the proportion of patients seen in the Emergency Department with pneumonia who could potentially be safely treated in the community rather than being admitted to hospital. A lower rate is generally considered to be better.

Return Visit Rate for Asthma (≤ 24 hours, Adult 20-64 years old) (RVRAa): This indicator measures the proportion of adult patients 20 to 64 years old who are discharged from the Emergency Department with a diagnosis of asthma who have an urgent or emergent return visit or a related condition to any Emergency Department within 24 hours after the initial discharge. This is a measure of the Emergency Department's ability to effectively treat asthma among adult patients. A lower rate is considered to be superior performance (Canadian Institute for Health Information, 2007).

Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old) (RVRAb): This indicator measures the proportion of adult patients 20 to 64 years old who are discharged from the Emergency Department with a diagnosis of asthma who have an urgent or emergent return visit or a related condition to any Emergency Department within 24 to 72 hours after the initial discharge. This is a measure of the Emergency Department's ability to effectively treat asthma among adult patients and adequately assess patients at risk for relapse. A lower rate is considered to be superior performance (Canadian Institute for Health Information, 2007).

Return Visit Rate for Asthma (0 to 72 hours, Paediatric 1-19 years old) (RVRAc): This indicator measures the proportion of paediatric patients, 1-19 years old, who are discharged from the Emergency Department with a diagnosis of asthma who have an urgent or emergent return visit for asthma or a related condition to any Emergency Department within 72 hours after the initial discharge. This is a measure of the Emergency Department's ability to manage asthma exacerbations in paediatric patients, a lower rate is considered to be better (Canadian Institute for Health Information, 2007).

X-Ray Rate for Ankle or Foot Injury Patients (Adult 20 to 84 years old) (XRRAFIPa): This indicator measures the proportion of adult patients, 20-84 years old, with an X-ray of the ankle or foot. The Ministry of Health and Long Term Care of Ontario (MOH) uses this as an indicator of clinical efficiency within the Emergency Department and the used of evidence-based clinical decision rules for diagnosing ankle or foot fractures in adult patients. The MOH seeks a median number on the basis that a number too low indicates that the hospital is under-utilizing X-rays, under diagnosing ankle and foot fractures, while a high number is indicates that the hospital may not be employing clinical decision rules and hence using X-rays inefficiently (Canadian Institute for Health Information, 2007). The literature review suggests that X-raying all ankle and foot injuries results in a lower return rate (Savary, Crawford-Mason, 2006).

X-Ray Rate for Ankle or Foot Injury Patients (Paediatric 5 to 19 years old) (XRRAFIPb): This indicator measures the proportion of paediatric patients, 5-19 years old, with an X-ray of the ankle or foot. The MOH uses this as an indicator of clinical efficiency within the Emergency Department and the used of evidence-based clinical decision rules for diagnosing ankle or foot fractures in adult patients. The MOH seeks a

median number on the basis that a number too low indicates that the hospital is under-utilizing X-rays, under diagnosing ankle and foot fractures, while a high number is indicates that the hospital may not be employing clinical decision rules and hence using X-rays efficiently (Canadian Institute for Health Information, 2007). As for adult patients, the literature review suggests that X-raying all ankle and foot injuries results in a lower return rate (Savary, Crawford-Mason, 2006).

Return X-Ray Rate for Ankle or Foot Injury Patients (≤ 7 Days) (XRRAFIPc): This measurement indicates the proportion of patients 5 to 84 years old who are discharged from the Emergency Department with a diagnosis of ankle or foot injury without an ankle or foot X-ray who have a return visit for ankle or foot injury to any Emergency Department within seven days after the initial Emergency Department discharge and who receive an ankle or foot X-ray on the return visit. A lower number is considered superior (Canadian Institute for Health Information, 2007).

% Total Worked Hours (TWH): This indicator measures the proportion of staff hours (excluding medical staff) spent engaged in activities relate to the operation of the Emergency Department. Sick time and educational time are examples of staff hours (nursing and non-nursing) that are not spent engaged in activities directly related to the operation of the Emergency Department. This indicator is a measure of productivity and variations in this indicator occur because of a complex mix of practices. Factors such as continuing staff education reduce labour productivity during the training period but may increase labour productivity or quality of care in subsequent periods. Low productivity due to high sick time is not desirable and may indicate a need for practice improvement.

Values much higher or lower than the mean and significant changes from previous years may require investigation (Canadian Institute for Health Information, 2007).

% Management and Operational Support Staff Hours (MOSSH): This indicator measures the proportion of staff hours spent engaged in activities related to managing or directly supporting the Emergency Department but not directly involved in providing patient care such as those performed by a unit manager or registration clerk. A higher value indicates a greater proportion of hours spent on management or support of the operation of the Emergency Department. A lower value indicates a lesser proportion of hours spent on management and more on activities that directly contribute to the provision of Emergency Department care to patients. The MOH believes that it is important to achieve a balance between management and operational support and patient care resources to ensure optimal quality patient care in Emergency Departments. The MOH believes that values much higher or lower than the mean and significant changes from previous years may require investigation (Canadian Institute for Health Information, 2007).

% Nursing Worked Hours (NWH): This measures the proportion of time nursing personnel spend working in the hospital on activities such as direct patient care, charting and in-service education, as a proportion of the total hours earned. The hours measured are for those nursing personnel who normally provide patient care and excludes nurses who fill management and administrative roles. Values much higher than the mean and significant changes from previous years may require investigation (Canadian Institute for Health Information, 2007).

% Registered Nurse (RN) Hours (RNH): This indicator measures the proportion of nursing care hours provided by registered nurses. Evidence suggests that a higher proportion of RNs in the staff mix may contribute to improved patient outcomes (Canadian Institute for Health Information, 2007). Variations in this indicator reflect the different nursing staff mix (that is registered nurses, regulated practical nurses, and unregulated staff) employed by hospitals (Canadian Institute for Health Information, 2007).

Hospital Performance Measures, Hospital Level

The following measures are Hospital level information. Hospitals self report this information in the form of a Balanced Scorecard to the MOH and to the CIHI (Appendix C). The source for the following data is Canadian Institute for Health Information publication *Hospital Report, Acute Care 2005 and 2007*. As with previous Ministry reports, any data reported at extremes (100% and 0%) relative to hospital class means have been excluded from the analysis. These hospital level data have been chosen for analysis as they relate directly to the operation of any hospital Emergency Department in Ontario as established by the MOH (Canadian Institute for Health Information, 2007, Ontario Hospital Association, 2007). Given that the objective is to use existing performance management data to propose improvements the credibility of the analysis is greater if MOH approved data is used. The data has been organized using the hospital classification of Teaching, Community, and Small. For the purposes of this dissertation this data has not been summarized by LHIN.

Patient Safety Reporting and Analysis (PSRA): The degree to which patient safety reporting processes and patient safety analysis activities are implemented and monitored within the hospital (Canadian Institute for Health Information, 2007).

Promoting a Patient Safety Culture (PPSC): The extent to which hospitals implement organizational practices to create a work setting that supports the safe delivery of care and service (Canadian Institute for Health Information, 2007). These organizational practices can be viewed as a subset of Standard Operating Procedures for any Emergency Department.

Strategies to Manage the Waiting Process in Ambulatory Care Clinics (SMWPACC): The extent to which hospitals use formal processes to remove a patient from a waiting list, use a centralized scheduling system to co-ordinate all patient visits and use strategies to make the patient's wait experience more informative and comfortable (Canadian Institute for Health Information, 2007).

Performance Management in Ambulatory Care (PMAC): The extent to which hospitals use and monitor clinic performance indicators, as well as how hospitals incorporate quality improvement initiatives in ambulatory clinics (Canadian Institute for Health Information, 2007).

Community Involvement and Coordination of Care, (CICC); The degree of coordination, both inside and outside the hospital, with other care providers and the community.

Total Margin, (TOTM); This indicator measures the percent by which a hospital's total revenues differs from its total expenses, excluding the impact of facility amortization (land, building and building service equipment). This indicator is a measure of financial

viability. A positive value indicates total expenses are less than total revenues (a surplus). Very high positive values may indicate temporary cash inflows (such as the sale of an asset), relatively high levels of funding, relatively high efficiency or under-provision of service. A negative value indicates total expenses are greater than total revenues (a deficit). Very high negative values may indicate temporary cash outflows (such as the purchase of an asset), relatively low levels of funding, relatively low efficiency or over-provision of service and, as a consequence, financial difficulty. The ability to generate a surplus is influenced by government funding levels, patient need and volume, local prices, service mix and complexity, third party payer rates, management strategies and other factors. A good Total Margin value is high enough to provide funds to acquire equipment, meet increases in patient need and volume and improve the quality of care, but not so high as to indicate the mandate of a not-for-profit hospital is not being fulfilled. In 2005, Ontario hospitals were surveyed to create benchmark values for Total Margin (Ontario Hospital Association, 2005). The outcome was that a hospital is demonstrating good financial management if Total Margin is between 0 to 5%. Variations in reporting non-recurring costs, such as pay-equity settlements and restructuring charges, and in the rate at which equipment purchases are expensed, can affect this indicator.

Current Ratio (CR): This indicator measures the number of times a hospital's short-term obligations can be paid using the hospital's short-term assets. It is a measure of liquidity and describes a hospital's ability to meet its short-term debts. A value greater than 1.0 indicates current assets are greater than current liabilities. Very high values may indicate under-investment in longer-term assets that usually yield higher returns. A value less than 1.0 indicates current assets are less than current liabilities. Very low

values may indicate financial difficulty. The ability to manage current assets and liabilities and to meet-day-to-day requirements for paying creditors is influenced by payer practices, payment policies, credit arrangements, investment policies, management strategies and other factors. A good Current Ratio value is high enough to meet creditor needs, but not so high as to forego the benefits of a long-term investment strategy. In 2005, Ontario hospitals were surveyed to create benchmark values for the Current Ratio. A hospital is demonstrating good financial management if the Current Ratio is between 1.0 and 2.0. Variations in the classification of assets and liabilities as either short-term or long-term can affect this indicator (Canadian Institute for Health Information, 2007). This metric was chosen as the key financial indicator because it was the measurement that was most consistently reported from all hospitals.

% Equipment Expense (PEE): This indicator measures the proportion of total expenses which is spent to acquire and operate computer systems, X-ray machines and other capital equipment. Higher than average values indicate more complex, newer or more equipment and/or higher equipment maintenance. Very high values may indicate overspending on equipment. Lower than average values indicate less complex, older or less equipment and/or less equipment maintenance. Very low values may indicate underspending on equipment. The ability to appropriately acquire and manage equipment is influenced by service mix and complexity, tertiary care role, teaching activities, research programs, asset management positions, funding sources and other factors. A good % Equipment Expense value is high enough to ensure that a hospital has the type and amount of equipment to meet patient needs, but not so high as to indicate low or inappropriate utilization of equipment. Variations in the rate at which equipment

purchases are expensed can affect this indicator (Canadian Institute for Health Information, 2007).

% Corporate Services (PCS): This indicator measures how much a hospital spends in areas of administrative services, finance, human resources and system support, relative to its total operating expenses. This indicator is a measure of efficiency. Higher than average values indicate a more complex or a greater amount of corporate services. Very high values may indicate over-spending on corporate services. Lower than average values indicate a less complex or a lesser amount of corporate services. Very low values may indicate under-spending on corporate services. The ability to appropriately manage corporate services is influenced by organizational size, service mix and complexity, information systems, management models and other factors. A good % Corporate Services value is low enough to indicate that the operations of the hospital are being supported at reasonable cost, but not so low as to indicate a lack of staff in leadership roles that would slow decisions and impair achievement of organizational goals and objectives. Variations in the allocation of corporate and support service staff costs between patient care and corporate areas can affect this indicator. For example, in some hospitals, the cost of system support staff on nursing units is assigned to a nursing/program administration functional centre, while in other hospitals these employees are assigned to general administration or information system support services (Canadian Institute for Health Information, 2007).

% Sick Time (PST): This indicator measures the proportion of full-time personnel hours that were paid sick hours. Higher than average values indicate more staff claiming sick time or longer sick time per staff member. Very high values may indicate high staff

vacancy, widespread workplace illness, generous benefits or problems in the management of human resources and technology. Lower than average values indicate less staff claiming sick time or shorter sick time per staff member. Very low values may indicate low staff vacancy, lack of widespread workplace illness, poor benefits or strengths in the management of human resources and technology. The ability to appropriately manage sick time is influenced by prevalence of workplace illness, type and level of sick time benefits, attendance awareness programs, human resource practices, organizational climate and other factors. A good PST value is low enough to indicate that sick time claims are for genuine illness, but not so low as to indicate sick staff are in the workplace. Variations in the classification of sick times may affect this indicator (Canadian Institute for Health Information, 2007).

Hospital Standardized Mortality Ratio (HSMR): This is a ratio which compares the actual number of deaths in a hospital to the number that would have been expected based on the types of patients a hospital treats. It is adjusted for various factors that may influence in-hospital mortality, such as patient demographics, diagnoses, and how the patient arrived at the hospital. This calculation focuses on 65 diagnosis groups that account for approximately 80% of in-hospital deaths in Canada, excluding patients as having palliative care. The HSMR is calculated as the ratio of actual (observed) deaths to expected deaths, multiplied by 100. A ratio of 100 suggests that there is no difference between a local mortality rate and the average national experience, given the types of patients cared for. An HSMR greater or less than 100 suggests that a local mortality rate is higher or lower than the national experience.

Use of Data for Decision-Making (UDDM): The degree to which organizations are disseminating and utilizing both clinical and administrative data (Canadian Institute for Health Information, 2007).

Formalized Audit of Hand Hygiene Practices (FAHHP): The extent to which hand hygiene practices are audited and the frequency with which they are monitored, as well as whether they are used as criteria for performance appraisal for all staff in the organization (Canadian Institute for Health Information, 2007).

Medication Documentation and Reconciliation (MDR): The extent to which hospital staff document, reconcile, and discuss complete lists of patient medications (Canadian Institute for Health Information, 2007).

Readmissions: Specific Medical Conditions (RSMC): The rate of unplanned readmissions within 7 days in patients following hospitalization for gastrointestinal (GI) bleed, or within 28 days for patients following hospitalization for acute myocardial infarction (AMI), heart failure, asthma, or stroke. Readmission rates may be influenced by a variety of factors including the quality and management of care provided in the hospital, availability of appropriate diagnostic/therapeutic technologies, drugs prescribed at discharge and discharging patients too early (Canadian Institute for Health Information, 2007). A lower rate is considered to be better.

Readmissions: Specific Surgical Procedures (RSSP): The rate of unplanned readmissions within 28 days for patients following cholecystectomy (gall bladder removal) or prostatectomy (partial or full removal of prostate gland) surgery or within 7 to 28 days for women following a hysterectomy. Readmission rates may be influenced by a variety of factors including the quality and management of care provided in the

hospital, availability of appropriate diagnostic and therapeutic technologies, drugs prescribed at discharge and discharging patients too early (Canadian Institute for Health Information, 2007). A lower rate is generally considered to be better.

Readmissions: Labour and Delivery (RLD): The rate of unplanned readmissions within 14 days following hospitalization for labour and or delivery (includes both vaginal and Caesarean-section deliveries). Readmission rates may be influenced by a variety of factors including the quality and management of care provided in the hospital, mode of delivery, social-economic and demographic factors, health care accessibility, and discharging patients too early. A lower rate is considered to be better (Canadian Institute for Health Information, 2007).

Adverse Events: Nurse-Sensitive Medical (AENSM): This indicator measures the rate of any one of the following adverse events for patients admitted with Acute Myocardial Infarction (AMI or heart attack), heart failure, asthma, Gastro-intestinal bleeding or stroke, post-admission pressure ulcers, post-admission fractures from falls, and post-admission pneumonia.

This is a measure of quality related to nursing care. Since nurses make up the largest group of health care providers in Ontario's hospitals (Ontario Ministry of Health and Long Term Care, 1999), they play a significant role in patient care. While nurse are not solely responsible for patient outcomes, they provide continuous, professional supervision. The conditions captured in this indicator are widely considered to be sensitive to nursing care. A lower rate is considered to be better (Canadian Institute for Health Information, 2007).

Adverse Events: Nurse-Sensitive Surgical (AENSS): This indicator measures the rate of any one of the following adverse events for patients who underwent cholecystectomy, hysterectomy or prostatectomy surgery, post-admission urinary tract infection, post-admission pressure ulcers, post-admission fractures from falls, and post-admission pneumonia.

This is a measure of quality related to nursing care. A lower rate is considered to be better (Canadian Institute for Health Information, 2007).

Adverse Events: Labour and Delivery (AELAD): this metric is the rate of adverse events in patients undergoing labour and/or delivery. Adverse events include uterine rupture, pulmonary or cardiac events, wound infection and haemorrhage. Adverse events after labour and delivery may be influenced by a variety of factors including the quality and management of care provided in the hospital, mode of delivery and use of instrumentation. A lower rate is considered to be better (Canadian Institute for Health Information, 2007).

Inpatient Nursing Productivity (INP): This indicator measures the proportion of nursing worked hours (including purchased service hours) for direct patient care. Higher than average values indicate a greater proportion of hours for direct patient care. Very high values may indicate insufficient time for care planning and documentation. Lower than average values indicate a lower proportion of hours for direct patient care. Very low values may indicate insufficient time for patient care. The ability to manage nursing productivity is influenced by collective agreements, teaching and learning activities, staff turnover, patient care delivery model, program and service changes, the size and composition of the nursing staff mix and other factors. A good Inpatient Nursing

Productivity value is one that is high enough to indicate that patients are receiving an appropriate amount of nursing care, but not so high as to indicate that documentation requirements and care planning needs of nurses are not being met. Variations in the allocation of workload between inpatient and outpatient units in small hospitals and in obstetrical and pediatric inpatient functional centers and variation in the reporting of workload for nurse practitioners may affect this indicator (Canadian Institute for Health Information, 2007).

% Registered Nurse Hours Hospital (RNHH): Measures the proportion of nursing care hours provided by registered nurses (RNs). Higher than average values indicate greater use of RNs and less use of registered practical nurses (RPNs). Lower than average values indicate less use of RNs and greater use of RPNs. This indicator is affected by nurse staffing models and methods for the allocation of nursing resources for inpatient health services, some of which may be driven by patient case mix and diagnosis; different hospitals may use a different mix of patient care staff to provide similar services. Substantial evidence in the acute care literature suggests that higher proportions of RNs in the staff mix lead to improved patient outcomes. While teaching and community hospitals in Ontario are able to attain high proportions of RNs in their staff mix, small hospitals may face a more limited supply of RNs. The ability to use RNs in patient care is influenced by the supply of RNs, wage rates, benefits, nurse staffing models, the provincial nurse staffing strategy and other factors (Canadian Institute for Health Information, 2007).

Hospital Board Characteristics

The following board data was sourced from LHIN and individual hospital annual reports and websites covering the years 2005 to 2007. Hospital level data can be viewed in Appendix D and LHIN board level data can be viewed in Appendix F.

Board Size (BS): This measure is the number of people on the board during the period from 2005 to 2007. BS will be used as a control variable to ensure that the size of an Ontario public hospital board has no impact on the patient and financial outcomes of an Emergency Department.

% of Inside Directors (PID): This measure is the percentage, relative to total board size, of the inside directors (Baysinger, Zardkoohi, 1986). It reflects the weighting and possible influence of inside directors to board operations. NID will be used as a control variable to ensure that the ratio of insider on an Ontario public hospital board has no impact on the patient and financial outcomes of an Emergency Department.

of Doctors on the Board (NDB): This measure counts the number of people on the board who are a certified medical doctor as recognized by the Ontario Medical Association (OMA). These doctors may or may not be an employee of the hospital. Doctors would be classified as “business experts” using the Baysinger, Zardkoohi (1986) typology.

of Nurses on the Board (NNB): This is the number of people on the board who are Registered Nurses (RN). These nurses may or may not be an employee of the hospital. Nurses would be classified as “business experts” using the Baysinger, Zardkoohi (1986) typology.

% of Medical Professionals on the Board (PMPB): This is the percentage, relative to total board size, of the sum of doctors and nurses on the board. Doctors and nurses were added together because research on Ontario hospital board member demonstrated that there were approximately 0.3 nurses on the average Ontario public hospital board (Appendix D). Doctors and nurses would be classified as “business experts” using the Baysinger, Zardkoohi (1986) typology.

% of Politicians on the Board (PPB): this number reflects the percentage of people on the board relative to the total board size whose primary occupation is politician. Occupation title of this category includes mayor, councillor, alderperson, Member of Parliament (Federal or Provincial), and any other job title considered as being a political function. Politicians would be classified as “community influentials” using the Baysinger, Zardkoohi (1986) typology.

% of Bureaucrats on the Board (PBB): This number is the measure of the percentage of Bureaucrats on the board relative to the total board. A bureaucrat is defined as a person who is employed to manage a government office or department. Generally these people have significant power to deploy government resources and tend to manage using fairly rigid rules and systems (MacMillan Dictionary, 2010). Bureaucrats who are a certified medical doctor, such as some hospital CEOs, have been recorded as a medical professional to reflect their primary training and skill set. Given that public hospitals have their legal, capital, and insurance needs met through government structure Bureaucrats would be classified as “support specialists” using the Baysinger, Zardkoohi (1986) typology.

% of Educators on the Board (PEB): This reflects the percentage of people on the board relative to total board size whose primary employment is in the education system. Typical job titles include teacher, instructor, professor and any other job title that is considered to be educational in nature. In the event that a board member is both a medical doctor or a registered nurse and works in a teaching hospital their profession is counted as a doctor or nurse as teaching hospitals in Ontario are “hands-on” and therefore medical professional teaching staff function as practitioners as well as educators. Given that Educators have related skills to offer to the board of a public hospital they would be classified as “support specialists” using the Baysinger, Zardkoohi (1986) typology.

% of Entrepreneurs on the Board (PENB): The measure reflects the percentage of people on the board relative to the total board whose primary occupation is operating their own company(s) which they own in total or in part. Their job title is usually president, chief executive officer or chairman of the board. Entrepreneurs, because of their resource management skills and innovative problem solving would be classified as “support specialists” using the Baysinger, Zardkoohi (1986) typology.

% of Corporate Managers on the Board (PCMB): This measure quantifies the percentage of for-profit corporate managers on the board who have successfully led operational or strategic turnarounds of the firms that they were responsible for. These managers tend to have job titles such as chief operating officer, vice-president of operations, chief restructuring officer or similar titles. Their performance as a turnaround leader was sourced from the board biographies listed on the LHIN and hospital websites verified by documents that their firms published regarding the

performance improvement during their tenure. Turnaround management behaviour is defined as the implementation of a set of actions required to save an organization from business failure and return it to operational normality and financial solvency. Turnaround management usually requires strong leadership and can include corporate restructuring, an investigation of the root causes of failure, and long-term programs to revitalize the organization (Schendel et al., 1975; Hofer, 1980; Bibeault, 1982). Corporate managers on the board who have not led turnarounds or performance improvements in their corporate career have been defined as Bureaucrats. Corporate managers, because of their skill in managing complex organizations in difficult environments, would be classified as “support specialists” using the Baysinger, Zardkoohi (1986) typology.

Data Consolidation and Relevance

There are several outcome data that are not relevant to this analysis. At the Emergency Department level the Proportion of Pneumonia Patients That Have an Inpatient Length of Stay (LOS) of ≤ 2 Days (PPPIS) depends significantly on external resources in a community and not on the performance of the Emergency Department (Ontario Hospital Association, 2007). Additionally, the Return Visit Rate for Asthma (0 to 72 hours, Paediatric 1-19 years old) (RVRAc), has been excluded from the analysis because of the specialty nature of several hospitals in the database that treat children exclusively. These hospitals function as centres of excellence for only paediatric patients with other Ontario hospitals feeding them their paediatric patients. Consequently the actual

performance of an Emergency Department is not known for this classification of patient given the behaviour of “outsourcing” care.

Patient Overall Impressions (POI) and Patient Communication Assessment (PCA) are subjective measurements which depend upon various factors such as geography, cultural tendencies, and response rates (Canadian Institute for Health Information, 2007). Given their level of subjectivity these outcomes have not been analysed in this paper but the data has been collected for further analysis.

The most consistent Emergency Department outcome data reported by all hospitals are Return Visit Rate for Asthma (≤ 24 hours, Adult 20-64 years old) (RVRAa), Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old) (RVRAb), and Return X-Ray Rate for Ankle or Foot Injury Patients (≤ 7 Days) (XRRAFIPc). These metrics represent a significant percentage of Emergency Department activity (Canadian Institute for Health Information, 2007). These three performance metrics will be used as the basis for performance measurement of Emergency Departments. Because this data is sourced from the MOH mandated hospital scorecards it is consistent and relevant to Emergency Department and hospital management as well as the MOH.

The most consistent activity data reported by hospitals at the Emergency Department level includes Healthy Work Environment (HWE), Use of Standardized Protocols (SOP), Internal Co-ordination of Care (ICC), Management and Support of Human Resources (MSHR), Clinical Data Collection and Dissemination (CDCD), Use of Clinical Information Technology (UCIT), External Partnerships (EP), % Management and Operational Support Staff Hours (MOSSH), % Nursing Worked Hours (NWH), and % Registered Nurse (RN) Hours (RNH).

The activity X-Ray Rate for Ankle or Foot Injury Patients (Adult 20 to 84 years old) (XRRAFIPa) does not capture patient outcomes whereas Return X-Ray Rate for Ankle or Foot Injury Patients (≤ 7 Days) (XRRAFIPc) does, better reflecting the quality of care in an Emergency Department. Additionally, the data available from this metric from 2005 for Small hospitals is low, making any comparisons over time difficult.

At the Hospital level, the outcomes of Readmissions: Labour and Delivery (RLD) and Adverse Events: Labour and Delivery (AELAD) will be used to test the critical activities and proposed board configuration given the importance that the human race places on healthy and successful birth and the fact that many births occur in the Emergency Departments of Ontario hospitals (Ontario Hospital Association, 2006, Canadian Institute for Health Information, 2007).

Hospital Standardized Mortality Ratio (HSMR) has been included in the analysis even though no Small hospitals reported on this metric. Unfortunately this metric does not differentiate between those people who die in an Emergency Department or in the hospital. However, this metric will be used to test the critical activities and the proposed board configuration given that mortality performance of an Emergency Department and its hospital is of key concern to any patient or manager.

A missing metric of concern is measuring the incident rate of Clostridium difficile, often called C. difficile or "C. diff". C. difficile is a bacterium that can cause symptoms ranging from diarrhoea to life-threatening inflammation of the colon. Illness from C. difficile most commonly affects older adults in hospitals or in long term care facilities and typically occurs after use of antibiotic medications, such as Emergency Department treatment (Health Canada, 2010).

In recent years, *C. difficile* infections have become more frequent, more severe, and more difficult to treat. *C. difficile* is a major cause of severe illness and fatalities in Ontario public hospitals (Health Canada, 2010). Infection control in hospitals is a major operational concern which impacts patient health and cost yet the MOH does not measure or report it on its mandated scorecards. Given that research has demonstrated that the best method to control this life threatening infection is through meticulous application of SOPs a hospital's Emergency Department *C. difficile* performance will be considered to be proportional to its SOP activity performance (Health Canada, 2010).

Outcomes such as Readmissions: Specific Medical Conditions (RSMC), Readmissions: Specific Surgical Procedures (RSSP), Adverse Events: Nurse-Sensitive Medical (AENSM), and Adverse Events: Nurse-Sensitive Medical (AENSM) are due to factors that are more hospital specific than Emergency Department oriented. However, the data has been collected for these outcomes and is available for further analysis.

The Hospital level outcome of Current Ratio (CR) is used as the financial performance metric as it reflects the ongoing operating performance of the hospital versus Total Margin (TOTM) which is susceptible to large swings due to disposal or acquisition of equipment, special funding intakes, or government funding excesses or deficits (Ontario Hospital Association, 2005, Canadian Institute for Health Information, 2007).

While the metric of % Sick Time (PST) is not differentiated at the Emergency Department level it is reported at the hospital level and may be an indicator of value in terms of assessing management effectiveness (Drucker, 1946).

Patient Safety Reporting and Analysis (PSRA), Promoting a Patient Safety Culture (PPSC), Performance Management in Ambulatory Care (PMAC), Strategies to Manage

the Waiting Process in Ambulatory Care Clinics (SMWPACC), % Equipment Expense (PEE), and % Corporate Services (PCS), are all hospital level metrics that are directly related to the operation of the Emergency Department and consequently will be analysed to determine their relevance to outcomes (Canadian Institute for Health Information, 2007).

The hospital level activities such as Use of Clinical Information Technology (UCITH), Use of Standard Protocols (SOPH), Management and Support of Human Resources (MSHRH), Healthy Work Environment (HWEH), and % Registered Nursing Hours (RNHH) are data gathered at the Hospital versus Emergency Department level. If there are significant discrepancies between the Emergency Department and the Hospital on these activities the data will be analysed further to determine if there is any causality.

Use of Data for Decision-Making (UDDM) at the hospital level is an activity that has a similar definition to Clinical Data Collection and Dissemination (CDCD) at the Emergency Department level as does Community Involvement and Co-ordination of Care (CICC) at the Hospital level compared to External Partnerships (EP). This data will be examined to determine if there are significant discrepancies between the Emergency Department and the Hospital to establish if there is any causality or relationship.

Some measures, such as Formalized Audit of Hand Hygiene Practices (FAHHP) are so new that there is a paucity of data to perform any analysis. Other activity measures such as Inpatient Nursing Productivity (INP) have been excluded because of variations in the allocation of workload between inpatient and outpatient units in small hospitals and in obstetrical and pediatric inpatient functional centers and variation in the reporting of

workload for nurse practitioners which may affect this indicator (Canadian Institute for Health Information, 2007).

Analysis of Results

Hospital Size Relevance

Introduction

The two primary research questions are:

Are there critical activities that determine the effectiveness of an Emergency Department for Ontario public hospitals?

Are there skill sets on a board of an Ontario public hospital which directly influence the performance of those critical activities?

Given that there are three different types of hospitals in Ontario it first must be determined if size is a critical variable which influences Emergency Department performance (Hackman, 1990, Raheja, 2005).

The following analyses are at the Emergency Department data level of the hospitals. The hypotheses analysed are initially based upon the mandated MOH balanced scorecard (Appendix B, Appendix C). The objective is to determine which activities are significant to Emergency Department outcomes.

All data has been analysed for normality, having acceptable skew and kurtosis to assume that the Central Limit Theorem analytical tools apply. A standard $\alpha=0.05$, which is accepted by the MOH for hospital reporting in Ontario (Canadian Institute for Health Information, 2007), has been used for all confidence interval and relevance testing so

that the outcome of this research will be meaningful to the MOH. The data is analysed by determining if there is a relevant relationship between activities and outcomes. The significance or weighting of the activity versus the outcome will be reported as well. Each activity will be analysed over the three years of data in terms of its impact on the outcomes.

Limitations

This research has several limitations. The first limitation is the inability of the researcher to collect data directly from the hospitals. Several attempts were made, including formal applications to access data for research purposes, without success. The performance of Ontario public hospitals, particularly their Emergency Departments, is a major political issue given the current performance of the hospital system and the fact that approximately one-third of the Ontario provincial budget is for health care (Closson, 2007, Health Canada, 2009). In spite of stated public access to hospital data, these factors may be responsible for a tacit policy of non-disclosure. Therefore, the primary hospital activity and outcome data available for research consisted of formal reports that each hospital is required to publish for the MOH.

The second limitation is the response rate of the hospitals to the activities and outcomes that are required reporting metrics to the MOH. While some activities and outcomes achieved 100% reporting, others such as Small hospitals HSMR outcomes were 0%. This illustrates that there is an issue with the Ontario hospital system reporting accountability. Therefore each activity and associated outcome has the participation rate reported for the relationship so that its overall relevance may be better evaluated. This

approach also identifies the specific areas where improvement in data collection is required.

The third limitation is the activity and outcome data itself. Ontario hospitals only started to collect performance data in 2003. Examination of this 2003 data indicated that the overall reporting on activities and outcomes was very incomplete, with data on many activities and outcomes not collected at all. No reports were published for 2004. 2005 was the first year that hospital reported specific data that could be analysed. Only one report for one type of hospital was published for 2006 (Ontario Hospital Association, 2006). 2007 improved on the data response rate of 2005, resulting in approximately 20,000 data points being available for study when the 2005 hospital activity and outcome data was combined with 2007 (Appendix B). This level of data, while suffering some gaps for some activities and outcomes, across a three year period is generally reported by all hospitals and large enough to allow the testing of hypotheses. A concern is that the most recent data available on published reports is for the year 2007. This raises the question of the actual current status of the performance of Emergency Departments and why there is such a time lag in reporting scorecard data.

The fourth limitation is the integrity of the data. Some hospitals for some activities have reported 100% compliance. Some hospitals have also reported 0% “mistakes” or perfect patient outcomes. Data that is suspiciously high or low (100% or 0%) versus the average for that class of hospital will be excluded unless there is evidence in that hospital’s annual reports as to how such exceptional performance was attained.

The fifth limitation of this study is that sophisticated software was not available to perform the analysis. Microsoft’s EXCEL software using the appropriate Statistical

Add-ins was used to analyse the data. Given the lack of more sophisticated analytical software, the relationship between each independent and dependent variable will be tested using two different techniques to confirm relevance.

The data table limitations of the software required data filtering to identify possibly relevant relationships between independent and dependent variables and to determine if there are significant differences in activities, outcomes, and board structures at the different types of hospitals. This filtering was performed using correlation analysis to initially determine if there was any promising relationship between the independent activity and the dependent outcome. Correlations have been calculated using the CORREL function, which uses a least squares approach. Preliminary data analysis indicated that correlations approximately >25% should be examined for relevance in order to isolate significant major activities. Significant changes in correlation performance from 2005 to 2007, which are primarily sign related, will also be examined for statistical relevance. Initial testing revealed that sign changes exceeding 40% indicated relationships of interest between independent and dependent variables. Confidence interval analysis based upon calculated averages and standard deviations for the data collected was used to determine if there are significant differences between hospital types. Confidence ranges have been calculated using the CONFIDENCE function, a two-tailed test.

If correlations exceeded 25% or there were major sign changes from 2005 to 2007 a regression analysis was performed to calculate the coefficient of determination, r^2 , and the independent variable coefficient, m_1 , for the equation $y=m_1*x+b$. The value of “x” is the anticipated independent activity which will influence “y”, the patient or financial

outcome. The coefficient of determination, r^2 , is an indicator of the correlation between the independent and dependent variables. Given the software limitations, the complexity of the hospital environment, and the fact that small improvements have great impacts on patients' quality of life it is expected that for a statistically proven critical activity or competency whose r^2 is in the range of 5% or greater the relationship will be considered of impact. The independent variable coefficient, m_1 , indicates the power or slope effect that the independent variable has on the dependent variable. The constant b is the y-intercept and is not considered relevant as the objective of the research is to identify the critical variables, not to develop an equation predicting performance. This regression analysis was calculated using the LINEST function (Appendix A). Preliminary data analysis revealed that superior curve fit was achieved with a linear versus exponential function therefore the EXCEL LINEST versus LOGEST function is used.

The coefficient of determination, r^2 , is then checked using the F test to determine if a higher value can occur by chance. F is calculated using the output of the LINEST function to drive the FDIST function which calculates the probability of a higher value occurring by chance. This approach avoids manual table lookup. Given $\alpha=0.05$, if $FDIST > 5\%$ then it is assumed that the probability of the r^2 value occurring by chance results in the F-test failing.

The second statistical test used is the t-test which determines whether the slope coefficient, m_1 , is useful in estimating the value of the outcome. The value t is calculated by dividing the slope coefficient, m_1 , by standard error, which is an output of the LINEST function. This t -value is then compared to t -critical, which is calculated using the TINV function (two tailed). If the t -value is greater than t -critical then the

independent variable is considered to be important in terms of influencing the dependent variable. An independent variable must pass both the F and t-tests to be considered a critical and relevant variable that affects outcomes.

More sophisticated software would allow testing of every value of r^2 , without any filtering, and generate other useful statistics which may result in a richer understanding of the activities, outcomes, and board member skill impacts, perhaps even leading to multi-dimensional equation development. However, the approach used in this research will meet the objectives of identifying critical activities and board member competencies.

Hypothesis 1 (H1)

Low performing hospital Emergency Departments tend to be larger facilities, perhaps indicating that a hospital becomes more difficult to manage once it reaches a critical size (Becker, Potter, 2002).

Table 3
Emergency Performance Based Upon Size/Type, 2005

Hospital Size	#	# Hospitals		RVRAa	RVRAa	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate	2005 Average	2005 Std Dev			
Teaching	15	3	80%	1.84%	0.52%	0.29%	1.55%	2.13%
Small	31	16	48%	3.10%	1.86%	0.94%	2.16%	4.04%
Community	63	7	89%	2.55%	0.95%	0.25%	2.30%	2.80%

Hospital Size	#	# Hospitals		RVRAb	RVRAb	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate	2005 Average	2005 Std Dev			
Teaching	15	3	80%	1.08%	0.37%	0.21%	0.88%	1.29%
Small	31	25	19%	1.98%	1.59%	1.27%	0.71%	3.26%
Community	63	10	84%	1.13%	0.50%	0.13%	1.00%	1.27%

RVRAa= Return Visit Rate for Asthma (24 hours, Adult 20-64 years old

RVRAb= Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)



Observations: H1 is not proved conclusively. In 2005 the larger (Teaching) hospitals have better Emergency Department performance on average in one of the two critical performance measures in both averages and variability. In 2005 there was no X-ray metric reported on an individual hospital basis. Additionally, the response rate for Small hospitals was substantially lower for both RVRaA and RVRaB at 48% and 19% respectively (Table 3) for 2005. With a response rate this low, particularly at 19% for the RVRaB metric, the actual reported performance of the Small hospitals is suspect.

Table 4
Emergency Performance Based Upon Size/Type, 2007

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	RVRaA 2007 Average	RVRaA 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	2	87%	1.30%	0.68%	0.37%	0.93%	1.67%
Small	31	19	39%	3.88%	2.24%	1.27%	2.61%	5.15%
Community	63	1	98%	2.12%	1.02%	0.00%	2.11%	2.12%

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	RVRaB 2007 Average	RVRaB 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	2	87%	1.55%	2.24%	1.22%	0.34%	2.77%
Small	31	15	52%	2.76%	1.92%	0.94%	1.82%	3.70%
Community	63	3	95%	1.82%	1.03%	0.00%	1.81%	1.82%

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	XRRaFIPc 2007 Average	XRRaFIPc 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	0.99%	0.42%	0.00%	0.99%	1.00%
Small	31	4	87%	5.32%	3.42%	0.01%	5.31%	5.34%
Community	63	13	79%	3.23%	2.82%	0.01%	3.22%	3.23%

RVRaA = Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRaB = Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

XRRaFIPc = Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

In 2007, the larger (Teaching) hospitals again scored better than the other hospitals, achieving a significant difference on two of the three critical performance measures (Table 4). Medium sized hospitals, Community, have the next best performance with Small hospitals having the poorest performance. This outcome is opposite to what

Becker and Potter (2002) proposed but in line with Walshe et al's, (2004) more recent findings.

In fact, comparing 2007 versus 2005 all hospitals improved on average. However, a significant percentage of Small hospitals are not meeting the Ministry expectations with respect to required performance reporting for the respiratory indicator of performance. In 2007 for RVRAa Small hospitals had a reporting rate of 39% with RVRAb scoring 52%. Yet, also for 2007, the new Emergency Department performance metric, XRRAFIPc, had a much higher reporting rate of 87%, scoring higher than the Community hospital rate of 79% (Table 4). Clearly Small hospitals are capable of high reporting rates so the question arises as to why can they not consistently report on performance metrics? This lower level of reporting from Small hospitals is a consistent observation from this research and because the data is complete versus the other types and this observation is an item of concern given that if performance is not measured then it is difficult to manage improvement (Drucker, 2005). This may be due to their significantly lower level of UCIT (Table 225, Table 226) or some other factor such as board composition.

At the Hospital level for 2005 the birth metric RLD has no significant difference across hospital types (Table 5). However for 2007, the Small hospitals again have a low reporting rate and their RLD performance, based upon the reported data, is substantially inferior to Teaching and Community hospitals (Table 6). The low reporting rate of 23% for both years brings the validity of the Small hospital data into question.

Table 5

Hospital Performance, RLD, Based Upon Size/Type, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	RLD 2005 Average	RLD 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	4	73%	0.70%	0.26%	0.15%	0.55%	0.86%
Small	31	24	23%	1.40%	0.89%	0.66%	0.74%	2.06%
Community	63	10	84%	0.75%	0.53%	0.14%	0.61%	0.89%

RLD=Readmissions Labour and Delivery

Table 6

Hospital Performance, RLD, Based Upon Size/Type, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	RLD 2007 Average	RLD 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	4	73%	0.84%	0.17%	0.10%	0.73%	0.94%
Small	31	24	23%	2.23%	1.07%	0.79%	1.44%	3.02%
Community	63	9	86%	0.78%	0.46%	0.12%	0.66%	0.90%

RLD=Readmissions Labour and Delivery

AELD performance is not significantly different for 2005 among the hospital types

(Table 7) however in 2007 Community hospitals have superior performance (Table 8).

The low reporting rate of Small hospitals for both years is again evident, causing a concern about the integrity of the data.

Table 7

Hospital Performance, AELAD, Based Upon Size/Type, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	AELD 2005 Average	AELD 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	4	73%	3.88%	2.51%	1.48%	2.40%	5.36%
Small	31	23	26%	2.83%	1.11%	0.77%	2.06%	3.60%
Community	63	7	89%	1.96%	1.47%	0.39%	1.58%	2.35%

AELD=Adverse Events Labour and Delivery

Table 8**Hospital Performance, AELAD, Based Upon Size/Type, 2007**

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	AELD 2007 Average	AELD 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	4	73%	3.73%	2.11%	1.25%	2.49%	4.98%
Small	31	21	32%	3.40%	1.12%	0.70%	2.70%	4.09%
Community	63	7	89%	2.11%	1.54%	0.40%	1.71%	2.51%

AELD=Adverse Events Labour and Delivery

Death rate, or HSMR, is not reported in any years for Small hospitals. While there is not a significant difference in HSMR for 2005 (Table 9), in 2007 Teaching hospitals have a significantly lower death rate versus Community hospitals (Table 10). Community hospitals managed to reduce their variation during this period but maintained the same average death rate in 2007 as 2005. The HSMR metric is the poorest reported outcome of all the mandated metrics. Death rates are a sensitive political issue (Canadian Institute for Health Information, 2008) however they represent the ultimate performance metric for a public hospital and the performance of its Emergency Department. The reason(s) for lack of reporting of this metric require investigation.

Table 9**Hospital Performance, HSMR, Based Upon Size/Type, 2005**

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	HSMR 2005 Average	HSMR 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	6	60%	96	6.8	4.4	91.7	100.5
Small	31	31	0%	N/A	N/A	N/A	N/A	N/A
Community	63	37	41%	102	15.8	6.1	96.0	108.1

HSMR=Hospital Standardized Mortality Ratio

Table 10

Hospital Performance, HSMR, Based Upon Size/Type, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	HSMR 2007 Average	HSMR 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	6	60%	91	11.3	7.4	84.0	98.9
Small	31	31	0%	N/A	N/A	N/A	N/A	N/A
Community	63	37	41%	103	12.4	4.8	97.8	107.3

HSMR=Hospital Standardized Mortality Ratio

For 2005 the CR for Teaching hospitals was significantly lower than the other types (Table 11). However, that distinction disappeared by 2007 due to the reduced average CR for both Small and Community hospitals (Table 12).

Table 11

Hospital Performance, CR, Based Upon Size/Type, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	CR 2005 Average	CR 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	0.76	0.50	0.26	0.50	1.02
Small	31	12	61%	2.52	2.52	1.13	1.39	3.65
Community	63	3	95%	1.34	1.09	0.28	1.06	1.61

CR=Current Ratio

Table 12

Hospital Performance, CR, Based Upon Size/Type, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	CR 2007 Average	CR 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	0.75	0.52	0.26	0.48	1.01
Small	31	2	94%	2.22	1.62	0.59	1.63	2.81
Community	63	1	98%	1.10	0.80	0.20	0.89	1.30

CR=Current Ratio

The final performance outcome evaluated at the Hospital level is PST. Absenteeism is often used as a measure of management effectiveness (Drucker, 1954). This metric was not evaluated in 2005. Based upon the analysis of the data there appears to be no difference in staff absenteeism based upon hospital type (Table 13). Small Hospitals had

a high reporting score of 90%, raising the question as to why can Small hospitals report this metric well when it apparently has difficulty reporting patient performance metrics?

Table 13

Hospital Performance, PST, Based Upon Size/Type

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	PST 2007 Average	PST 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	4.74%	0.80%	0.41%	4.33%	5.15%
Small	31	3	90%	4.35%	1.53%	0.57%	3.78%	4.92%
Community	63	0	100%	4.48%	1.29%	0.32%	4.16%	4.80%

PST=% Sick Time

While H1 is not proved conclusively there is enough variation in outcomes versus type of hospital to mandate that the remainder of the analysis be performed on a type versus agglomerated basis. Additionally, type specific “best practices” or deficiencies would be buried if the hospitals were agglomerated.

Activities and Outcomes

Introduction

The next series of hypotheses will examine the first major research question of;

Are there critical activities that determine the effectiveness of an Emergency Department for Ontario public hospitals and if so, what might they be?

Each activity will be examined to determine if there is any relationship between the activity and the outcome. Activities at the Emergency Department level and the Hospital level will be compared to outcomes at both the Emergency Department and Hospital level to against each other to determine if there is any causality (Table 14).

Additionally, where activities exist at both the Emergency Department and the Hospital level they will be compared against each other to determine if any relationship exists.

Several Hospital level activities will be considered an extension of Emergency Department SOPs as they are procedures which, although measured at the Hospital level in the mandated scorecard, are most visible to the public in the Emergency Department (Ms. Taylor, President, St. Mary’s Hospital, personal communication, Jan. 15, 2009, Ms Bowers, RN, Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010). These procedures are Patient Safety Reporting and Analysis (PSRA), Promoting a Patient Safety Culture (PPSC), Performance Management in Ambulatory Care (PMAC), and Strategies to Manage the Waiting Process in Ambulatory Care Clinics (SMWPACC).

Table 14
Analysis Table, Determination of Critical Activities and Outcomes

<u>Activity</u>	Compared to	<u>Outcome</u>	<u>Relationships</u>		
<u>ED Level</u>		<u>ED Level</u>	<u>ED Level</u>	<u>Hospital Level</u>	
SOP		RVRAa	SOP	versus	SOPH
HWE		RVRAb	CDCD	versus	UDDM
ICC		XRRAFIPc	UCIT	versus	UCITH
EP			EP	versus	CICC
MSHR			MSHR	versus	MSHRH
CDC			HWE	versus	HWEH
UCIT			RNH	versus	RNHH
MOSSH			SOP	versus	PSRA
TWH			SOP	versus	PPSC
NWH			SOP	versus	PMAC
RNH			SOP	versus	SMWPACC
PEE					
<u>Hospital Level</u>		<u>Hospital Level</u>			
SOPH		RLD			
<u>ED-Hospital SOPs</u>		AELD			
PSRA		HSMR			
PPSC		CR			
PMAC		PST			
SMWPACC					

ED=Emergency Department

Hypothesis 2 (H2)

A critical activity of High performing hospitals is the consistent use of Standard Operating Procedures (SOPs) (Savary, Crawford-Mason, 2006). Turnaround leaders use SOPs to ensure that best practices are implemented throughout an organization and to have a standardized foundation from which to improve (Schendel et al., 1975, Hofer, 1980, and Bibeault, 1982).

Observations: H2 appears to be initially inconclusive. Use of SOPs in 2005 versus type of hospital does not result in any significant differences (Table 15). In 2005 the reporting rate for Small hospitals is still much lower than that for the other types however the rate improved significantly in 2007, being essentially equal to the performance of the other hospital types (Table 16). In 2007 Community hospitals have statistically significant greater use of SOPs than Small hospitals. Teaching hospitals use of SOPs has no statistical difference as compared to Community and Small hospitals. This is an observation of concern because if the Ontario doctor training does not teach interns the importance of SOPs then the system is likely to reflect a large variance of treatment outcomes due to the lack of consistent implementation of best practices.

Table 15

Use of SOP in Emergency Department Based Upon Size/Type, 2005

Hospital Size	#	# Hospitals		SOP			Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate	2005 Average	SOP 2005 Std Dev	Confidence		
Teaching	15	1	93%	77%	24%	12%	64%	89%
Small	31	14	55%	69%	29%	14%	55%	83%
Community	63	7	89%	82%	22%	6%	76%	88%

SOP=Use of Standard Operating Procedures

Table 16**Use of SOP in Emergency Department Based Upon Size/Type , 2007**

Hospital Size	# Hospitals	# Hospitals		SOP 2007 Average	SOP 2007 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	1	93%	78%	21%	11%	67%	89%
Small	31	4	87%	69%	25%	10%	59%	78%
Community	63	2	97%	84%	20%	5%	79%	89%

SOP=Use of Standard Operating Procedures

The impact of the use of SOPs in the different types of hospitals has produced mixed results. In 2005, the first year that SOPs were measured and reported to the MOH the correlations were weak or in the wrong direction (Table 17). Given that research in the for-profit and turnaround environments indicate that use of SOPs improves performance this suggests that the implemented SOPs in 2005 were not developed or implemented correctly (Hambrick, Schecter, 1983, Kanter, 2003). Kotter (1995) arrived at the seminal conclusion that institutionalizing new approaches was critical to executing positive change.

In 2007 there were significant changes in the effectiveness of SOPs versus Emergency Department outcomes (Table 18). Teaching hospitals use of SOPs result in significantly lower patient returns due to an asthma or breathing difficulty within 24 to 72 hours of release from the Emergency Department (RVRAb). This relationship passes both the F-test due the low probability of a higher F occurring by chance and the t-test as t is greater than the critical value (Table 19). The r^2 coefficient is 36%, indicating strong relevance between use of SOPs and the RVRAb outcomes. This is a significant difference for Teaching hospitals compared to 2005. This suggests that staff likely improved both the quality and implementation effectiveness of SOPs associated with

RVRAa. This may be due to a change in teaching methods by using a step-by-step review of intern diagnosis as a learning experience for the students (Kotter, 1995). This process appears to be superior compared to the processes used by the other classes of hospitals.

Table 17

Correlation Between Use of SOP and Emergency Performance, 2005

Hospital Size	#	# Hospitals		Correlation RVRAa & SOP 2005	Correlation RVRAb & SOP 2005
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	3	80%	-13%	36%
Small	31	25	19%	33%	9%
Community	63	10	84%	-15%	-8%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

SOP=Use of Standard Operating Procedures

Table 18

Correlation Between Use of SOP and Emergency Performance, 2007

Hospital Size	#	# Hospitals		Correlation RVRAa & SOP 2007	Correlation RVRAb & SOP 2007	Correlation XRRAFIPc & SOP 2007
		Not Reporting or Report Zero	Reporting Rate			
Teaching	15	2	87%	-22%	-60%	-25%
Small	31	19	39%	22%	39%	2%
Community	63	13	79%	-14%	8%	-42%

XRRAFIPc = Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

SOP=Use of Standard Operating Procedures

Table 19

SOP Relevance Test in Teaching Hospital versus RVRAb

SOP and RVRAb
in Teaching

m_1	-1.43
r^2	0.36
FDIST	3.75%
t	-2.397
TINV	2.228

SOP=Use of Standard Operating Procedures

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

The question of the quality of these Teaching hospital SOPs for RVRAa versus the quality of Small and Community hospital RVRAa SOPs arises due to the superior performance of Teaching hospitals in the RVRAa metric (Table 4). While the relationship is not as strong, it is important to note that for the new 2007 metric, XRRAFIPc, Community hospitals appear to have developed a SOP that appears to be effective as demonstrated by Table 18. This relationship passes both the F-test due the low probability of a higher F occurring by chance and the t-test as t is greater than the critical value (Table 20). The r^2 coefficient is 17%, indicating some relevance between use of SOPs and the XRRAFIPc outcomes. However, while it appears that the Community hospital SOP has a link between use and the XRRAFIPc outcome it still does not result in the statistically significant superior performance of the Teaching hospital (Table 4).

Table 20

SOP Relevance Test in Community Hospital versus XRRAFIPc

	SOP and XRRAFIPc in Community
m_1	-3.10
r^2	0.17
FDIST	0.33%
t	-3.099
TINV	2.013

SOP=Use of Standard Operating Procedures

XRRAFIPc = Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

Additional research has shown that Ontario hospitals do not share “best practices” on any formal or rigorous basis, any actions a hospital does in terms of “best practices” compliance is voluntary, thereby losing the advantage of learning from others (Ontario Hospital Association, 2008). Research has demonstrated that the best way to incorporate best practices is to have a formal process that is measured (Porter, 1996, Drucker,

2005). Perhaps a best practice metric should be incorporated in the mandated balanced scorecard to improve the average performance of all Ontario hospitals. This lack of best practices sharing could affect Small hospitals more significantly in that their lack of resources might also be related to their lower use of SOPs and lower quality SOPs, perhaps due to their need to experiment and develop them. This might be reflected in their lower performance in Emergency Department outcomes (Table 4).

An item of concern noted in the data analysis is that following numbers of hospitals reported 100% use of SOPs at the Emergency Department level;

2 Teaching hospitals

6 Small hospitals

19 Community hospitals

Research has shown, in spite of an organization's best intentions, achievement of 100% use of SOPs in every circumstance is highly unlikely (Barker, DuHaime, 1997). The performance of the hospitals that reported 100% use of SOPs ranges from excellent to poor so no definitive conclusion can be made for these hospitals regarding the relationship between use of SOPs and Emergency Department performance. No hospitals reported 100% use of SOPs at the Hospital level and in fact the use of SOPs in the general hospital environment is significantly lower than that in the Emergency Department (Table 23).

At the Hospital level, while the use of SOPs in Small hospitals is not significantly different in 2005 (Table 21), for 2007 the overall use of SOPs in Small hospitals is significantly lower as compared to the other hospital types (Table 22). It is also noted

that only Community hospitals statistically increased their use of SOPHs from 2005 to 2007 (Table 21, Table 22).

Table 21

SOP in Hospital Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals		SOPH 2005 Average	SOPH 2005 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	1	93%	35%	15%	8%	27%	43%
Small	31	13	58%	26%	26%	12%	14%	38%
Community	63	4	94%	30%	15%	4%	27%	34%

SOPH = Use of Standard Operating Procedures Hospital Level

Table 22

Use of SOPH Based Upon Size/Type, 2007

Hospital Size	#	# Hospitals		SOPH 2007 Average	SOPH 2007 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	0	100%	46%	19%	10%	36%	55%
Small	31	10	68%	27%	19%	8%	19%	35%
Community	63	2	97%	41%	16%	4%	36%	45%

SOPH = Use of Standard Operating Procedures Hospital Level

Table 23

Use of SOP versus Hospital SOPH, 2007

Hospital Size	SOPH 2007		SOP 2007	
	Average	Confidence	Average	Confidence
Teaching	46%	10%	78%	11%
Small	27%	8%	69%	10%
Community	41%	4%	84%	5%

SOP=Use of Standard Operating Procedures
SOPH=Use of Standard Operating Procedures Hospital Level

The complexity and variation of all services that a hospital provides suggest that use of SOPHs in all of its activities would be less overall than use in a more time sensitive critical environment, like an Emergency Department and this is demonstrated by the data (Table 23).

The reporting rate of Small hospitals is still significantly lower at the Hospital level and the use of SOPHs at the Hospital level is appreciably lower than that of the other types. However, it appears that most of the SOPs for a Small hospital are for the Emergency Department (Table 24, Table 25).

In spite of this strong correlation, given the results of Emergency Department outcomes (Table 4), the SOPs employed by Small hospitals in Emergency Departments are not as effective with respect to patient outcome as the other hospital types.

Table 24

Correlation of Use of SOP versus SOPH

Hospital Size	Correlation SOP & SOPH 2005	Correlation SOP & SOPH 2007
Teaching	-17%	15%
Small	33%	61%
Community	27%	18%

SOP=Use of Standard Operating Procedures

SOPH=Use of Standard Operating Procedures Hospital Level

Table 25

SOP Relevance Test in Small Hospitals versus SOPH, 2007

	SOP and SOPH in Small
m_1	0.46
r^2	0.37
FDIST	0.32%
t	3.372
TINV	2.093

SOP=Use of Standard Operating Procedures

SOPH=Use of Standard Operating Procedures Hospital Level

At the Hospital outcome level, Emergency Department level SOPs appear to have a positive impact to the performance of Small hospitals for the birth metric RLD (Table 26). However, in spite of the strong correlation the relationship does not pass the F-test and t-test (Table 27). At the Hospital level the same situation exists. While the correlation appears strong it is not significant (Table 28) The issue may be that the

reporting level for Small hospitals is so low it may be difficult to get a statistically relevant outcome.

For Teaching hospitals at the Emergency Department SOP level the correlation appears to be in the wrong direction (Table 26) however the relationship is not statistically significant (Table 29). At the Hospital level the correlation appears to be strong but also is not statistically significant (Table 30). This could indicate the impact of the small sample size for Teaching hospitals.

Both Teaching and Community hospitals have superior performance to Small hospitals in the RLD metric (Table 5, Table 6) however there does not appear to be any significant correlation with Standard Operating Procedures at either the Emergency Department or the Hospital level.

Table 26

Correlation of Use of SOP, SOPH, and RLD

Hospital Size	Correlation RLD & SOPH 2005	Correlation RLD & SOPH 2007	Correlation RLD & SOP 2005	Correlation RLD & SOP 2007
Teaching	-51%	-40%	12%	37%
Small	-11%	-56%	-12%	-43%
Community	-39%	-3%	-27%	-2%

RLD=Readmissions due to Delivery Issues
 SOP=Use of Standard Operating Procedures
 SOPH=Use of Standard Operating Procedures Hospital Level

Table 27

SOP Relevance Test in Small Hospitals versus RLD, 2007

SOP and RLD in Small	
m_1	-0.004
r^2	0.01
FDIST	83.45%
t	-0.223
TINV	2.776

RLD= Readmissions due to Delivery Issues
 SOP=Use of Standard Operating Procedures



Table 28

SOPH Relevance Test in Small Hospitals versus RLD, 2007

	SOPH and RLD in Small
m_1	-0.02
r^2	0.31
FDIST	24.90%
t	-1.348
TINV	2.776

RLD= Readmissions due to Delivery Issues
SOPH=Use of Standard Operating Procedures in Hospital

Table 29

SOPH Relevance Test in Teaching Hospitals versus RLD, 2007

	SOPH and RLD in Teaching
m_1	0.003
r^2	0.09
FDIST	52.34%
t	0.686
TINV	2.571

RLD= Readmissions due to Delivery Issues
SOPH=Use of Standard Operating Procedures

Table 30

SOPH Relevance Test in Teaching Hospitals versus RLD, 2007

	SOPH and RLD in Teaching
m_1	-0.003
r^2	0.15
FDIST	38.90%
t	-0.943
TINV	2.571

RLD= Readmissions due to Delivery Issues
SOPH=Use of Standard Operating Procedures in Hospital

For the other birth metric, AELAD, the correlation for the use of SOPs at the Emergency Department level is not strong for any hospital (Table 31) except for Small hospitals but this relationship is not statistically relevant (Table 32). At the Hospital

level, for Small hospitals, the use of SOPHs appears to have a strong correlation with AELAD in the wrong direction over the span of 2005 to 2007 (Table 31). However, this relationship does not pass the statistical relevance test (Table 32, Table 33). The low response rate may be contributing to the lack of any specific outcome in spite of an apparent strong correlation.

Table 31

Correlation of Use of SOP, SOPH, and AELAD

	Correlation AELAD & SOPH 2005	Correlation AELAD & SOPH 2007	Correlation AELAD & SOP 2005	Correlation AELAD & SOP 2007
Hospital Size				
Teaching	-40%	4%	-27%	13%
Small	72%	49%	59%	10%
Community	-5%	-7%	-5%	-1%

AELAD=Adverse Events Labour and Delivery
 SOP=Use of Standard Operating Procedures
 SOPH=Use of Standard Operating Procedures in Hospital

Table 32

SOPH and SOP Relevance Test in Small Hospitals versus AELAD, 2005

	SOPH and AELAD in Small	SOP and AELAD in Small
m_1	0.06	0.02
r^2	0.52	0.34
FDIST	7.84%	20.34%
t	0.050	0.037
TINV	2.447	2.776

AELAD=Adverse Events Labour and Delivery
 SOP=Use of Standard Operating Procedures
 SOPH=Use of Standard Operating Procedures in Hospital

Table 33

SOPH Relevance Test in Small Hospitals versus AELAD, 2007

	SOPH and AELAD in Small
m_1	0.02
r^2	0.31
FDIST	24.79%
t	1.352
TINV	2.776

AELAD=Adverse Events Labour and Delivery
 SOPH=Use of Standard Operating Procedures in Hospital

For 2005 there appears to be some strong correlations between SOP, SOPH, and HSMR for Teaching hospitals (Table 34). However, none of these relationships are statistically significant (Table 36, Table 37). There appears to be no correlation between the use of SOPs at both the Hospital and Emergency Department levels for the mortality metric, HSMR, in the most recently available data (Table 35). However, with the reporting rate for Small hospitals being 0% and the rates for the other hospitals low (Table 35) the data set for analysis is small.

Table 34

Correlation of Use of SOP, SOPH, and HSMR, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & SOPH 2005	Correlation HSMR & SOP 2005
Teaching	15	6	60%	-27%	60%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	23%	-4%

HSMR=Hospital Standardized Mortality Ratio

SOP=Use of Standard Operating Procedures

SOPH=Use of Standard Operating Procedures in Hospital

Table 35

Correlation of Use of SOP, SOPH, and HSMR, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & SOPH 2007	Correlation HSMR & SOP 2007
Teaching	15	6	60%	19%	15%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	-16%	-13%

HSMR=Hospital Standardized Mortality Ratio

SOP=Use of Standard Operating Procedures

SOPH=Use of Standard Operating Procedures in Hospital

Table 36

SOPH Relevance Test in Teaching Hospitals versus HSMR, 2005

SOPH and HSMR in Teaching	
m_1	-0.16
r^2	0.12
FDIST	39.49%
t	-0.916
TINV	2.447

HSMR=Hospital Standardized Mortality Ratio
SOPH=Use of Standard Operating Procedures in Hospital

Table 37

SOP Relevance Test in Teaching Hospitals versus HSMR, 2005

SOPH and HSMR in Teaching	
m_1	0.16
r^2	0.36
FDIST	11.32%
t	1.854
TINV	2.447

HSMR=Hospital Standardized Mortality Ratio
SOP=Use of Standard Operating Procedures

The relationship between CR and SOPs appears to be mixed. For 2005 all hospitals have CR decreasing as SOPs increase at the Emergency Department level, which is unfavourable (Table 38). These relationships are not significant as they fail significance testing. (Table 39, Table 40, and Table 41). There appears to be no relationship at the Hospital level for 2005 (Table 38).

Table 38

Correlation Between Use of SOP, SOPH, and CR, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation SOPH & CR 2005	Correlation SOP & CR 2005
Teaching	15	1	93%	9%	-50%
Small	31	12	61%	-23%	-47%
Community	63	3	95%	-17%	-27%

CR=Current Ratio
SOP=Use of Standard Operating Procedures
SOPH=Use of Standard Operating Procedures in Hospital

Table 39

SOP Relevance Test in Teaching Hospitals versus CR, 2005

	SOP and CR in Teaching
m_1	-0.01
r^2	0.25
FDIST	8.00%
t	-1.928
TINV	2.201

CR=Current Ratio

SOP=Use of Standard Operating Procedures

Table 40

SOP Relevance Test in Small Hospitals versus CR, 2005

	SOP and CR in Small
m_1	-0.05
r^2	0.20
FDIST	0.08%
t	0.139
TINV	2.179

CR=Current Ratio

SOP=Use of Standard Operating Procedures

Table 41

SOP Relevance Test in Community Hospitals versus CR, 2005

	SOP and CR in Community
m_1	-0.01
r^2	0.04
FDIST	13.07%
t	-1.533
TINV	2.002

CR=Current Ratio

SOP=Use of Standard Operating Procedures

For 2007 Teaching hospitals continue to have unfavourable performance between Emergency Department SOPs and CR as well as Hospital level SOPs and CR (Table 42). The relationship between CR and the Emergency Department level SOPs is now statistically significant (Table 43). The Hospital level SOPs now exhibit the same level of unfavourable outcome however this relationship is not statistically significant as

it fails the t-test (Table 44). If the past trend continues with SOPH given what happened with SOPs in terms of a high correlation failing in 2005 but passing in 2007 then it could be expected that at some near future point SOPH will be a statistically significant unfavourable result as well. Given that Teaching hospitals are learning institutions it is reasonable to expect that in the interest of patient safety they may be using more SOPs and SOPHs than the other types of hospitals (Kotter, 1995). Additionally, exposure to litigation is greater when patient treatment is conducted by apprentice medical staff so to ensure procedural compliance Teaching hospitals may be using more SOPs and SOPHs than required (Goodstein et al., 1994).

Table 42
Correlation Between Use of SOP, SOPH, and CR, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation SOPH & CR 2007	Correlation SOP & CR 2007
Teaching	15	0	100%	-47%	-57%
Small	31	2	94%	53%	27%
Community	63	1	98%	-16%	-10%

CR=Current Ratio
SOP=Use of Standard Operating Procedures
SOPH=Use of Standard Operating Procedures in Hospital

Table 43
SOP Relevance Test in Teaching Hospitals versus CR, 2007

	SOP and CR in Teaching
m_1	-0.02
r^2	0.44
FDIST	1.81%
t	-2.823
TINV	2.228

CR=Current Ratio
SOP=Use of Standard Operating Procedures

Table 44
SOPH Relevance Test in Teaching Hospitals versus CR, 2007

	SOPH and CR in Teaching
m_1	-0.01
r^2	0.20
FDIST	14.10%
t	-1.599
TINV	2.228

CR=Current Ratio

SOPH=Use of Standard Operating Procedures Hospital Level

For Small hospitals for 2007 there appears to be a complete turnaround in results as the apparent correlations are now favourable (Table 42). While the correlation is not strong for the Emergency Department level and CR, testing reveals that it is not statistically significant either (Table 45). The association does appear to be strong for the SOPH Hospital level (Table 42) with the relationship passing the statistical significance test (Table 46).

Table 45
SOP Relevance Test in Small Hospitals versus CR, 2007

	SOP and CR in Small
m_1	0.02
r^2	0.09
FDIST	2.18%
t	0.140
TINV	2.069

CR=Current Ratio

SOP=Use of Standard Operating Procedures

Table 46

SOPH Relevance Test in Small Hospitals versus CR, 2007

	SOPH and CR in Small
m_1	0.05
r^2	0.28
FDIST	1.40%
t	2.707
TINV	2.093

CR=Current Ratio

SOPH=Use of Standard Operating Procedures Hospital Level

Community hospitals appear to have no strong relationship between the use of SOPs and SOPHs versus CR (Table 38, Table 42).

The outcome of PST is only available for 2007. However, the amount of time that employees are “sick” is often viewed as a measure of management effectiveness (Drucker, 1954). While there appears to be some relationship at the Emergency Department level for Teaching hospitals (Table 47) this relationship does not pass the significance test (Table 48). At the Hospital level there does not appear to be any relationship between PST and the Use of Standard Operating Procedures.

Table 47

Correlation Between Use of SOP, SOPH, and PST

Hospital Size	#	# Hospitals		Correlation SOPH & PST 2007	Correlation SOP & PST 2007
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	1	93%	2%	39%
Small	31	10	68%	-6%	-11%
Community	63	2	97%	-14%	10%

PST=% Sick Time

SOP=Use of Standard Operating Procedures

SOPH=Use of Standard Operating Procedures in Hospital

Table 48

SOP Relevance Test in Teaching Hospitals versus PST

	SOP and PST in Teaching
m_1	0.01
r^2	0.07
FDIST	39.18%
t	0.895
TINV	2.228

PST=% Sick Time
 SOP=Use of Standard Operating Procedures

Based upon this analysis of SOPs and SOPHs activities versus outcomes H2 is inconclusive as the results are inconsistent. However, there are Hospital level SOPs which are used extensively in the operation of the Emergency Department which are measured independently that have not been included as part of the Emergency Department level SOP measurement or the Hospital level SOPH (Ms. Taylor, M., President, St. Mary's Hospital, personal communication, Jan. 15, 2009). These SOPs include Safety Reporting and Analysis (PSRA), Promoting a Patient Safety Culture (PPSC), Performance Management in Ambulatory Care (PMAC), and Strategies to Manage the Waiting Process in Ambulatory Care Clinics (SMWPACC). To rigorously prove or disprove H2 each of these specific SOPs must be analysed to determine their impact on Emergency Department and relevant Hospital level outcomes. These specific SOPs were not measured in 2005 as there was no mandate from the MOH to perform on these metrics (Ontario Hospital Association, 2005). Research has shown that some Ontario public hospitals had various SOPs in these categories however the activity was not significant (Ontario Ministry of Health and Long Term Care, 1999). Public reaction to extensive wait times in Emergency Departments and influenza epidemics forced the MOH to exhibit more pro-activity in terms of improving hospital Emergency Department performance. Consequently these metrics were developed and mandated by

the MOH in an effort to respond to the public outcry of their perception of inadequate Emergency Department performance. Given the reality that these SOPs span the entire hospital the MOH classified them as a Hospital level performance metric (Ontario Hospital Association, 2007).

The implementation level of PSRA is not statistically different between the different types of hospitals (Table 49). Small hospitals are still challenged with a reporting rate that is lower than the other types of hospitals. In terms of impact on Emergency Department outcomes there appears to be no relationship (Table 50).

Table 49

PSRA Based Upon Size/Type

Hospital Size	#	# Hospitals		PSRA 2007 Average	PSRA 2007 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	0	100%	82%	12%	6%	76%	88%
Small	31	6	81%	72%	25%	10%	62%	81%
Community	63	2	97%	78%	21%	5%	72%	83%

PSRA=Patient Safety and Reporting Analysis

Table 50

Correlation Between PSRA and Emergency Performance

Hospital Size	#	# Hospitals Not		Correlation RVRAa & PSRA 2007	Correlation RVRAb & PSRA 2007	Correlation XRRAFIPc & PSRA 2007
		Reporting or Report Zero	Reporting Rate			
Teaching	15	2	87%	1%	-1%	-11%
Small	31	19	39%	13%	14%	0%
Community	63	13	79%	3%	17%	3%

XRRAFIPc =Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

PSRA=Patient Safety and Reporting Analysis

At the Hospital level there appears to be a strong correlation between PSRA and RLD for Small hospital (Table 51) however this correlation does not pass the significance test (Table 52). The continued low reporting rate for Small hospitals may be a contributing

factor to the lack of relevance, in spite of the apparent high correlation. Therefore, this SOP appears to have no relevant impact on the RLD performance metric.

Table 51

Correlation Between PSRA and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & PSRA 2007
Teaching	15	4	73%	14%
Small	31	25	19%	-87%
Community	63	8	87%	-15%

RLD=Readmissions Labour and Delivery
PSRA=Patient Safety and Reporting Analysis

Table 52

PSRA Relevance Test in Small Hospitals versus RLD

	PSRA and RLD in Small
m_1	-0.018
r^2	0.22
FDIST	35.36%
T	-1.048
TINV	2.7768

RLD=Readmissions Labour and Delivery
PSRA=Patient Safety and Reporting Analysis

There appears to be no relationship between the performance of AELAD and the use of PRSA (Table 53).

Table 53

Correlation Between PSRA and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & PSRA 2007
Teaching	15	4	73%	-6%
Small	31	21	32%	8%
Community	63	8	87%	-9%

AELAD=Adverse Events Labour and Delivery
PSRA=Patient Safety and Reporting Analysis

There also appears to be no relationship between PSRA and HSMR. Note the lower reporting rate and the lack of reporting for Small hospitals altogether on this outcome (Table 54).

Table 54
Correlation Between PSRA and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & PSRA 2007
Teaching	15	6	60%	-4%
Small	31	31	0%	N/A
Community	63	37	41%	-10%

HSMR=Hospital Standardized Mortality Ratio
PSRA=Patient Safety and Reporting Analysis

Additionally, there is no significant relationship between PSRA and CR. It is interesting to note the near perfect reporting on a metric that is financial versus patient centred (Table 55).

Table 55
Correlation Between PSRA and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & PSRA 2007
Teaching	15	0	100%	25%
Small	31	4	87%	18%
Community	63	2	97%	-3%

CR=Current Ratio
PSRA=Patient Safety and Reporting Analysis

The final outcome, that of PST also appears to have no relationship with the implementation of PSRA (Table 56).

Table 56

Correlation Between PSRA and PST

Hospital Size	#	# Hospitals		Correlation PST & PSRA 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	0	100%	-3%
Small	31	4	87%	-28%
Community	63	2	97%	-3%

PST=% Sick Time

PSRA=Patient Safety and Reporting Analysis

When comparing this specific Standard Operating Procedure of PSRA to SOPs as measured at the Emergency Department level it appears that there is only a relationship for Small hospitals (Table 57).

Table 57

Correlation Between PSRA and SOP

Hospital Size	#	# Hospitals		Correlation SOP & PSRA 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	0	100%	-26%
Small	31	4	87%	66%
Community	63	2	97%	9%

SOP=Use of Standard Operating Procedures

PSRA=Patient Safety and Reporting Analysis

This relationship is significant as it passes both the F and t-tests (Table 58). Its relevance is medium at 40%. Given the observed ineffectiveness of this activity versus patient outcomes it suggests that the effort that Small hospitals may be expending on this specific SOP may be a waste of resources.

Table 58

PSRA Relevance Test in Small Hospitals versus SOP

	PSRA and SOP in Small
m_1	0.67
r^2	0.40
FDIST	0.21%
T	3.567
TINV	2.093

SOP=Use of Standard Operating Procedures

PSRA=Patient Safety and Reporting Analysis

Overall, it seems that there is no relationship between PSRA and any of the Emergency Department outcomes, even those that are measured at the Hospital level. This observation generates the question why are hospitals required to report this metric if there is no causality with respect to outcomes? Expending the effort to measure this metric may be a waste of resources for hospitals.

The implementation of PPSC is statistically different between Teaching and Small hospitals whereas Community hospitals have no difference with either type (Table 59). The reporting rate of all hospitals on this metric is relatively high indicating that it may be a metric easy to report. In terms of impact on Emergency Department performance there appears to be an unfavourable impact between PPSC and RVRAa (Table 60). This relationship is statistically significant (Table 61). Teaching hospitals for 2007 statistically have the best performance of all types for the RVRAa metric. Investigation has shown that given the learning environment of Teaching hospitals, when the intern is not completely certain of the diagnosis they are encouraged to ask the patient to return within 24 hours to make sure that the treatment is working (Ms Bowers, RN, Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010). This may also explain the superior performance of SOPs at the

Emergency Department level for the RVRAb metric (Table 18) as the diagnosis approach may be more rigorous when the patient is first treated and errors appear immediately, not 1 to 3 days later.

Table 59

PPSC Based Upon Size/Type

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	PPSC 2007 Average	PPSC 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	64%	13%	7%	58%	71%
Small	31	4	87%	49%	22%	8%	40%	57%
Community	63	2	97%	58%	20%	5%	53%	63%

PPSC=Promoting a Patient Safety Culture

Table 60

Correlation Between PPSC and Emergency Performance

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRaA & PPSC 2007	Correlation RVRAb & PPSC 2007	Correlation XRRAFIPc & PPSC 2007
Teaching	15	2	87%	57%	18%	-11%
Small	31	19	39%	-30%	-12%	3%
Community	63	13	79%	5%	1%	-1%

XRRAFIPc = Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
 PPSC=Promoting a Patient Safety Culture

Table 61

PPSC Relevance Test in Teaching Hospitals versus RVRaA

PPSC and RVRaA
 in Teaching

m_1	0.03
r^2	0.36
FDIST	3.89%
T	2.375
TINV	2.228

RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PPSC=Promoting a Patient Safety Culture

The relationship between PPSC and RVRaA for Small hospitals is not significant as it fails the t-test (Table 62). The low reporting rate for Small hospitals on Emergency Department outcomes may be impacting this relationship

Table 62

PPSC Relevance Test in Small Hospitals versus RVRAa

	PPSC and RVRAa in Small
m_1	-0.03
r^2	0.09
FDIST	3.70%
T	0.414
TINV	2.306

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

PPSC=Promoting a Patient Safety Culture

It appears that there is a relationship between PPSC and RLD for Teaching and Small Hospitals (Table 63) however neither relationship is relevant as they both fail F and t-tests (Table 64, Table 65).

Table 63

Correlation Between PPSC and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & PPSC 2007
Teaching	15	2	87%	-43%
Small	31	19	39%	-46%
Community	63	13	79%	-15%

RLD=Readmissions Labour and Delivery

PPSC=Promoting a Patient Safety Culture

Table 64

PPSC Relevance Test in Teaching Hospitals versus RLD

	PPSC and RLD in Teaching
m_1	-0.01
r^2	0.20
FDIST	31.06%
T	-1.128
TINV	2.571

RLD=Readmissions Labour and Delivery

PPSC=Promoting a Patient Safety Culture

Table 65

PPSC Relevance Test in Small Hospitals versus RLD

	PPSC and RLD in Small
m_1	-0.018
r^2	0.22
FDIST	35.36%
T	-1.048
TINV	2.776

RLD=Readmissions Labour and Delivery
 PPSC=Promoting a Patient Safety Culture

While there appears to be a relationship between PPSC and AELAD for Teaching hospitals (Table 66) it fails both the F and t-tests (Table 67). Again, the low reporting rate for Small hospitals is continuing behaviour.

Table 66

Correlation Between PPSC and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & PPSC 2007
Teaching	15	2	87%	42%
Small	31	19	39%	13%
Community	63	13	79%	-23%

AELAD=Adverse Events Labour And Delivery
 PPSC=Promoting a Patient Safety Culture

Table 67

PPSC Relevance Test in Teaching Hospitals versus AELAD

	PPSC and AELAD in Teaching
m_1	0.07
r^2	0.11
FDIST	46.22%
T	0.796
TINV	2.571

AELAD=Adverse Events Labour And Delivery
 PPSC=Promoting a Patient Safety Culture

There appears to be no relationship between PPSC and the mortality rate, HSMR (Table 68).

Table 68

Correlation Between PPSC and HSMR

Hospital Size	#	# Hospitals		Correlation HSMR & PPSC 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	6	60%	-2%
Small	31	31	0%	N/A
Community	63	37	41%	15%

HSMR=Health Standardized Mortality Ratio
PPSC=Promoting a Patient Safety Culture

There is no strong relationship between PPSC and CR (Table 69). The apparent relationship between PPSC in Teaching hospitals and CR is not statistically significant (Table 70).

Table 69

Correlation Between PPSC and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero		Correlation CR & PPSC 2007
		Reporting or Report Zero	Reporting Rate	
Teaching	15	0	100%	37%
Small	31	4	87%	19%
Community	63	2	97%	6%

CR=Current Ratio
PPSC=Promoting a Patient Safety Culture

Table 70

PPSC Relevance Test in Teaching Hospitals versus CR

	PPSC and CR in Teaching
m_1	0.015
r^2	0.14
FDIST	17.91%
T	1.512
TINV	2.145

CR=Current Ratio
PPSC=Promoting a Patient Safety Culture

The final outcome, PST, has no apparent relationship with PPSC (Table 71).

Table 71

Correlation Between PPSC and PST

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST 2007 & PPSC 2007
Teaching	15	0	100%	-4%
Small	31	4	87%	-28%
Community	63	2	97%	4%

PST=% Sick Time
PPSC=Promoting a Patient Safety Culture

The relationship between PPSC and SOPs (Table 72) is only significant for Small hospitals (Table 73). However, this relationship has not translated into any improved outcomes as the previous analysis has demonstrated. What Small hospitals are doing needs to be compared with the other hospital types to better understand the differences in the execution of PPSC. The PPSC implementation in Small hospitals may be efficient but not effective (Drucker, 2005).

Table 72

Correlation Between PPSC and SOP

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation SOP 2007 & PPSC 2007
Teaching	15	0	100%	-29%
Small	31	4	87%	43%
Community	63	2	97%	-13%

SOP=Use of Standard Operating Procedures
PPSC=Promoting a Patient Safety Culture

Table 73

PPSC Relevance Test in Small Hospitals versus SOP

	PPSC and SOP in Small
m_1	0.36
r^2	0.22
FDIST	3.32%
T	2.297
TINV	2.093

SOP=Use of Standard Operating Procedures
PPSC=Promoting a Patient Safety Culture

Overall, the only relationship that may be of significance for the activity PPSC is its potential impact on the RVRAb outcome for Teaching hospitals. Otherwise, this metric has no impact on any of the outcomes and should be eliminated as it consumes resources without any apparent benefit.

Performance Management in Ambulatory Care (PMAC) implementation is significantly different between Small hospitals and the other types (Table 74).

Table 74

PMAC Based Upon Size/Type

alpha= 0.05

Hospital Size	#	# Hospitals		PMAC 2007 Average	PMAC 2007 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	0	100%	74%	19%	10%	65%	84%
Small	31	5	84%	48%	24%	9%	39%	58%
Community	63	4	94%	65%	25%	6%	58%	71%

PMAC=Performance Management in Ambulatory Care

There appears to be a relationship between PMAC in Teaching hospitals and the Emergency Department outcomes of RVRaA and XRRAFIPc (Table 75) but these do not pass the significance tests (Table 76, Table 77). The lower reporting rate of Small hospitals is a continuing behaviour.

Table 75

Correlation Between PMAC and Emergency Performance

Hospital Size	#	# Hospitals		Correlation RVRaA & PMAC 2007	Correlation RVRAb & PMAC 2007	Correlation XRRAFIPc & PMAC 2007
		Not Reporting or Report Zero	Reporting Rate			
Teaching	15	2	87%	39%	19%	41%
Small	31	19	39%	-3%	0%	-18%
Community	63	13	79%	-5%	18%	-7%

XRRAFIPc =Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
 PMAC=Performance Management in Ambulatory Care

Table 76

PMAC Relevance Test in Teaching Hospitals versus RVRAa

	PMAC and RVRAa in Teaching
m_1	0.01
r^2	0.08
FDIST	38.37%
t	0.911
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

PMAC=Performance Management in Ambulatory Care

Table 77

PMAC Relevance Test in Teaching Hospitals versus XRRAFIPc

	PMAC and XRRAFIPc in Teaching
m_1	0.01
r^2	0.13
FDIST	24.43%
t	1.237
TINV	2.228

XRRAFIPc =Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

PMAC=Performance Management in Ambulatory Care

There does appear to be some impact of PMAC with respect to RLD in Teaching hospitals (Table 78) however it does not pass relevance testing (Table 79).

Table 78

Correlation Between PMAC and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & PMAC 2007
Teaching	15	2	87%	-36%
Small	31	24	23%	4%
Community	63	13	79%	3%

RLD=Readmissions Labour and Delivery

PMAC=Performance Management in Ambulatory Care

Table 79

PMAC Relevance Test in Teaching Hospitals versus RLD

	PMAC and RLD in Teaching
m_1	-0.01
r^2	0.37
FDIST	14.40%
t	-1.731
TINV	2.571

RLD=Readmissions Labour and Delivery

PMAC=Performance Management in Ambulatory Care

There is no significant relationship between PMAC and AELAD (Table 80).

Table 80

Correlation Between PMAC and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & PMAC 2007
Teaching	15	2	87%	29%
Small	31	24	23%	6%
Community	63	13	79%	-12%

AELAD=Adverse Events Labour and Delivery

PMAC=Performance Management in Ambulatory Care

While there appears to be a strong favourable relationship between PMAC and HSMR in both Teaching and Community hospitals (Table 81), only the Community hospitals have a significant relationship that passes both the F and t-tests (Table 82, Table 83). A comparison of how PMAC is implemented in Community hospitals versus Teaching hospitals needs to be done to understand why their implementation of PMAC is relevant and the Teaching hospital implementation is not. Again, no data is available for Small hospitals as they have not reported on the HSMR metric.

Table 81

Correlation Between PMAC and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & PMAC 2007
Teaching	15	6	60%	-48%
Small	31	31	0%	N/A
Community	63	37	41%	-45%

HSMR=Hospital Standardized Mortality Rate

PMAC=Performance Management in Ambulatory Care

Table 82

PMAC Relevance Test in Teaching Hospitals versus HSMR

PMAC and HSMR
in Teaching

m_1	-0.10
r^2	0.03
FDIST	63.5%
t	-0.496
TINV	2.364

HSMR=Hospital Standardized Mortality Rate

PMAC=Performance Management in Ambulatory Care

Table 83

PMAC Relevance Test in Community Hospitals versus HSMR

PMAC and HSMR
in Community

m_1	-0.29
r^2	0.32
FDIST	1.18%
t	-2.820
TINV	2.110

HSMR=Hospital Standardized Mortality Rate

PMAC=Performance Management in Ambulatory Care

There appears to be a weak relationship at best between PMAC and CR in Teaching hospitals (Table 84). There is no relationship between PMAC and CR in any of the other hospital types. The Teaching hospital relationship was tested given the critical importance of financial performance, even though the “bar” set for relationship testing has been set at 25%. The relationship was found to pass both the F and t-tests with a medium level of r^2 (Table 85). It may be that the difference between the Teaching and

Community hospitals in terms of how PMAC affects the HSMR outcome is that Teaching hospitals may have PMAC procedures that are more cost versus patient focused. Again, these practices at the two hospital types need to be compared as it may be possible to take the best from both.

Table 84

Correlation Between PMAC and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & PMAC 2007
Teaching	15	0	100%	21%
Small	31	4	87%	-6%
Community	63	4	94%	8%

CR=Current Ratio
PMAC=Performance Management in Ambulatory Care

Table 85

PMAC Relevance Test in Teaching Hospitals versus CR

	PMAC and CR in Teaching
m_1	0.02
r^2	0.41
FDIST	2.56%
t	2.620
TINV	2.228

CR=Current Ratio
PMAC=Performance Management in Ambulatory Care

Comparing PST to PMAC there only appears to be a relationship for Teaching hospitals (Table 86). However, this relationship fails both the F and t-tests indicating that the PMAC activity has no significant impact to the PST outcome (Table 87).

Table 86

Correlation Between PMAC and PST

Hospital Size	#	# Hospitals		Reporting Rate	Correlation PST 2007 & PMAC 2007
		Not Reporting or Report Zero	Reporting		
Teaching	15	0	100%	100%	43%
Small	31	4	87%	87%	20%
Community	63	4	94%	94%	7%

PST=% Sick Time

PMAC=Performance Management in Ambulatory Care

Table 87

PMAC Relevance Test in Teaching Hospitals versus PST

PMAC and PST in Teaching

m_1	0.001
r^2	0.002
FDIST	89.69%
t	0.133
TINV	2.228

PST=% Sick Time

PMAC=Performance Management in Ambulatory Care

The correlation between PMAC and SOP appears to be strong for Small hospitals only (Table 88). When tested this relationship is relevant (Table 89) but since PMAC has only impacted the HSMR outcome, which Small hospitals have not reported on, it is not known if this relationship influences patient outcomes in any way.

Table 88

Correlation Between PMAC and SOP

Hospital Size	#	# Hospitals		Reporting Rate	Correlation SOP & PMAC 2007
		Not Reporting or Report Zero	Reporting		
Teaching	15	0	100%	100%	-7%
Small	31	4	87%	87%	47%
Community	63	4	94%	94%	11%

SOP=Use of Standard Operating Procedures

PMAC=Performance Management in Ambulatory Care

Table 89

PMAC Relevance Test in Small Hospitals versus SOP

	PMAC and SOP in Small
m_1	0.51
r^2	0.23
FDIST	3.12%
t	2.337
TINV	2.101

SOP=Use of Standard Operating Procedures

PMAC=Performance Management in Ambulatory Care

Overall, the only impact that PMAC appears to have on outcomes is a favourable relationship with HSMR for Community hospitals and for CR in Teaching hospitals. These relationships need to be investigated as there may be a series of best practices associated with Community hospitals' implementation of PMAC that drive down HSMR and the Teaching hospitals' implementation of PMAC that improves CR..

Strategies to Manage the Waiting Process in Ambulatory Care Clinics (SMWPACC) is a Hospital level SOP that was implemented in response to the public outcry with extensive wait times for Emergency Department and Clinic treatment (Canadian Institute for Health Information, 2007). The only significant difference in the implementation of SMWPACC appears to be between Teaching and Community hospitals, with Community hospitals having a significantly greater implementation rate (Table 90).

Teaching and Small hospitals appear to have some relationship with Emergency Department outcomes (Table 91). However, neither the Teaching or Small hospital relationships pass the statistical tests for relevance (Table 92, Table 93, Table 94, and Table 95).

Table 90

SMWPACC Based Upon Size/Type

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	SMWPACC 2007 Average	SMWPACC 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	45%	19%	10%	35%	54%
Small	31	4	87%	56%	19%	7%	49%	63%
Community	63	2	97%	60%	20%	5%	55%	65%

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 91

Correlation Between SMWPACC and Emergency Performance

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & SMWPACC 2007	Correlation RVRAb & SMWPACC 2007	Correlation XRRAFIPc & SMWPACC 2007
Teaching	15	2	87%	32%	42%	23%
Small	31	19	39%	-69%	-61%	-3%
Community	63	13	79%	12%	30%	-14%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 92

SMWPACC Relevance Test in Teaching Hospitals versus RVRAa

SMWPACC and RVRAa in Teaching

m_1	0.01
r^2	0.10
FDIST	30.99%
t	1.070
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 93

SMWPACC Relevance Test in Teaching Hospitals versus RVRAb

	SMWPACC and RVRAb in Teaching
m_1	0.01
r^2	0.10
FDIST	30.99%
t	1.070
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 94

SMWPACC Relevance Test in Small Hospitals versus RVRaA

	SMWPACC and RVRaA in Small
m_1	-0.05
r^2	0.47
FDIST	0.16%
t	0.040
TINV	2.306

RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 95

SMWPACC Relevance Test in Small Hospitals versus RVRAb

	SMWPACC and RVRAb in Small
m_1	-0.05
r^2	0.48
FDIST	0.47%
t	0.041
TINV	2.364

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

There does appear to be a relationship between RLD and SMWPACC for Teaching and Small hospitals (Table 96) however neither relationship passes the F or t-tests (Table 97, Table 98).

Table 96

Correlation Between SMWPACC and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & SMWPACC 2007
Teaching	15	2	87%	-59%
Small	31	19	39%	-88%
Community	63	13	79%	-10%

RLD=Readmissions Labour and Delivery

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 97

SMWPACC Relevance Test in Teaching Hospitals versus RLD

SMWPACC and RLD in Teaching

m_1	-0.01
r^2	0.24
FDIST	26.03%
t	-1.269
TINV	2.364

RLD=Readmissions Labour and Delivery

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 98

SMWPACC Relevance Test in Small Hospitals versus RLD

SMWPACC and RLD in Small

m_1	-0.03
r^2	0.77
FDIST	13.02%
t	0.010
TINV	2.776

RLD=Readmissions Labour and Delivery

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

While SMWPACC appears to have an impact on AELAD performance in Small hospitals (Table 99), the relationship does not pass either the F or t-test (Table 100).

Table 99

Correlation Between SMWPACC and AELAD

Hospital Size	# Hospitals	Reporting or Report Zero	Reporting Rate	Correlation AELAD & SMWPACC 2007
Teaching	15	2	87%	22%
Small	31	19	39%	-41%
Community	63	13	79%	-2%

AELAD=Adverse Events Labour And Delivery

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 100

SMWPACC Relevance Test in Small Hospitals versus AELAD

	SMWPACC and AELAD in Small
m_1	-0.03
r^2	0.77
FDIST	13.02%
t	0.010
TINV	2.776

AELAD=Adverse Events Labour And Delivery

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

While it appears that there is a favourable relationship between HSMR and SMWPACC for both Teaching and Community hospitals (Table 101) only Community hospitals pass both the F and t-tests (Table 102, Table 103). In spite of Teaching hospitals almost having statistically superior HSMR performance versus Community hospitals (Table 10) with respect to HSMR this activity of SMWPACC appears to be executed better at the Community hospital level. Further investigation into these practices at the Community hospital level may uncover opportunity for improvement at Teaching hospitals. Again, no conclusions can be drawn with respect to Small hospitals as they have not reported on this metric.

Table 101

Correlation Between SMWPACC and HSMR

Hospital Size	#	# Hospitals		Correlation HSMR & SMWPACC 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	6	60%	-21%
Small	31	31	0%	N/A
Community	63	37	41%	-50%

HSMR=Hospital Standardized Mortality Rate

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 102

SMWPACC Relevance Test in Teaching Hospitals versus HSMR

SMWPACC and HSMR in Teaching

m_1	-0.11
r^2	0.04
FDIST	59.05%
t	-0.564
TINV	2.364

HSMR=Hospital Standardized Mortality Rate

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 103

SMWPACC Relevance Test in Community Hospitals versus HSMR

SMWPACC and HSMR in Community

m_1	-0.27
r^2	0.26
FDIST	2.44%
t	-2.471
TINV	2.110

HSMR=Hospital Standardized Mortality Rate

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

On the CR financial metric the reporting from all hospital types is high. There appears to be a strong favourable correlation between CR and SMWPACC for Teaching hospitals with no significant correlations for the other types (Table 104). The Teaching hospital relationship is statistically significant as both F and t-tests are passed (Table 105). The financial performance of Teaching hospitals is largely the worst of all types (Table 11, Table 12) however they seem to be using SMWPACC as method to improve

performance. Further investigation into the specific nature of the SMWPACC programs that Teaching hospitals are using may be worth further investigation to apply to other types. The unfavourable relationship in Teaching hospitals between SMWPACC and the mortality rate, HSMR, may be a trade-off to improve the financial outcome, CR. Kaplan and Norton (2001) in their not-for-profit (NFP) research noted that NFPs focused more on patient or client outcomes, delivering their mission, in their application of the Balanced Scorecard versus pure financial performance. This may not be the right trade-off as it appears that Community hospitals have found a way to apply SMWPACC in a favourable way with respect to the mortality rate, HSMR. Combining the CR performance of Teaching hospitals with the HSMR impact of SMWPACC in Community hospitals may be a winning combination.

Table 104

Correlation Between SMWPACC and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & SMWPACC 2007
Teaching	15	0	100%	64%
Small	31	4	87%	-5%
Community	63	2	97%	-3%

CR=Current Ratio

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 105

SMWPACC Relevance Test in Teaching Hospitals versus CR

	SMWPACC and CR in Teaching
m_1	0.02
r^2	0.45
FDIST	1.72%
t	2.853
TINV	2.228

CR=Current Ratio

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

There appear to be no significant relationships between the last outcome, PST, and the activity SMWPACC (Table 106)

Table 106

Correlation Between SMWPACC and PST

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST 2007 & SMWPACC 2007
Teaching	15	0	100%	16%
Small	31	4	87%	-22%
Community	63	2	97%	-4%

PST=% Sick Time

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Relationships appear to exist between SOPs and SMWPACC for both Teaching and Small hospitals (Table 107). However, only the relationship between Small hospital SOPs and SMWPACC passes both the F and t-tests (Table 108, Table 109). Unfortunately, given the lack of response to HSMR for Small hospitals it is not known if increased use of SOPs and SMWPACC lead to a lower mortality rate, HSMR.

Table 107

Correlation Between SMWPACC and SOP

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation SMWPACC & SOP 2007
Teaching	15	0	100%	-37%
Small	31	4	87%	36%
Community	63	2	97%	16%

SOP=Use of Standard Operating Procedures

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Overall, the key relationships that appear to be relevant are the impact that SMWPACC has on HSMR for Community hospitals and on CR for Teaching hospitals. These relationships require further investigation to determine if they are best practices which can be transplanted to the other hospital types.

Table 108

SMWPACC Relevance Test in Teaching Hospitals versus SOP

	SMWPACC and SOP in Teaching
m_1	-0.53
r^2	0.24
FDIST	10.85%
t	-1.762
TINV	2.228

SOP=Use of Standard Operating Procedures o

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Table 109

SMWPACC Relevance Test in Small Hospitals versus SOP

	SMWPACC and SOP in Small
m_1	0.15
r^2	0.06
FDIST	0.00%
t	4.106
TINV	2.306

SOP=Use of Standard Operating Procedures

SMWPACC=Strategies to Manage the Waiting Process in Ambulatory Care Clinics

Therefore, to prove or disprove H2, all Standard Operating Procedure metrics have been examined. They include SOP (Emergency Department Level) and SOPH (Hospital Level as well as specific SOP programs that are tracked separately which include PSRA, PPSC, PMAC, and SMWPACC. While H2 has not been proved for each type of hospital the analysis has shown that:

Teaching hospitals have the most effective SOPs for improving RVRAb outcomes.

Community hospitals have the most effective SOPs for improving XRRAFIPc outcomes.

Small hospitals have significantly lower use of SOPHs at the Hospital level however the SOPHs that they are using positively impact CR.

Small hospitals have the lowest effective SOPs for Emergency Department outcomes.

Small hospitals have a low reporting rate on patient outcomes in comparison to Teaching and Community hospitals, making it difficult to draw relevant conclusions, particularly on HSR where there is no reporting at all.

The CR performance in Small hospitals demonstrates the likely existence of the use of inefficient and ineffective SOPs in the Emergency Department.

Teaching hospital performance with CR and use of SOPs in the Emergency Department may indicate excessive or inefficient use of SOPs. However, the SOPS appear to be effective, at least for the RVRAb outcome.

There is no impact on outcomes with the implementation of PRSA. This specific SOP program provides not patient or financial benefit. In fact Small hospitals in particular appear to be expending unnecessary resources for no positive outcome.

There is no impact on the use of SOPs with PST.

Teaching hospitals use of PPSC appears to improve RVRaA and RVRAb performance, other than that outcome there is no impact of this specific program SOP to Emergency Department performance.

Community hospitals have developed a PMAC program which favourably impacts HSMR. Teaching hospitals have developed a more financially efficient PMAC program, positively impacting CR, but it may be at the expense of the HSMR metric.

Community hospitals have also developed a SMWPACC program which favourably impacts HSMR. Teaching hospitals again have developed a more financially efficient

SMWPACC program, positively impacting CR but again it may be at the expense of HSMR.

In summary, the different types of hospitals have developed various SOPs that perform better than their peers, on both patient outcomes and financial outcomes. Therefore they are a critical activity but implementation inconsistency across the system appears to be an issue. These specific SOPs need to be better understood and shared, as appropriate, as best practices to improve the overall average performance of the Ontario Emergency Department hospital system. A SOP measuring the implementation and effectiveness of “best practice” SOPs is required in order to institutionalize the new and best approaches (Kotter, 1995).

Hypothesis 3 (H3)

Emergency Departments in high performing hospitals engage in a variety of strategies that facilitate the Internal Co-ordination of Care (ICC) such as Lean methodologies.

Observations: H3 is difficult to prove or disprove. The first step in Lean optimization is standardization (Jones, Roos, Womack, 1996). The lack of effective SOPs and their broad implementation in the Ontario hospital system means that any attempts at Lean optimization are likely to be poorly executed as Lean’s foundation is standardization of process and information. Significant research has been done regarding the implementation of Lean in hospitals and their Emergency Departments, verifying that standardization is crucial to the success of any implementation (Savary, Crawford-Mason, 2006).

As research verifies (Table 110, Table 111) Lean systems do exist in Ontario public hospitals, with significantly lower levels of implementation in Small hospitals.

Table 110

ICC in Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero		Reporting Rate	ICC 2005 Average	ICC 2005 Std Dev	Confidence	Lower Range	Upper Range
		Reporting or Report Zero	Report Zero						
Teaching	15	1		93%	76%	16%	9%	67%	84%
Small	31	16		48%	32%	19%	10%	22%	41%
Community	63	7		89%	76%	14%	4%	72%	79%

ICC=Internal Co-ordination of Care

Table 111

ICC in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero		Reporting Rate	ICC 2007 Average	ICC 2007 Std Dev	Confidence	Lower Range	Upper Range
		Reporting or Report Zero	Report Zero						
Teaching	15	1		93%	78%	18%	9%	69%	87%
Small	31	8		74%	40%	24%	10%	31%	50%
Community	63	3		95%	69%	23%	6%	63%	74%

ICC=Internal Co-ordination of Care

Further research notes that there may be a relationship between the implementation and of Lean and Emergency Department outcomes (Table 112).

Table 112

Correlation Between ICC and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero		Reporting Rate	Correlation RVRAa & ICC 2007	Correlation RVRAb & ICC 2007	Correlation XRRAFIPc & ICC 2007
		Reporting or Report Zero	Report Zero				
Teaching	15	2		87%	29%	36%	23%
Small	31	19		39%	-16%	-29%	-23%
Community	63	13		79%	-23%	-2%	-23%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

ICC=Internal Co-ordination of Care



However, when these relationships are tested, no hospitals pass the F and t-tests (Table 113, Table 114, and Table 115). Note that Teaching hospitals attempt to use these strategies but they are in an unfavourable direction (Table 112). Even though these relationships are not relevant in 2007 they need to be monitored by management to ensure that they do not become relevant. There may be an emerging conflict between the goals of teaching and standardization which remains unresolved. The conflict between time honoured physician autonomy and scientific evidence based medicine is increasing and this may be a symptom of that controversy (Larson, 2007). Small hospitals, which have the lowest resources of all, and likely to benefit the most from effective Lean implementation (Walshe, Shortell, 2004), are also lacking in statistical relevance (Table 115). Given the fundamental nature of Lean, waste minimization or restated, resource optimization, Small hospitals are the type most likely to benefit from a correct Lean implementation. Overall, the minimal impact that Lean has on outcomes is a signal that the Lean process in Ontario hospitals is suboptimal versus outcomes at other hospital systems which have successfully implemented Lean (Savary, Crawford-Mason, 2006). Implementation of Lean strategies has been proven to be a key success factor in dramatically improving the performance of hospitals (Alexander, Weiner, Griffith, 2006) yet the MOH has not been aggressive in expecting hospitals to deliver the expected performance improvements (Canadian Institute for Health Information, 2007). Experimentation with Lean in the Ontario hospital system has demonstrated that there are large operational and patient performance benefits achievable. These are only achievable if the proven Lean methodology is followed, which includes standardization (Hummel, 2009).

The inability of Small hospitals to meet basic MOH expectations in terms of standardized reporting (Table 112) is a signal that there are basic execution problems with the current operational system with less than half the Small hospitals reporting on Emergency Department outcomes.

Table 113

ICC Relevance Test in Teaching Hospitals versus RVRAa

	ICC and RVRAa in Teaching
m_1	0.01
r^2	0.09
FDIST	35.44%
t	0.971
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 ICC=Internal Co-ordination of Care

Table 114

ICC Relevance Test in Teaching Hospitals versus RVRAb

	ICC and RVRAb in Teaching
m_1	0.010
r^2	0.13
FDIST	25.55%
t	1.206
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
 ICC=Internal Co-ordination of Care

Table 115

ICC Relevance Test in Small Hospitals versus RVRAb

	ICC and RVRAb in Small
m_1	-0.059
r^2	0.34
FDIST	3.62%
t	0.106
TINV	2.571

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
 ICC=Internal Co-ordination of Care

The impact of Lean on the RLD maternity metric appears to be strong, with Teaching hospitals reversing unfavourable to favourable performance and Small hospitals exhibiting a potentially unfavourable relationship (Table 116). However, none of these relationships are relevant (Table 117, Table 118, and Table 119).

Table 116

Correlation Between ICC and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & ICC 2005	Correlation RLD & ICC 2007
Teaching	15	5	67%	42%	-50%
Small	31	24	23%	17%	28%
Community	63	10	84%	-14%	-6%

RLD=Readmissions Labour and Delivery
ICC=Internal Co-ordination of Care

Table 117

ICC Relevance Test in Teaching Hospitals versus RLD, 2005

ICC and RLD in Teaching

m_1	0.008
r^2	0.18
FDIST	22.80%
t	1.305
TINV	2.306

RLD=Readmissions Labour and Delivery
ICC=Internal Co-ordination of Care

Table 118

ICC Relevance Test in Teaching Hospitals versus RLD, 2007

ICC and RLD in Teaching

m_1	-0.01
r^2	0.25
FDIST	14.34%
t	-1.623
TINV	2.306

RLD=Readmissions Labour and Delivery
ICC=Internal Co-ordination of Care

Table 119

ICC Relevance Test in Small Hospitals versus RLD, 2007

ICC and RLD in Small

m ₁	-0.01
r ²	0.02
FDIST	77.53%
t	-0.305
TINV	2.777

RLD=Readmissions Labour and Delivery

ICC=Internal Co-ordination of Care

A similar situation exists with the other maternity metric, AELAD. Teaching hospitals exhibit an apparent consistently unfavourable relationship with Small hospitals exhibiting an apparent favourable relationship (Table 120). However, in spite of the relatively strong correlations, neither relationship passes the significance tests (Table 121, Table 123, and Table 124). Community hospitals start with a favourable relationship that becomes weaker in the most recent period (Table 120, Table 122). It appears that Community hospitals are doing something right with their Lean implementation but it is becoming less effective. Management needs to understand why and then share these practices with the other hospital types as it will improve their performance on this metric. Community hospitals have the best performance of all types in this metric (Table 7, Table 8) and even through the recent r² is low at 9%, in 2005 it was 34% in 2005.

Table 120

Correlation Between ICC and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & ICC 2005	Correlation AELAD & ICC 2007
Teaching	15	5	67%	59%	36%
Small	31	26	16%	4%	-73%
Community	63	7	89%	-30%	-21%

AELAD=Adverse Events Labour And Delivery

ICC=Internal Co-ordination of Care



Table 121

ICC Relevance Test in Teaching Hospitals versus AELAD, 2005

ICC and AELAD in
Teaching

m_1	0.10
r^2	0.34
FDIST	7.43%
t	2.052
TINV	2.306

AELAD=Adverse Events Labour And Delivery
ICC=Internal Co-ordination of Care

Table 122

ICC Relevance Test in Community Hospitals versus AELAD, 2005

ICC and AELAD in
Community

m_1	-0.03
r^2	0.09
FDIST	3.01%
t	-2.233
TINV	2.009

AELAD=Adverse Events Labour And Delivery
ICC=Internal Co-ordination of Care

Table 123

ICC Relevance Test in Teaching Hospitals versus AELAD, 2007

ICC and AELAD in
Teaching

m_1	0.04
r^2	0.13
FDIST	30.43%
t	1.098
TINV	2.306

AELAD=Adverse Events Labour And Delivery
ICC=Internal Co-ordination of Care

Table 124

ICC Relevance Test in Small Hospitals versus AELAD, 2007

ICC and AELAD in Small

m_1	-0.03
r^2	0.39
FDIST	18.66%
t	-1.592
TINV	2.777

AELAD=Adverse Events Labour And Delivery
 ICC=Internal Co-ordination of Care

Examining the mortality metric, HSMR, reveals that there appears to be a strong correlation with Lean implementation (Table 125) but again this relationship is fails the statistical tests (Table 126). Evaluation is proving that it appears that most of the Lean effort, with the exception of the RVRAb metric in Small hospitals, is not geared towards patient outcomes.

Table 125

Correlation Between ICC and HSMR

Hospital Size	#	# Hospitals		Correlation HSMR & ICC 2005	Correlation HSMR & ICC 2007
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	6	60%	-3%	-37%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	-2%	-18%

HSMR=Hospital Standardized Mortality Rate
 ICC=Internal Co-ordination of Care

Table 126

ICC Relevance Test in Teaching Hospitals versus HSMR, 2007

ICC and HSMR in Teaching

m_1	-0.23
r^2	0.14
FDIST	32.68%
t	-1.054
TINV	2.364

HSMR=Hospital Standardized Mortality Rate
 ICC=Internal Co-ordination of Care

Teaching hospitals have an apparent strong relationship between Lean implementation and the key financial metric, CR (Table 127). This relationship barely fails the statistical tests (Table 128). If the p-value were slightly greater than 0.05, at p=0.08, the tests pass. Given this close outcome of the relevance test and the r^2 value compared to the patient outcome testing, it is likely that most of the Lean effort in Teaching hospitals is directed towards improving financial versus patient outcomes. The opposite situation exists in Small hospitals as the effort to standardize has an unfavourable impact on costs (Table 127). Like the situation with the Teaching hospitals, this situation barely fails the relevance testing (Table 129). In spite of the relevant relationship with RVRAB outcomes it appears that standardization hurts financial performance, the exact opposite of what is expected (Jones, Roos, Womack, 1990). This indicates that the implementation of standardization may be flawed and needs to be compared to best-in-class Small hospitals that have achieved successful Lean implementations. As cost optimization is a major objective of the MOH this investigation should have immediate priority.

Table 127

Correlation Between ICC and CR

Hospital Size	#	# Hospitals		Reporting Rate	Correlation	Correlation
		Not Reporting or Report Zero	Reporting		CR & ICC 2005	CR & ICC 2007
Teaching	15	1	93%	-7%	55%	
Small	31	12	61%	-10%	-25%	
Community	63	3	95%	15%	-8%	

CR=Current Ratio

ICC=Internal Co-ordination of Care



Table 128

ICC Relevance Test in Teaching Hospitals versus CR

ICC and CR in Teaching

m ₁	0.02
r ²	0.29
FDIST	7.08%
t	2.021
TINV	2.228

CR=Current Ratio

ICC=Internal Co-ordination of Care

Table 129

ICC Relevance Test in Small Hospitals versus CR

ICC and CR in Small

m ₁	-0.04
r ²	0.20
FDIST	6.12%
t	-2.013
TINV	2.120

CR=Current Ratio

ICC=Internal Co-ordination of Care

The absenteeism metric, PST, was only reported for 2007. However, in spite of an apparent unfavourable relationship in Teaching hospitals with Lean implementation (Table 130) there is no significance (Table 131).

Table 130

Correlation Between ICC and PST

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST & ICC 2007
Teaching	15	1	93%	37%
Small	31	12	61%	-12%
Community	63	3	95%	18%

PST=% Sick Time

ICC=Internal Co-ordination of Care

Table 131

ICC Relevance Test in Teaching Hospitals versus PST

ICC and PST in Teaching

m_1	0.01
r^2	0.10
FDIST	32.25%
t	1.041
TINV	2.228

CR=Current Ratio

ICC=Internal Co-ordination of Care

Overall it appears that in spite of all the research (Walshe, Shortell, 2004) and the high participation rate by Teaching and Community hospitals (Table 110, Table 111), the implementation of Lean systems in Ontario public hospitals is focused on financial outcomes and even that appears to be weak (Table 128, Table 129). There is a large emerging body of research which suggests that an effective Lean implementation not only significantly improves financial performance and patient outcomes it also improves patient perception and public image of the hospital (Savary, Crawford-Mason, 2006). Ontario public hospitals are not performing on this metric to their potential. This is a major opportunity for improvement. Perhaps the measure should not be participation oriented but benchmarking oriented, evaluating the hospitals on implementing established Lean best practices, practice by practice to ensure a thorough and successful implementation.

Hypothesis 4 (H4)

Emergency Departments in high performing hospitals engage in initiatives with external health care providers and agencies in their communities, using these External

Partnerships (EP) to improve performance. This activity includes outsourcing of health care activities (Canadian Institute for Health Information, 2007).

Observations: H4 is not proven. Participation with external providers is significantly different for each type of hospital with Teaching hospitals having the largest level of EP and Small hospitals having the lowest level (Table 132, Table 133).

Table 132

EP In Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals		EP 2005 Average	EP 2005 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	1	93%	48%	16%	8%	40%	56%
Small	31	16	48%	22%	20%	10%	12%	32%
Community	63	7	89%	40%	17%	4%	35%	44%

EP=External Partnerships

Table 133

EP In Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals		EP 2007 Average	EP 2007 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	1	93%	56%	19%	10%	46%	66%
Small	31	4	87%	26%	20%	8%	19%	34%
Community	63	2	97%	41%	22%	5%	36%	47%

EP=External Partnerships

This greater use of EP by Teaching hospitals appears to have an unfavourable impact on the RVRAa Emergency Department metric in the latest period (Table 135). The more significant use by Teaching hospitals of EP (Table 133) affords the Teaching hospital the opportunity to offload respiratory patients to local or regional health clinics for treatment. The performance of these clinics is not tracked as part of the health system. This “outsourcing” of care may result in a false performance measure of the performance of the Emergency Department of the Teaching hospital because another

part of the system is treating the patient, not the Emergency Department. However, the correlation may indicate that this is not working as the patients are returning to the Teaching hospital for care (Table 135). This hypothesis cannot be proved because the relationship does not pass the F or t-tests (Table 138).

Small and Community hospitals appear to have made a performance improvement from 2005 to 2007 (Table 134, Table 135) but this cannot be proven as the starting points do not pass significance testing (Table 136, Table 137).

Table 134

Correlation Between EP and Emergency Performance, 2005

Hospital Size	#	# Hospitals		Correlation RVRAa & EP 2005	Correlation RVRAb & EP 2005
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	3	80%	21%	-7%
Small	31	26	16%	23%	56%
Community	63	7	89%	25%	22%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

EP=External Partnerships

Table 135

Correlation Between EP and Emergency Performance, 2007

Hospital Size	#	# Hospitals		Correlation RVRAa & EP 2007	Correlation RVRAb & EP 2007	Correlation XRRAFIPc & EP 2007
		Not Reporting or Report Zero	Reporting Rate			
Teaching	15	2	87%	44%	-12%	11%
Small	31	19	39%	6%	9%	-17%
Community	63	13	79%	3%	12%	-15%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

EP=External Partnerships

Table 136

EP Relevance Test in Small Hospitals versus RVRAb, 2005

EP and RVRAb in Small

m ₁	0.12
r ²	0.32
FDIST	11.61%
t	0.278
TINV	2.776

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
EP=External Partnerships

Table 137

EP Relevance Test in Community Hospitals versus RVRaA, 2005

EP and RVRaA in
Community

m ₁	0.006
r ²	0.05
FDIST	10.72%
t	1.640
TINV	2.008

RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
EP=External Partnerships

Table 138

EP Relevance Test in Teaching Hospitals versus RVRaA, 2007

EP and RVRaA in
Teaching

m ₁	0.016
r ²	0.20
FDIST	14.73%
t	1.571
TINV	2.228

RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
EP=External Partnerships

The use of EP to improve RLD performance appears to show that a favourable relationship exists in both Teaching and Small hospitals (Table 139). However, the Teaching hospitals do not pass the statistical tests (Table 140). Small hospitals have significantly reversed their performance, becoming favourable. Investigation of this relationship indicates that while it is not currently statistically favourable an unfavourable relationship appeared to have been terminated (Table 141). Given that the

r^2 is large it is apparent that this relationship may have been harmful. Existence of this relationship should be investigated for termination at the other types of hospitals.

Table 139

Correlation Between EP and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & EP 2005	Correlation RLD & EP 2007
Teaching	15	4	73%	-6%	-32%
Small	31	24	23%	88%	-22%
Community	63	10	84%	-5%	-4%

RLD=Readmissions Labour and Delivery
EP=External Partnerships

Table 140

EP Relevance Test in Teaching Hospitals versus RLD, 2007

EP and RLD in Teaching

m_1	-0.003
r^2	0.11
FDIST	36.01%
t	-0.971
TINV	2.306

RLD=Readmissions Labour and Delivery
EP=External Partnerships

Table 141

EP Relevance Test in Small Hospitals versus RLD, 2005

EP and RLD in Small

	2005	2007
m_1	0.09	-0.02
r^2	0.77	0.22
FDIST	4.97%	34.73%
t	3.189	-1.064
TINV	3.182	2.776

RLD=Readmissions Labour and Delivery
EP=External Partnerships

The other maternity metric, AELAD, shows only the Small hospitals having some relationship with EP and that relationship appears favourable (Table 142). However, this relationship does not pass the statistical relevance test (Table 143)

Table 142

Correlation Between EP and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & EP 2005	Correlation AELAD & EP 2007
Teaching	15	4	73%	17%	20%
Small	31	24	23%	10%	-50%
Community	63	7	89%	-8%	-16%

AELAD=Adverse Events Labour And Delivery
EP=External Partnerships

Table 143

EP Relevance Test in Small Hospitals versus AELAD

EP and AELAD in Small

m_1	-0.03
r^2	0.31
FDIST	25.06%
t	-1.343
TINV	2.776

AELAD=Adverse Events Labour And Delivery
EP=External Partnerships

The mortality rate metric, HSMR, describes a favourable relationship with EP (Table 144). This relationship does pass statistical testing (Table 145). However, performance of Teaching hospitals on this metric is cause for concern. Interviews of operational staff indicate that many hospitals “outsource” patients that have a low recovery chance in order to improve their score on this metric (Ms Bowers, RN, Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010). Provincial government has recently challenged this practice as the government needs to be seen as giving each patient the best care, not removing them from high performing hospitals just because it is perceived that their chances of recovery are low (Ontario Ministry of Health and Long Term Care, 2010). Unfortunately the MOH has not evaluated the mortality rate in secondary care and until it does so, publishing the results, it will be difficult to convince the public that they are best served by being

removed from the best performing hospitals. The MOH challenge of this practice can be seen in the downward trend in EP associated with the HSMR metric from 2005 to 2007 (Table 144) and its recent lack of significance (Table 145).

Table 144

Correlation Between EP and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & EP 2005	Correlation HSMR & EP 2007
Teaching	15	6	60%	-76%	-32%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	-14%	1%

HSMR=Hospital Standardized Mortality Rate
EP=External Partnerships

Table 145

EP Relevance Test in Teaching Hospitals versus HSMR

	EP and HSMR in Teaching	
	2005	2007
m_1	-0.41	-0.17
r^2	0.58	0.10
FDIST	2.77%	40.87%
t	-2.889	-0.8788
TINV	2.447	2.364

HSMR=Hospital Standardized Mortality Rate
EP=External Partnerships

Normally organizations “outsource” in order to improve financial performance (Drucker, 2002). However, in the case of Ontario hospitals, outsourcing appears to have had no impact in the most recent data (Table 146). Examining the apparent strong relationship for 2005 for Teaching hospitals (Table 146) proves that the relationship is not statistically significant (Table 147). Analysis is demonstrating that it appears that “outsourcing” is neither financially beneficial for the hospitals and the patient outcomes are not beneficial the way the current system is being managed.

Table 146

Correlation Between EP and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & EP 2005	Correlation CR & EP 2007
Teaching	15	1	93%	42%	4%
Small	31	16	48%	-2%	4%
Community	63	7	89%	-12%	9%

CR=Current Ratio
EP=External Partnerships

Table 147

EP Relevance Test in Teaching Hospitals versus CR, 2005

EP and CR in Teaching 2005

m_1	0.01
r^2	0.18
FDIST	14.85%
t	1.554
TINV	2.201

CR=Current Ratio
EP=External Partnerships

Finally, examination of the PST metric, which only available for 2007, demonstrates that in spite of an apparent unfavourable relationship (Table 148), the relationship fails all statistical testing (Table 149). Therefore analysis demonstrates that EP has no impact on PST.

Table 148

Correlation Between EP and PST

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST & EP 2007
Teaching	15	1	93%	47%
Small	31	4	87%	-16%
Community	63	2	97%	-8%

PST=% Sick Time
EP =External Partnerships

Table 149

EP Relevance Test in Teaching Hospitals versus PST

EP and PST in Teaching

m_1	0.01
r^2	0.13
FDIST	24.26%
t	1.242
TINV	2.228

CR=Current Ratio

EP =External Partnerships

EP is an Emergency Department metric whereas the Hospital level metric is Community Involvement and Coordination of Care (CICC). This metric evaluates the level of “outsourcing” from the hospital in its entirety. When comparing EP to CICC there are apparent strong correlations (Table 150), but none of the relationships are statistically significant (Table 151, Table 152).

Overall, it appears that there is little positive to show for the “outsourcing” effort that Ontario public hospitals are making. In fact, measuring this metric has led to counterproductive behaviour that the MOH has had to address with respect to “outsourcing” mortally ill patients but it remains to be seen if these actions are successful (Ontario Ministry of Health and Long Term Care, 2010). The fact that there are no other strong correlations in any activity versus outcome brings into question the effectiveness of external resources in treating patients after discharge from Ontario Emergency Departments. The lack of effective SOPs across the hospital system is likely a symptom of the lack of standardization of best practices across the health care system. This deficit will prevent external health care providers from operating at “best practice” effectiveness and perhaps efficiency, reflecting the lack of impact that outsourcing has on the quality of health care. Successful industrial implementations of outsourcing focus on the use of best practices throughout the supply chain, regardless of ownership

(Tomasko, 1987). This lack of performance may be a reason that needs to be investigated by further study. Until the MOH measures the effectiveness of the hospital system, which includes External Partnerships, this measure is ineffective on both financial and patient outcome levels.

Table 150

Correlation Between EP and CICC

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CICC & EP 2007
Teaching	15	1	93%	50%
Small	31	4	87%	57%
Community	63	2	97%	24%

CICC=Community Involvement and Coordination of Care
EP=External Partnerships

Table 151

EP Relevance Test in Teaching Hospitals versus CICC

EP and CICC in Teaching

m_1	0.42
r^2	0.23
FDIST	11.67%
t	1.717
TINV	2.228

CICC=Community Involvement and Coordination of Care
EP=External Partnerships

Table 152

EP Relevance Test in Small Hospitals versus CICC

EP and CICC in Small

m_1	0.41
r^2	0.21
FDIST	0.00%
t	0.932
TINV	2.120

CICC=Community Involvement and Coordination of Care
EP=External Partnerships

Hypothesis 5 (H5)

Emergency Departments in high performing hospitals have superior human resources and management support activities. These support activities include training, education, programs addressing quality of work life, recruitment, and retention of staff, resulting in a healthy work environment, thereby contributing to employees' physical, social, mental, and emotional well-being.

Observations: H5 is not proven. Hospitals use two metrics to evaluate their performance in terms of human capital. Those metrics are Healthy Work Environment (HWE) and Management and Support of Human Resources (MSHR). HWE focuses on having mechanisms in place to support and promote a healthy work environment such as benefit programs and counselling while MSHR focuses on more developmental activities such as training, recruiting, and retention.

Examined separately, MSHR is statistically different for each of the three different sizes of hospitals in reviewing the latest data (Table 153, Table 154). Not surprisingly, Teaching hospitals have the highest level of training, recruitment, and retention programs followed by the Community and Small hospitals. The only strong relationship between Emergency Department outcomes and MSHR appears to be in 2005 (Table 155) but it is not statistically significant (Table 157). Only 6 of the Small hospitals responded on this relationship for 2005 so the sample size is very small. For 2007 there appear to be weak relationships for all hospitals (Table 156) but these are not statistically significant either (Table 158, Table 159, and Table 160).

Therefore, regardless of the size of the hospital, MSHR effort does not seem to translate into any strong correlation with Emergency Department performance. Research has

shown that learning environments result in superior workplace performance (Drucker, 2002). Overall, Teaching hospitals do have superior performance in their Emergency Departments (Table 4) but the MSHR activity does not appear to be responsible for that performance. Given the outcome with H4 this is not surprising as continuous improvement programs and team building are part of Lean implementations. Management indecisiveness is a big problem when managing change (Bruhn, 1990) and it may be that Ontario public hospitals lack the transformational leadership skills necessary to be successful in difficult environments (Port, 1995, Drucker, 2002).

Table 153

MSHR In Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	MSHR 2005 Average	MSHR 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	74%	17%	9%	65%	83%
Small	31	14	55%	46%	16%	7%	39%	54%
Community	63	7	89%	71%	13%	3%	68%	74%

MSHR=Management and Support of Human Resources

Table 154

MSHR In Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reportin g Rate	MSHR 2007 Average	MSHR 2007 Std Dev	Confidence	Lowe r Range	Upper Rang e
Teaching	15	1	93%	82%	15%	8%	74%	90%
Small	31	4	87%	48%	18%	7%	41%	55%
Community	63	2	97%	70%	17%	4%	66%	75%

MSHR=Management and Support of Human Resources

Table 155

Correlation Between MSHR and Emergency Performance, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & MSHR 2005	Correlation RVRAb & MSHR 2005
Teaching	15	3	80%	20%	21%
Small	31	25	19%	12%	69%
Community	63	10	84%	-22%	5%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

MSHR=Management and Support of Human Resources

Table 156

Correlation Between MSHR and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & MSHR 2007	Correlation RVRAb & MSHR 2007	Correlation XRRAFIPc & MSHR 2007
Teaching	15	2	87%	27%	24%	-9%
Small	31	19	39%	-28%	-24%	-11%
Community	63	13	79%	-7%	-5%	-25%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

MSHR=Management and Support of Human Resources

Table 157

MSHR Relevance Test in Small Hospitals versus RVRAb, 2005

MSHR and RVRAb in Small

m_1	0.06
r^2	0.48
FDIST	6.99%
t	0.064
TINV	2.776

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

MSHR=Management and Support of Human Resources

Table 158

MSHR Relevance Test in Teaching Hospitals versus RVRAa, 2007

MSHR and RVRAa in Teaching

m_1	0.012
r^2	0.07
FDIST	40.47%
t	0.870
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

MSHR=Management and Support of Human Resources



Table 159

MSHR Relevance Test in Small Hospitals versus RVRAa, 2007

MSHR and RVRAa in Small

m ₁	-0.046
r ²	0.12
FDIST	4.35%
t	0.346
TINV	2.306

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

MSHR=Management and Support of Human Resources

Table 160

MSHR Relevance Test in Community Hospitals versus XRRAFIPc, 2007

MSHR and XRRAFIPc in
Community

m ₁	-0.043
r ²	0.06
FDIST	8.16%
t	-1.780
TINV	2.013

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

MSHR=Management and Support of Human Resources

Examination of the first birth performance metric as influenced by MSHR reveals that even though there are apparent relationships for all hospitals in 2005 (Table 161) none of them pass the statistical tests (Table 162, Table 163, and Table 164). In 2007 it appears that the relationships have weaker correlations with no apparent cause and effect.

Table 161

Correlation Between MSHR and RLD

Hospital Size	#	# Hospitals		Correlation	Correlation
		Not Reporting or Report Zero	Reporting Rate	RLD & MSHR 2005	RLD & MSHR 2007
Teaching	15	4	73%	31%	-21%
Small	31	24	23%	-54%	7%
Community	63	10	84%	-25%	-14%

RLD=Readmissions Labour and Delivery

MSHR=Management and Support of Human Resources

Table 162

MSHR Relevance Test in Teaching Hospitals versus RLD, 2005

MSHR and RLD in Teaching

m_1	0.005
r^2	0.10
FDIST	37.82%
t	0.933
TINV	2.306

RLD=Readmissions Labour and Delivery

MSHR=Management and Support of Human Resources

Table 163

MSHR Relevance Test in Small Hospitals versus RLD, 2005

MSHR and RLD in Small

m_1	-0.03
r^2	0.29
FDIST	27.26%
t	-1.271
TINV	2.776

RLD=Readmissions Labour and Delivery

MSHR=Management and Support of Human Resources

Table 164

MSHR Relevance Test in Community Hospitals versus RLD, 2005

MSHR and RLD in Community

m_1	-6.47
r^2	0.06
FDIST	7.78%
t	-1.803
TINV	2.012

RLD=Readmissions Labour and Delivery

MSHR=Management and Support of Human Resources

The other birth metric, AELAD, has more consistent correlations with MSHR than RLD (Table 165). They are all apparently favourable but the only relationship that passes the significance tests is Community hospitals (Table 166, Table 167). The impact of MSHR on AELAD is not high with r^2 equalling 10% but it is favourable.

Table 165

Correlation Between MSHR and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & MSHR 2005	Correlation AELAD & MSHR 2007
Teaching	15	4	73%	-10%	-23%
Small	31	24	23%	-5%	-36%
Community	63	10	84%	-28%	-31%

AELAD=Adverse Events Labour And Delivery
MSHR=Management and Support of Human Resources

Table 166

MSHR Relevance Test in Small Hospitals versus AELAD, 2007

MSHR and AELAD in Small

m_1	-0.029
r^2	0.13
FDIST	30.25%
t	-1.102
TINV	2.306

AELAD=Adverse Events Labour And Delivery
MSHR=Management and Support of Human Resources

Table 167

MSHR Relevance Test in Community Hospitals versus AELAD, 2007

MSHR and AELAD in Community

m_1	-0.030
r^2	0.10
FDIST	2.18%
t	-2.366
TINV	2.007

AELAD=Adverse Events Labour And Delivery
MSHR=Management and Support of Human Resources

The relationship for hospital mortality rate appears favourably strong for Teaching hospitals only (Table 168). However, testing this relationship proves that it does not pass statistical significance testing (Table 169). Therefore, it appears that there is no meaningful impact of MSHR on HSMR.

Table 168

Correlation Between MSHR and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & MSHR 2005	Correlation HSMR & MSHR 2007
Teaching	15	6	60%	-47%	-45%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	13%	15%

HSMR=Hospital Standardized Mortality Rate

MSHR=Management and Support of Human Resources

Table 169

MSHR Relevance Test in Teaching Hospitals versus HSMR, 2007

MSHR and HSMR in Teaching

m_1	-0.355
r^2	0.20
FDIST	22.99%
t	-1.315
TINV	2.364

HSMR=Hospital Standardized Mortality Rate

MSHR=Management and Support of Human Resources

The impact of MSHR on hospital financial performance appears to be mixed (Table 170). Teaching hospitals have an apparent favourable relationship for 2005 and 2007 but this relationship does not pass significance testing (Table 171, Table 174). Small and Community hospitals have unfavourable relationships in 2005 (Table 170) However only the Community hospitals have a relationship that passes the F and t-tests (Table 172, Table 173). Therefore, it can be assumed that Community hospitals had unfavourable MSHR activities in place for 2005 that they halted by 2007. Overall, MSHR currently has no favourable benefit to the financial performance of the hospital in spite of research indicating that positive management of human resources improves financial results (Kotter, Heskett, 1992).

Table 170

Correlation Between MSHR and CR

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & MSHR 2005	Correlation CR & MSHR 2007
Teaching	15	1	93%	44%	39%
Small	31	16	48%	-27%	1%
Community	63	7	89%	-32%	-8%

CR=Current Ratio

MSHR=Management and Support of Human Resources

Table 171

MSHR Relevance Test in Teaching Hospitals versus CR, 2005

MSHR and CR in Teaching

m_1	0.013
r^2	0.19
FDIST	15.12%
t	1.554
TINV	2.228

CR=Current Ratio

MSHR=Management and Support of Human Resources

Table 172

MSHR Relevance Test in Small Hospitals versus CR, 2005

MSHR and CR in Small

m_1	-1.50
r^2	0.07
FDIST	31.97%
t	-1.032
TINV	2.145

CR=Current Ratio

MSHR=Management and Support of Human Resources

Table 173

MSHR Relevance Test in Community Hospitals versus CR, 2005

MSHR and CR in Community

m_1	-0.03
r^2	0.10
FDIST	1.51%
t	-2.511
TINV	2.005

CR=Current Ratio

MSHR=Management and Support of Human Resources

Table 174

MSHR Relevance Test in Teaching Hospitals versus CR, 2007

MSHR and CR in Teaching

m_1	0.013
r^2	0.16
FDIST	16.33%
t	1.485
TINV	2.179

CR=Current Ratio

MSHR=Management and Support of Human Resources

The impact of MSHR on PST also appears negligible. In spite of an ostensible unfavourable relationship between PST and MSHR in Community hospitals (Table 175), the relationship is not statistically significant (Table 176). However, it comes very close to passing the F and t-tests and given that the relationship appears to be unfavourable Community hospitals should be examining the MSHR activities that they are implementing as they are on the verge of having real negative impact on PST.

Table 175

Correlation Between MSHR and PST

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST & MSHR 2007
Teaching	15	1	93%	23%
Small	31	4	87%	-6%
Community	63	2	97%	42%

PST=% Sick Time

MSHR=Management and Support of Human Resources

Table 176

MSHR Relevance Test in Community Hospitals versus PST, 2007

MSHR and PST in Community

m_1	2.02
r^2	0.23
FDIST	11.64%
t	1.719
TINV	1.812

PST=% Sick Time

MSHR=Management and Support of Human Resources

The relationship between Emergency Department activities associated with MSHR and overall Hospital level MSHRH programs is strong (Table 177) and statistically significant for all types of hospitals (Table 178, Table 179, and Table 180). While this is good in terms of the hospitals being consistent the impact of the MSHR and MSHRH activities is not benefiting patients, with the exception of a weak positive impact with respect to AELAD in Community hospitals. There is also no impact of these programs with the financial performance of the hospitals, contrary to research which indicates the either the wrong programs may be implemented or the implementation is flawed, or both (Grunfeld, Kassum, 1973; Herrod, 1978; Deines, 1981; Margulies, Duval, 1984). Further research on exactly what hospitals are doing in terms of programs associated with training, recruitment and retention needs to be conducted in order to understand why their performance is so poor.

Table 177

Correlation Between MSHR and MSHRH

Hospital Size	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation MSHRH & MSHR 2005	Correlation MSHRH & MSHR 2007	
Teaching	15	1	93%	29%	65%
Small	31	11	65%	51%	83%
Community	63	6	90%	42%	64%

MSHRH=Management and Support of Human Resources Hospital Level

MSHR=Management and Support of Human Resources

Table 178

MSHR Relevance Test in Teaching Hospitals versus MSHRH, 2007

MSHR and MSHRH in Teaching

m_1	0.93
r^2	0.42
FDIST	0.24%
t	2.937
TINV	2.179

MSHRH=Management and Support of Human Resources Hospital Level

MSHR=Management and Support of Human Resources

Table 179

MSHR Relevance Test in Small Hospitals versus MSHRH, 2007

MSHR and MSHRH in Small

m_1	0.66
r^2	0.69
FDIST	.00%
t	7.202
TINV	2.029

MSHRH=Management and Support of Human Resources Hospital Level

MSHR=Management and Support of Human Resources

Table 180

MSHR Relevance Test in Community Hospitals versus MSHRH, 2007

MSHR and MSHRH in Community

m_1	0.45
r^2	0.40
FDIST	0.00%
t	6.337
TINV	2.001

MSHRH=Management and Support of Human Resources Hospital Level

MSHR=Management and Support of Human Resources

The other people development activity, Healthy Work Environment (HWE), was not recorded by Emergency Departments in 2005. HWE focuses on having mechanisms in place to support and promote a healthy work environment such as benefit programs and counselling. Again, there is no surprise that Teaching hospitals, being a learning environment, have a greater level of programs in place to optimise the learning process (Table 181) (Kaplan, Norton, 1996).

However, like the MSHR metric which focuses on the people development activities, there is no significant relationship between HWE and Emergency Department performance (Table 182). As discussed with respect to the MSHR metric, this may be a symptom of the lack of transformational leadership skills in the hospital system.

Table 181

HWE in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	HWE 2007 Average	HWE 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	87%	15%	8%	79%	95%
Small	31	4	87%	60%	26%	10%	51%	70%
Community	63	2	97%	74%	25%	6%	68%	80%

HWE=Healthy Work Environment

Table 182

Correlation Between HWE and Emergency Performance

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & HWE 2007	Correlation RVRAb & HWE 2007	Correlation XRRAFIPc & HWE 2007
Teaching	15	2	87%	21%	-1%	-17%
Small	31	19	39%	6%	-17%	-9%
Community	63	13	79%	-8%	21%	1%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

HWE=Healthy Work Environment

The first birth metric, RLD, indicates that a favourable relationship exists in Teaching hospitals between RLD and HWE (Table 183). However, this relationship does not pass relevance testing (Table 184).

Table 183

Correlation Between HWE and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & HWE 2007
Teaching	15	4	73%	-53%
Small	31	24	23%	18%
Community	63	10	84%	-1%

RLD=Readmissions Labour and Delivery

HWE=Healthy Work Environment

Table 184

HWE Relevance Test in Teaching Hospitals versus RLD, 2007

HWE and RLD in Teaching

m_1	-0.01
r^2	0.28
FDIST	11.23%
t	-0.05
TINV	2.306

RLD=Readmissions Labour and Delivery
HWE=Healthy Work Environment

The second birth metric, AELAD, appears to have a strong correlation with HWE in Teaching and Small hospitals (Table 185) however neither relationship passes significance testing (Table 186, Table 187).

Table 185

Correlation Between HWE and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & HWE 2007
Teaching	15	4	73%	-26%
Small	31	24	23%	-68%
Community	63	10	84%	3%

AELAD=Adverse Events Labour And Delivery
HWE=Healthy Work Environment

Table 186

HWE Relevance Test in Teaching Hospitals versus AELAD, 2007

HWE and AELAD in Teaching

m_1	-0.06
r^2	0.07
FDIST	47.32%
t	-0.190
TINV	2.306

AELAD=Adverse Events Labour And Delivery
HWE=Healthy Work Environment

Table 187

HWE Relevance Test in Small Hospitals versus AELAD, 2007

HWE and AELAD in Small

m ₁	-0.027
r ²	0.477
FDIST	5.08%
t	-0.022
TINV	2.306

AELAD=Adverse Events Labour And Delivery
HWE=Healthy Work Environment

There is no apparent correlation at all between HWE and the mortality rate, HSMR (Table 188).

Table 188

Correlation Between HWE and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & HWE 2007
Teaching	15	6	60%	15%
Small	31	31	0%	N/A
Community	63	37	41%	10%

HSMR=Hospital Standardized Mortality Rate
HWE=Healthy Work Environment

Additionally, HWE has no impact on the financial performance of Ontario hospitals (Table 189).

Table 189

Correlation Between HWE and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & HWE 2007
Teaching	15	1	93%	1%
Small	31	4	87%	-20%
Community	63	2	97%	16%

CR=Current Ratio
HWE=Healthy Work Environment

There appears to be an unfavourable correlation between HWE and PST for Teaching hospitals (Table 190). When tested this relationship is relevant (Table 191).

Management in Teaching hospitals needs to understand why their human resource practices are increasing versus reducing staff absenteeism.

Table 190

Correlation Between HWE and PST

Hospital Size	# Hospitals	# Hospitals		Correlation PST & HWE 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	1	93%	33%
Small	31	4	87%	8%
Community	63	2	97%	0%

PST=% Sick Time
HWE=Healthy Work Environment

Table 191

HWE Relevance Test in Teaching Hospitals versus PST, 2007

HWE and PST in Teaching

m_1	0.023
r^2	0.27
FDIST	8.07%
t	2.385
TINV	2.228

PST=% Sick Time
HWE=Healthy Work Environment

When examining the relationship between Emergency Department HWE and Hospital level HWEH there is 100% correlation (Table 192), indicating that there is no difference in these activities. Examination of the raw data reveals that each hospital reported exactly the same number for both HWE and HWEH. While this is encouraging for consistency, the only relevant impact that HWE has on Emergency Department outcomes is that the practices have an unfavourable impact on Teaching hospitals, increasing absenteeism.

Table 192

Correlation Between HWE and HWEH

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HWEH & HWE 2007
Teaching	15	1	93%	100%
Small	31	4	87%	100%
Community	63	2	97%	100%

HWEH=Healthy Work Environment Hospital Level

HWE=Healthy Work Environment

Examination of the relationship between HWE and MSHR indicates that there is some correlation between these activities in both Teaching and Small hospitals but insignificant correlation for Community hospitals (Table 193). However, only the relationship between HWE and MSHR is relevant for Teaching hospitals (Table 194, Table 195).

Table 193

Correlation Between MSHR and HWE

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HWE & MSHR 2007
Teaching	15	1	93%	73%
Small	31	11	65%	47%
Community	63	6	90%	11%

MSHR=Management and Support of Human Resources

HWE=Healthy Work Environment

Table 194

HWE Relevance Test in Teaching Hospitals versus MSHR, 2007

HWE and MSHR in Teaching

m_1	0.74
r^2	0.53
FDIST	0.32%
t	3.047
TINV	2.179

MSHR=Management and Support of Human Resources

HWE=Healthy Work Environment

Table 195

HWE Relevance Test in Small Hospitals versus MSHR, 2007

HWE and MSHR in Small

m_1	0.33
r^2	0.22
FDIST	0.00%
t	0.563
TINV	2.060

MSHR=Management and Support of Human Resources

HWE=Healthy Work Environment

Therefore, H5 is not proven. In fact, for Teaching hospitals implementation of their HWE programs is unfavourable for the absenteeism, PST, metric. Research has shown that effective implementation of MSHR and PST programs has a positive impact on both patient and financial performance of organizations (Drucker, 2002). However, in the case of Ontario public hospitals, while these programs exist, they are not effective.

Hypothesis 6 (H6)

Emergency Departments in high performing hospitals collect and disseminate clinical outcomes and appropriateness data related to timing issues, patient care management, and adverse events. These Emergency Departments perform these tasks using modern electronic data collection and communication systems.

The metrics that measure this activity are Clinical Data Collection and Dissemination (CDCD) and Use of Clinical Information Technology (UCIT). Each metric will be examined separately and then compared to determine if H6 is true.

Observations: H6 is not proven. Examination of the activity CDCD illustrates that there is a statistical difference in the implementation of this activity between Small hospitals and the other types that is consistent from 2005 to 2007 (Table 196, Table 197)

Table 196

CDCD in Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	CDCD 2005 Average	CDCD 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	66%	17%	9%	57%	74%
Small	31	14	55%	35%	21%	10%	25%	45%
Community	63	7	89%	59%	14%	4%	56%	63%

CDCD=Clinical Data collection and Dissemination

Table 197

CDCD in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	CDCD 2007 Average	CDCD 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	71%	13%	7%	64%	78%
Small	31	4	87%	29%	20%	8%	21%	36%
Community	63	2	97%	68%	17%	4%	64%	72%

CDCD=Clinical Data collection and Dissemination

When comparing this low use of CDCD in Small hospitals versus Emergency Department outcomes it appears the results are mixed (Table 198, Table 199). Teaching hospitals and Small hospitals have apparent unfavourable relationships for 2005 however these do not pass significance testing (Table 200, Table 201). For 2007 Teaching hospitals have an apparent unfavourable relationship with XRRAFIPc while Community hospitals have a favourable relationship (Table 199). However, the Teaching hospital relationship fails significance testing (Table 202) while Community hospitals have an apparent favourable relationship (Table 203). Community hospitals are the only type that has found a way to perform the CDCD activity to benefit an Emergency Department outcome.

Table 198

Correlation Between CDCD and Emergency Performance, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & CDCD 2005	Correlation RVRAb & CDCD 2005
Teaching	15	3	80%	-6%	27%
Small	31	16	48%	28%	12%
Community	63	13	79%	-9%	0%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

CDCD=Clinical Data collection and Dissemination

Table 199

Correlation Between CDCD and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & CDCD 2007	Correlation RVRAb & CDCD 2007	Correlation XRRAFIPc & CDCD 2007
Teaching	15	2	87%	11%	3%	53%
Small	31	19	39%	17%	12%	-5%
Community	63	13	79%	-4%	22%	-31%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

CDCD=Clinical Data collection and Dissemination

Table 200

CDCD Relevance Test in Small Hospitals versus RVRAa, 2005

CDCD and RVRAa in Small

m_1	0.03
r^2	0.08
FDIST	7.64%
t	0.398
TINV	2.160

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

CDCD=Clinical Data collection and Dissemination

Table 201

CDCD Relevance Test in Teaching Hospitals versus RVRAb, 2005

CDCD and RVRAb in Teaching

m_1	0.005
r^2	0.07
FDIST	39.54%
t	0.888
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

CDCD=Clinical Data collection and Dissemination



Table 202

CDCD Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007

CDCD and XRRAFIPc in Teaching

m_1	0.01
r^2	0.13
FDIST	24.57%
t	1.233
TINV	2.228

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

CDCD=Clinical Data collection and Dissemination

Table 203

CDCD Relevance Test in Community Hospitals versus XRRAFIPc, 2007

CDCD and XRRAFIPc in
Community

m_1	-0.053
r^2	0.09
FDIST	3.17%
t	-2.216
TINV	2.013

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

CDCD=Clinical Data collection and Dissemination

The relationships between the CDCD activity and the first birth metric, RLD, are mixed. For 2005 Teaching and Small hospitals appear to have an unfavourable relationship while Community hospitals are exhibiting a favourable correlation (Table 204). The Teaching and Small hospitals do not have relationships that pass statistical testing (Table 205, Table 206) however, the Community hospitals for 2005 have a favourable relationship for 2005 (Table 206). In 2007, this favourable relationship disappears while Teaching hospitals have now developed an apparent favourable relationship (Table 104). The Teaching hospital correlation is statistically significant (Table 205). Management of Community hospitals needs to determine what changed in order to recover the favourable relationship that they had in 2005. Additionally, it is clear that Teaching hospitals have now developed a “best practice” with respect to CDCD that needs to be shared with the other hospital types.

Table 204

Correlation Between CDCD and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & CDCD 2005	Correlation RLD & CDCD 2007
Teaching	15	4	73%	36%	-69%
Small	31	24	23%	30%	-7%
Community	63	10	84%	-43%	0%

RLD=Readmissions Labour and Delivery

CDCD=Clinical Data collection and Dissemination

Table 205

CDCD Relevance Test in Teaching Hospitals versus RLD, 2005

CDCD and RLD in Teaching

m_1	0.006
r^2	0.13
FDIST	31.25%
t	1.078
TINV	2.306

RLD=Readmissions Labour and Delivery

CDCD=Clinical Data collection and Dissemination

Table 206

CDCD Relevance Test in Small Hospitals versus RLD, 2005

CDCD and RLD in Small

m_1	0.011
r^2	0.09
FDIST	76.81%
t	0.194
TINV	2.776

RLD=Readmissions Labour and Delivery

CDCD=Clinical Data collection and Dissemination

Table 207

CDCD Relevance Test in Community Hospitals versus RLD, 2005

CDCD and RLD in Community

m_1	-0.017
r^2	0.19
FDIST	0.19%
t	-3.289
TINV	2.012

RLD=Readmissions Labour and Delivery

CDCD=Clinical Data collection and Dissemination

Table 208

CDCD Relevance Test in Teaching Hospitals versus RLD, 2007

CDCD and RLD in Teaching

m_1	-0.010
r^2	0.48
FDIST	2.62%
t	-2.722
TINV	2.306

RLD=Readmissions Labour and Delivery

CDCD=Clinical Data collection and Dissemination

The relationship between CDCD and the second birth metric, AELAD, is also mixed (Table 209). Teaching hospitals have an unfavourable correlation in 2005 that becomes favourable in 2007. Small hospitals appear to be exhibiting the same change in performance but at a lower level of correlation (Table 209). However, none of these relationships pass the F or t-tests (Table 207, Table 208, and Table 209).

Table 209

Correlation Between CDCD and AELAD

Hospital Size	#	# Hospitals		Correlation AELAD & CDCD 2005	Correlation AELAD & CDCD 2007
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	4	73%	39%	-27%
Small	31	24	23%	19%	-23%
Community	63	10	84%	-13%	-10%

AELAD=Adverse Events Labour And Delivery

CDCD=Clinical Data collection and Dissemination

Table 210

CDCD Relevance Test in Teaching Hospitals versus AELAD, 2005

CDCD and AELAD in Teaching

m_1	0.057
r^2	0.15
FDIST	26.12%
t	1.209
TINV	2.306

AELAD=Adverse Events Labour And Delivery

CDCD=Clinical Data collection and Dissemination

Table 211

CDCD Relevance Test in Teaching Hospitals versus AELAD, 2007

CDCD and AELAD in Teaching

m ₁	-0.044
r ²	0.05
FDIST	45.1%
t	-0.792
TINV	2.306

AELAD=Adverse Events Labour And Delivery
 CDCD=Clinical Data collection and Dissemination

Table 212

CDCD Relevance Test in Small Hospitals versus AELAD, 2007

CDCD and AELAD in Small

m ₁	-0.013
r ²	0.07
FDIST	46.52%
t	-0.390
TINV	2.306

AELAD=Adverse Events Labour And Delivery
 CDCD=Clinical Data collection and Dissemination

The mortality metric, HSMR, appears to have an unfavourable relationship in terms of the CDCD implementation in Teaching hospitals for 2007 (Table 213) however the relationship fails testing (Table 214).

Table 213

Correlation Between CDCD and HSMR

Hospital Size	#	# Hospitals		Correlation HSMR & CDCD 2005	Correlation HSMR & CDCD 2007
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	6	60%	23%	31%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	-9%	-22%

HSMR=Hospital Standardized Mortality Rate
 CDCD=Clinical Data collection and Dissemination

Table 214

CDCD Relevance Test in Teaching Hospitals versus HSMR, 2007

CDCD and HSMR in Teaching

m_1	-0.07
r^2	0.006
FDIST	84.34%
t	-0.205
TINV	2.364

HSMR=Hospital Standardized Mortality Rate

CDCD=Clinical Data collection and Dissemination

The CDCD activity does not have any strong correlations with the financial performance of any type of hospital (Table 215)

Table 215

Correlation Between CDCD and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & CDCD 2005	Correlation CR & CDCD 2007
Teaching	15	1	93%	24%	22%
Small	31	13	58%	-13%	12%
Community	63	7	89%	-1%	7%

CR=Current Ratio

CDCD=Clinical Data collection and Dissemination

The absenteeism metric, PST, appears to have a favourable correlation with CDCD (Table 216) however the relationship fails statistical testing (Table 217).

Table 216

Correlation Between CDCD and PST

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST & CDCD 2007
Teaching	15	1	93%	-3%
Small	31	13	58%	-32%
Community	63	7	89%	5%

PST=% Sick Time

CDCD=Clinical Data collection and Dissemination

Table 217

CDCD Relevance Test in Small Hospitals versus PST, 2007

CDCD and PST in Small

m_1	-0.027
r^2	0.14
FDIST	1.80%
t	-0.099
TINV	2.064

PST=% Sick Time

CDCD=Clinical Data collection and Dissemination

The Hospital level metric that is similar to the Emergency Department level metric CDCD is Use of Data for Decision-Making (UDDM), which is the degree to which organizations are disseminating and utilizing both clinical and administrative data. This data was collected in periods examined, 2005 and 2007, with relatively high utilizations over the three year period (Table 218, Table 219).

Table 218

UDDM in Hospital Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals		UDDM 2005 Average	UDDM 2005 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	1	93%	70%	18%	9%	61%	80%
Small	31	12	61%	52%	15%	7%	45%	58%
Community	63	3	95%	66%	15%	4%	62%	69%

UDDM=Use of Data for Decision Making in Hospital

Table 219

UDDM in Hospital Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals		UDDM 2007 Average	UDDM 2007 Std Dev	Confidence	Lower Range	Upper Range
		Not Reporting or Report Zero	Reporting Rate					
Teaching	15	0	100%	75%	15%	7%	68%	82%
Small	31	5	84%	42%	16%	6%	36%	48%
Community	63	2	97%	63%	18%	5%	59%	68%

UDDM=Use of Data for Decision Making in Hospital

Additionally, there are weak to strong correlations between CDCD and UDDM over the same period with Small hospitals having the strongest correlation (Table 220). The apparent relationships between CDCD and UDDM only pass statistical testing for Community hospitals (Table 221, Table 222, Table 223, and Table 224). The r^2 is low at 12% for this relationship but it does exist. This indicates that for Teaching and Small hospitals different data collection and dissemination programs may be in place between the Emergency Department and the Hospital, potentially causing confusion and errors amongst staff. This needs to be investigated by management given the mobility of staff in any hospital (Ontario Hospital Association, 2008).

Table 220

Correlation Between CDCD and UDDM

Hospital Size	Correlation CDCD & UDDM 2005	Correlation CDCD & UDDM 2007
Teaching	39%	25%
Small	50%	72%
Community	36%	35%

UDDM=Use of Data for Decision Making in Hospital
CDCD=Clinical Data Collection and Dissemination

Table 221

CDCD Relevance Test in Teaching Hospitals versus UDDM, 2005

CDCD and UDDM in Teaching

m_1	0.40
r^2	0.15
FDIST	19.21%
t	1.390
TINV	2.201

UDDM=Use of Data for Decision Making in Hospital
CDCD=Clinical Data collection and Dissemination

Table 222

CDCD Relevance Test in Teaching Hospitals versus UDDM, 2007

CDCD and UDDM in Teaching

m_1	0.26
r^2	0.06
FDIST	39.24%
t	0.887
TINV	2.179

UDDM=Use of Data for Decision Making in Hospital

CDCD=Clinical Data collection and Dissemination

Table 223

CDCD Relevance Test in Small Hospitals versus UDDM, 2007

CDCD and UDDM in Small

m_1	0.62
r^2	0.52
FDIST	0.00%
t	0.232
TINV	2.064

UDDM=Use of Data for Decision Making in Hospital

CDCD=Clinical Data collection and Dissemination

Table 224

CDCD Relevance Test in Community Hospitals versus UDDM, 2007

CDCD and UDDM in Community

m_1	0.37
r^2	0.12
FDIST	0.55%
t	2.880
TINV	2.001

UDDM=Use of Data for Decision Making in Hospital

CDCD=Clinical Data collection and Dissemination

In summary, for the CDCD metric with respect to proving or disproving H6, CDCD appears to have a favourable impact in Community hospitals on the XRRAFIPc outcome, Teaching hospitals on the RLD outcome, and Community hospitals in terms of the UDDM process in the rest of the hospital. It appears that CDCD can have a favourable impact on the patient outcomes however this is not implemented consistently across all the hospital types.

The other metric associated with the proof of H6 is the Use of Clinical Information Technology (UCIT), the extent to which Emergency Departments use or develop electronic tracking systems, records, and perform selected functions online.

Teaching hospitals are the leader in this category with Small hospitals having almost half the level of activity versus the other hospital types (Table 225, Table 226).

Table 225

UCIT in Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	UCIT 2005 Average	UCIT 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	57%	12%	6%	50%	63%
Small	31	14	55%	34%	21%	10%	24%	44%
Community	63	2	97%	51%	19%	5%	46%	56%

UCIT=Use of Clinical Information Technology

Table 226

UCIT in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	UCIT 2007 Average	UCIT 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	69%	16%	9%	60%	77%
Small	31	4	87%	29%	18%	7%	22%	36%
Community	63	2	97%	57%	19%	5%	52%	61%

UCIT=Use of Clinical Information Technology

The impact that this level of activity has on outcomes appears mixed. For Teaching hospital, a favourable relationship for RVRa in 2005 turns highly unfavourable in 2007 (Table 227, Table 228). Likewise a highly favourable relationship for RVRb turns to a neutral relationship for 2007 while there exists an apparent favourable relationship for XRRAFIPc in 2007. Small hospitals have favourable relationships for RVRa and XRRAFIPc for 2007 while Community hospitals have favourable relationships for RVRa and RVRb in 2005 turn less favourable for 2007.

The relationships between RVRAa for Teaching hospitals in 2005 and 2007 (Table 227, Table 228) fail statistical testing however the 2007 relationship is approaching significance (Table 229, Table 233). The favourable performance on RVRAb for Teaching hospitals passes statistical testing for 2005 (Table 231) but there is no significant correlation for 2007 (Table 228). The question as to what changed in terms of UCIT to cause a reduction in the performance needs to be investigated by Emergency Department management. The apparent favourable XRRAFIPc performance (Table 228) fails relevance testing (Table 236).

Small hospitals appear to have a favourable relationship between UCIT and RVRAa and XRRAFIPc for 2007 (Table 228) but neither relationship passes statistical testing (Table 234, Table 237).

The Community hospital favourable performance in the RVRAa outcome for 2005 and 2007 (Table 227, Table 228) both fails relevance testing (Table 230, Table 235). The failure in 2007 is close to being relevant and needs to be encouraged to improve by management. RVRAb performance has a favourable correlation for 2005 that diminishes for 2007 (Table 227, Table 228). The relationship for 2005 barely fails significance testing (Table 232) and has weak correlations for 2007 (Table 228). Emergency Department management needs to investigate what changed to cause a reduction in performance. UCIT appears to have no impact on the outcome of XRRAFIPc.

In summary, the impact of UCIT on Emergency Department performance needs further investigation. It appears that Community hospitals have uncovered UCIT activities which are nearly significant for RVRAa while Teaching hospitals have stopped some

UCIT activities associated with RVRAb for 2007 that had a favourable impact in 2005.

The Ontario hospital implementation of UCIT appears to have had no favourable impact on XRRAFIPc.

Table 227

Correlation Between UCIT and Emergency Performance, 2005

Hospital Size	#	# Hospitals		Correlation RVRAa & UCIT 2005	Correlation RVRAb & UCIT 2005
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	2	87%	-34%	-65%
Small	31	25	19%	11%	12%
Community	63	10	84%	-27%	-27%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

UCIT=Use of Clinical Information Technology

Table 228

Correlation Between UCIT and Emergency Performance, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not		Correlation RVRAa & UCIT 2007	Correlation RVRAb & UCIT 2007	Correlation XRRAFIPc & UCIT 2007
		Reporting or Report Zero	Reporting Rate			
Teaching	15	2	87%	45%	-9%	-42%
Small	31	19	39%	-28%	-8%	-35%
Community	63	13	79%	-24%	-7%	-14%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

UCIT=Use of Clinical Information Technology

Table 229

UCIT Relevance Test in Teaching Hospitals versus RVRAa, 2005

UCIT and RVRAa in Teaching

m_1	-0.015
r^2	0.12
FDIST	27.85%
t	-1.146
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

UCIT=Use of Clinical Information Technology

Table 230

UCIT Relevance Test in Community Hospitals versus RVRAa, 2005

UCIT and RVRAa in Community

m_1	-0.009
r^2	0.03
FDIST	20.60%
t	-1.280
TINV	2.005

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
UCIT=Use of Clinical Information Technology

Table 231

UCIT Relevance Test in Teaching Hospitals versus RVRAb, 2005

UCIT and RVRAb in Teaching

m_1	-0.02
r^2	0.41
FDIST	2.31%
t	-2.680
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
UCIT=Use of Clinical Information Technology

Table 232

UCIT Relevance Test in Community Hospitals versus RVRAb, 2005

UCIT and RVRAb in Community

m_1	-0.007
r^2	0.07
FDIST	5.19%
t	-1.990
TINV	2.008

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
UCIT=Use of Clinical Information Technology

Table 233

UCIT Relevance Test in Teaching Hospitals versus RVRAa, 2007

UCIT and RVRAa in Teaching

m_1	0.02
r^2	0.20
FDIST	14.37%
t	1.587
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
UCIT=Use of Clinical Information Technology

Table 234

UCIT Relevance Test in Small Hospitals versus RVRAa, 2007

UCIT and RVRAa in Small

m_1	-0.028
r^2	0.08
FDIST	8.73%
t	0.400
TINV	2.262

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
UCIT=Use of Clinical Information Technology

Table 235

UCIT Relevance Test in Community Hospitals versus RVRAa, 2007

UCIT and RVRAa in Community

m_1	-0.012
r^2	0.06
FDIST	6.60%
t	-1.874
TINV	2.002

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
UCIT=Use of Clinical Information Technology

Table 236

UCIT Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007

UCIT and XRRAFIPc in Teaching

m_1	-0.008
r^2	0.13
FDIST	24.24%
t	-1.243
TINV	2.228

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
UCIT=Use of Clinical Information Technology

Table 237

UCIT Relevance Test in Small Hospitals versus XRRAFIPc, 2007

UCIT and XRRAFIPc in Small

m_1	-0.064
r^2	0.12
FDIST	0.00%
t	-0.301
TINV	2.069

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
UCIT=Use of Clinical Information Technology

The impact of UCIT on the first birth metric, RLD appears to be mixed as well. Teaching hospitals have taken an apparent unfavourable relationship in 2005 and turned it into favourable performance for 2007 (Table 238). However, neither relationship is significant (Table 239, Table 241).

Small hospitals have an unfavourable relationship for 2007 (Table 238) which fails statistical testing (Table 242).

Community hospitals have nearly identical correlations between UCIT and RLD for 2005 and 2007 (Table 238). Both relationships have passed F and t-tests indicating that Community hospitals have found a way to implement UCIT in a favourable way to improve RLD outcomes. This process needs to be shared with the other hospital types as it appears to be sustainable.

Table 238

Correlation Between UCIT and RLD

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & UCIT 2005	Correlation RLD & UCIT 2007
Teaching	15	4	73%	47%	-24%
Small	31	24	23%	3%	26%
Community	63	10	84%	-37%	-40%

RLD=Readmissions Labour and Delivery
UCIT=Use of Clinical Information Technology

Table 239

UCIT Relevance Test in Teaching Hospitals versus RLD, 2005

UCIT and RLD in Teaching

m_1	0.013
r^2	0.22
FDIST	16.73%
t	1.519
TINV	2.306

RLD=Readmissions Labour and Delivery
UCIT=Use of Clinical Information Technology

Table 240

UCIT Relevance Test in Community Hospitals versus RLD, 2005

UCIT and RLD in Community

m_1	-0.010
r^2	0.11
FDIST	1.81%
t	-2.449
TINV	2.012

RLD=Readmissions Labour and Delivery
UCIT=Use of Clinical Information Technology

Table 241

UCIT Relevance Test in Teaching Hospitals versus RLD, 2007

UCIT and RLD in Teaching

m_1	-0.003
r^2	0.06
FDIST	50.53%
t	-0.697
TINV	2.306

RLD=Readmissions Labour and Delivery
UCIT=Use of Clinical Information Technology

Table 242

UCIT Relevance Test in Small Hospitals versus RLD, 2007

UCIT and RLD in Small

m_1	0.018
r^2	0.07
FDIST	52.72%
t	0.453
TINV	2.571

RLD=Readmissions Labour and Delivery
UCIT=Use of Clinical Information Technology

Table 243

UCIT Relevance Test in Community Hospitals versus RLD, 2007

UCIT and RLD in Community

m_1	-0.009
r^2	0.16
FDIST	0.31%
t	-3.100
TINV	2.069

RLD=Readmissions Labour and Delivery
UCIT=Use of Clinical Information Technology

The impact of UCIT on the other birth metric, AELAD, is also mixed. Teaching hospitals have highly unfavourable correlations for 2005 and 2007 (Table 244) but both fail statistical testing (Table 245, Table 246). Small hospitals have a weak favourable correlation for 2007 (Table 244) however it fails statistical testing as well (Table 247). Community hospitals again set the standard for the application of UCIT with respect to birth metrics as the relationship for 2007 is favourable (Table 244) and significant (Table 248) for AELAD.

Table 244

Correlation Between UCIT and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & UCIT 2005	Correlation AELAD & UCIT 2007
Teaching	15	4	73%	55%	48%
Small	31	24	23%	-18%	-23%
Community	63	10	84%	-24%	-38%

AELAD=Adverse Events Labour And Delivery
UCIT=Use of Clinical Information Technology

Table 245

UCIT Relevance Test in Teaching Hospitals versus AELAD, 2005

UCIT and AELAD in Teaching

m_1	0.13
r^2	0.31
FDIST	9.74%
t	1.877
TINV	2.306

AELAD=Adverse Events Labour And Delivery
UCIT=Use of Clinical Information Technology

Table 246

UCIT Relevance Test in Teaching Hospitals versus AELAD, 2007

UCIT and AELAD in Teaching

m_1	0.077
r^2	0.23
FDIST	15.71%
t	1.561
TINV	2.306

AELAD=Adverse Events Labour And Delivery
UCIT=Use of Clinical Information Technology



Table 247

UCIT Relevance Test in Small Hospitals versus AELAD, 2007

UCIT and AELAD in Small

m_1	-0.019
r^2	0.05
FDIST	45.41%
t	-0.521
TINV	2.306

AELAD=Adverse Events Labour And Delivery
UCIT=Use of Clinical Information Technology

Table 248

UCIT Relevance Test in Community Hospitals versus AELAD, 2007

UCIT and AELAD in Community

m_1	-0.035
r^2	0.15
FDIST	0.41%
t	-3.006
TINV	2.007

AELAD=Adverse Events Labour And Delivery
UCIT=Use of Clinical Information Technology

The impact of UCIT on the mortality rate, HSMR, is also mixed. Teaching hospitals have an apparent unfavourable relationship between UCIT and HSMR (Table 249) for 2007 however this relationship fails statistical testing (Table 250). There is no data for Small hospitals on the mortality metric HSMR. Community hospitals appear to have had a significant change in their performance on HSMR due to UCIT (Table 249). In 2005 the relationship was unfavourable and significant (Table 251). While the relationship turned favourable in 2007 it was not significant (Table 252). It appears that Community hospitals may have eliminated a UCIT related activity that had negative impact in 2005. Investigation into this activity and its presence in the other hospital types needs to be investigated by management to improve the performance of the hospital system.

Table 249

Correlation Between UCIT and HSMR

Hospital Size	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & UCIT 2005	Correlation HSMR & UCIT 2007	
Teaching	15	6	60%	18%	31%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	44%	-22%

HSMR=Hospital Standardized Mortality Rate
UCIT=Use of Clinical Information Technology

Table 250

UCIT Relevance Test in Teaching Hospitals versus HSMR, 2007

UCIT and HSMR in Teaching

m_1	0.23
r^2	0.09
FDIST	42.24%
t	0.852
TINV	2.364

HSMR=Hospital Standardized Mortality Rate
UCIT=Use of Clinical Information Technology

Table 251

UCIT Relevance Test in Community Hospitals versus HSMR, 2005

UCIT and HSMR in Community

m_1	0.41
r^2	0.20
FDIST	2.63%
t	2.375
TINV	2.069

HSMR=Hospital Standardized Mortality Rate
UCIT=Use of Clinical Information Technology

Table 252

UCIT Relevance Test in Community Hospitals versus HSMR, 2007

UCIT and HSMR in Community

m_1	-0.199
r^2	0.05
FDIST	27.67%
t	-1.113
TINV	2.064

HSMR=Hospital Standardized Mortality Rate
UCIT=Use of Clinical Information Technology

The only hospital type that is exhibiting any correlation between UCIT and CR are Community hospitals with approximately the same unfavourable correlation in 2005 and 2007 (Table 253). Both relationships pass F and t-tests (Table 254, Table 255) Community hospitals are the only type that has been able to establish a favourable patient outcome through the implementation of UCIT, that being both birth metrics RLD and AELAD. Community hospitals are also the performance leaders in the birth category (Table 6, Table 8). It appears that these positive outcomes are having a negative impact on the financial performance of the Community hospitals. Hospital management needs to investigate how to perform these UCIT activities more efficiently so that the patient outcomes are preserved but at a cost that is not unfavourable.

Table 253

Correlation Between UCIT and CR

Hospital Size	# Hospitals		Reporting Rate	Correlation	Correlation
	#	Not Reporting or Report Zero		CR & UCIT 2005	CR & UCIT 2007
Teaching	15	1	93%	7%	1%
Small	31	14	55%	4%	7%
Community	63	7	89%	-39%	-34%

CR=Current Ratio

UCIT=Use of Clinical Information Technology

Table 254

UCIT Relevance Test in Community Hospitals versus CR, 2005

UCIT and CR in Community

m_1	-0.023
r^2	0.165
FDIST	0.26%
t	-3.153
TINV	2.005

CR=Current Ratio

UCIT=Use of Clinical Information Technology

Table 255

UCIT Relevance Test in Community Hospitals versus CR, 2007

UCIT and CR in Community

m ₁	-0.014
r ²	0.12
FDIST	0.78%
t	-2.755
TINV	2.002

CR=Current Ratio

UCIT=Use of Clinical Information Technology

There appears to be an unfavourable relationship between UCIT and PST for Teaching hospitals and a favourable relationship for Small hospitals for the same activity and outcome (Table 256). Community hospitals have no relevant relationship. However, Teaching and Small hospitals do not pass statistical testing, therefore the relationships are not relevant either (Table 257, Table 258).

Table 256

Correlation Between UCIT and PST

Hospital Size	#	# Hospitals		Correlation PST & UCIT 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	1	93%	35%
Small	31	4	87%	-32%
Community	63	2	97%	5%

PST=% Sick Time

UCIT=Use of Clinical Information Technology

Table 257

UCIT Relevance Test in Teaching Hospitals versus PST, 2007

UCIT and PST in Teaching

m ₁	0.004
r ²	0.01
FDIST	76.28%
t	0.310
TINV	2.228

PST=% Sick Time

UCIT=Use of Clinical Information Technology

Table 258

UCIT Relevance Test in Small Hospitals versus PST, 2007

UCIT and PST in Small

m ₁	-0.025
r ²	0.104
FDIST	3.89%
t	-0.144
TINV	2.064

PST=% Sick Time

UCIT=Use of Clinical Information Technology

The UCIT Emergency Department activity also occurs at the hospital level. When comparing the Emergency Department level UCIT to the Hospital level UCITH, in spite of high apparent correlations, the results are mixed (Table 259). Teaching and Small hospitals have relationships that do not pass the relevance testing (Table 260, Table 261) whereas the Community hospitals do pass statistical relevance (Table 262). This indicates a higher degree of “commonality” in operations between an Emergency Department at a Community hospital and the rest of the hospital, perhaps leading to fewer patient errors. The reason(s) why the correlations are not relevant for Teaching and Small hospitals need to be investigated as there may be an opportunity to avoid mistakes.

Table 259

Correlation Between UCIT and UCITH

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation UCITH & UCIT 2005	Correlation UCITH & UCIT 2007
Teaching	15	1	93%	59%	74%
Small	31	14	55%	81%	64%
Community	63	7	89%	74%	79%

UCITH=Use of Clinical Information Technology Hospital level

UCIT=Use of Clinical Information Technology



Table 260

UCIT Relevance Test in Teaching Hospitals versus UCITH, 2007

UCIT and UCITH in Teaching

m_1	0.485
r^2	0.16
FDIST	15.35%
t	1.524
TINV	2.179

UCITH=Use of Clinical Information Technology Hospital level

UCIT=Use of Clinical Information Technology

Table 261

UCIT Relevance Test in Small Hospitals versus UCITH, 2007

UCIT and UCITH in Small

m_1	0.546
r^2	0.409
FDIST	0.00%
t	0.328
TINV	2.064

UCITH=Use of Clinical Information Technology Hospital level

UCIT=Use of Clinical Information Technology

Table 262

UCIT Relevance Test in Community Hospitals versus UCITH, 2007

UCIT and UCITH in Community

m_1	0.607
r^2	0.618
FDIST	0.00%
t	9.771
TINV	2.228

UCITH=Use of Clinical Information Technology Hospital level

UCIT=Use of Clinical Information Technology

In summary, both the CDCD and UCIT activities were investigated for impact on patient and financial outcomes in an effort to prove H6. Small hospitals have statistically lower levels of both the CDCD and UCIT activities (Table 197, Table 226) and well as the lowest reporting percentages in the examination of each activity versus each outcome. While analysis has not demonstrated a direct causality between low levels of these activities and outcomes, it is suspicious given that Small hospitals have

statistically lower levels of Emergency Department performance in two of the three primary patient outcomes (Table 4).

Overall, it appears that Community hospitals have performed best in these two activities and have integrated these into the other operations of the hospitals as well. However, this improved performance, particularly as associated with the RLD and AELAD patient outcomes, has come with an unfavourable relationship with CR, financial performance. It appears that the Community hospital CDCD and UCIT activities may be the right activities but they may need to have their efficiency improved. This needs to be investigated by management as the potential for “best practices” is strong. Implementing these “best practices” in the other hospital types will generate a system-wide patient outcome improvement. Research has demonstrated that effective management of these activities will result in improved patient and financial performance (Wagner, 2003, Walshe, Shortell, 2004).

Hypothesis 7 (H7)

High performing Emergency Departments have their resources, which include people, skills, and equipment, deployed by management in a manner to optimize patient outcomes and financial performance.

The metrics which measure these activities are; % Management and Operational Support Staff (MOSSH), % Total Worked Hours (TWH), % Nurse Worked Hours (NWH), % Registered Nurse Hours (RNH), and % Equipment Expense (PEE). Each of these activities will be examined versus the patient and financial outcomes to determine if H7 is true.

Observations: H7 is not proven. The first activity examined, MOSSH, shows that there is no statistical difference between the level of support that management gives to Emergency Departments versus hospital type and in fact the level has remained unchanged from 2005 to 2007 (Table 263, Table 264). It would be expected that higher levels of management support would lead to improved patient outcomes as the medical staff may have more time to address patient issues.

Table 263

MOSSH in Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	MOSSH 2005 Average	MOSSH 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	20%	9%	5%	15%	25%
Small	31	23	26%	13%	10%	7%	6%	19%
Community	63	11	83%	15%	9%	2%	12%	17%

MOSSH = % Management & Operational Support Staff Hours

Table 264

MOSSH in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	MOSSH 2007 Average	MOSSH 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	19%	8%	4%	15%	23%
Small	31	17	45%	12%	11%	6%	6%	18%
Community	63	3	95%	15%	9%	2%	13%	17%

MOSSH = % Management & Operational Support Staff Hours

The examination of the performance impact of this activity on patient outcomes in the Emergency Department show large differences in correlations for each type of hospital versus each patient outcome (Table 265, Table 266). However, none of these relationships pass statistical testing (Table 267, Table 268, Table 269, Table 270, Table 271, Table 272, Table 273, and Table 274). Detailed examination shows that Teaching hospitals may have improved unfavourable performance in the RVRAb patient outcome

from 2005 to 2007 (Table 268, Table 272) but the relationships fail statistical testing. Additionally, the low reporting rate with highly variable activity levels and outcomes makes analysis of Small hospital performance difficult. Overall, analysis illustrates that management support has no impact on the patient outcomes of the Emergency Department.

Table 265

Correlation MOSSH and Emergency Performance, 2005

Hospital Size	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & MOSSH 2005	Correlation RVRAb & MOSSH 2005
Teaching	15	3	80%	13%
Small	31	25	19%	-31%
Community	63	11	83%	-5%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

MOSSH=% Management & Operational Support Staff Hours

Table 266

Correlation Between MOSSH and Emergency Performance, 2007

Hospital Size	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & MOSSH 2007	Correlation RVRAb & MOSSH 2007	Correlation XRRAFIPc & MOSSH 2007
Teaching	15	2	87%	24%	22%
Small	31	19	39%	-45%	-6%
Community	63	13	79%	-16%	-34%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

MOSSH=% Management & Operational Support Staff Hours

Table 267

MOSSH Relevance Test in Small Hospitals versus RVRAa, 2005

MOSSH and RVRAa in Small

m_1	-0.060
r^2	0.093
FDIST	19.15%
t	0.902
TINV	2.571

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

MOSSH=% Management & Operational Support Staff Hours



Table 268

MOSSH Relevance Test in Teaching Hospitals versus RVRAb, 2005

MOSSH and RVRAb in Teaching

m_1	0.023
r^2	0.25
FDIST	9.84%
t	1.822
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

Table 269

MOSSH Relevance Test in Small Hospitals versus RVRAb, 2005

MOSSH and RVRAb in Small

m_1	-0.450
r^2	0.499
FDIST	27.58%
t	-0.901
TINV	12.706

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

Table 270

MOSSH Relevance Test in Teaching Hospitals versus RVRaA, 2007

MOSSH and RVRaA in Teaching

m_1	0.027
r^2	0.05
FDIST	46.65%
t	0.757
TINV	2.228

RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

Table 271

MOSSH Relevance Test in Small Hospitals versus RVRaA, 2007

MOSSH and RVRaA in Small

m_1	-0.068
r^2	0.105
FDIST	31.12%
t	-0.722
TINV	2.364

RVRaA=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

Table 272

MOSSH Relevance Test in Teaching Hospitals versus RVRAb, 2007

MOSSH and RVRAb in Teaching

m_1	.018
r^2	0.05
FDIST	49.22%
t	0.713
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

Table 273

MOSSH Relevance Test in Small Hospitals versus RVRAb, 2007

MOSSH and RVRAb in Small

m_1	-0.054
r^2	0.207
FDIST	11.86%
t	-0.181
TINV	2.306

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

Table 274

MOSSH Relevance Test in Community Hospitals versus XRRAFIPc, 2007

MOSSH and XRRAFIPc in
Community

m_1	-0.046
r^2	0.031
FDIST	23.43%
t	-1.205
TINV	2.013

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
MOSSH=% Management & Operational Support Staff Hours

The correlations for the impact of MOSSH on the first birth outcome, RLD, are mixed. MOSSH in Teaching hospitals have an apparent unfavourable impact while Small hospitals are favourable with Community hospitals having no relevant impact (Table 275). However, none of the apparent relationships pass significance testing (Table 276, Table 277).

Table 275

Correlation Between MOSSH and RLD

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & MOSSH 2005	Correlation RLD & MOSSH 2007
Teaching	15	4	73%	24%	20%
Small	31	24	23%	21%	-83%
Community	63	10	84%	-8%	-7%

RLD=Readmissions Labour and Delivery

MOSSH=% Management & Operational Support Staff Hours

Table 276

MOSSH Relevance Test in Teaching Hospitals versus RLD, 2005

MOSSH and RLD in Teaching

m_1	0.01
r^2	0.06
FDIST	50.73%
t	0.694
TINV	2.306

RLD=Readmissions Labour and Delivery

MOSSH=% Management & Operational Support Staff Hours

Table 277

MOSSH Relevance Test in Small Hospitals versus RLD, 2007

MOSSH and RLD in Small

m_1	-0.457
r^2	0.693
FDIST	22.24%
t	-0.310
TINV	4.303

RLD=Readmissions Labour and Delivery

MOSSH=% Management & Operational Support Staff Hours

The impact of MOSSH on the second birth outcome, AELAD, exhibits similar behaviour with Teaching hospitals having a strong unfavourable relationship in 2005 and Small hospitals having nearly identical favourable relationships from 2005 to 2007 (Table 278, Table 279). MOSSH in Community hospitals appear to have no real correlations with patient outcomes.

None of the relationships pass statistical testing, however the highly unfavourable relationship that Teaching hospitals have in 2005, which is close to being significant, virtually disappears for 2007. The close distance to being relevant in 2005 and the large correlation change from 2005 to 2007 indicates that Teaching hospitals changed something to avoid this potentially harmful performance. It may be that this is due to implementation issues in terms of data collection and reporting on this mandated scorecard as 2005 was only the second time that Ontario hospitals reported on their activities and outcomes.

The low reporting rate of Small hospitals, visible with the large TINV value, (Table 280, Table 281) makes it challenging to arrive at any substantial conclusions about apparent favourable correlations.

Table 278

Correlation Between MOSSH and AELAD

Hospital Size	#	# Hospitals		Correlation AELAD & MOSSH 2005	Correlation AELAD & MOSSH 2007
		Not Reporting or Report Zero	Reporting Rate		
Teaching	15	4	73%	55%	3%
Small	31	24	23%	-27%	-26%
Community	63	10	84%	-2%	14%

AELAD=Adverse Events Labour And Delivery
 MOSSH=% Management & Operational Support Staff Hours

Table 279

MOSSH Relevance Test in Teaching Hospitals versus AELAD, 2005

MOSSH and AELAD in Teaching

m_1	0.22
r^2	0.30
FDIST	10.13%
t	1.851
TINV	2.306

AELAD=Adverse Events Labour And Delivery
 MOSSH=% Management & Operational Support Staff Hours



Table 280

MOSSH Relevance Test in Small Hospitals versus AELAD, 2005

MOSSH and AELAD in Small

m_1	-0.028
r^2	0.072
FDIST	56.08%
t	-0.799
TINV	3.182

AELAD=Adverse Events Labour And Delivery
 MOSSH=% Management & Operational Support Staff Hours

Table 281

MOSSH Relevance Test in Small Hospitals versus AELAD, 2007

MOSSH and AELAD in Small

m_1	-0.011
r^2	0.07
FDIST	77.59%
t	-0.290
TINV	2.776

AELAD=Adverse Events Labour And Delivery
 MOSSH=% Management & Operational Support Staff Hours

The impact of MOSSH on the mortality rate, HSMR, appears unfavourable for Teaching hospitals and insignificant for Community hospitals (Table 282) however the relationships are not relevant (Table 283). Therefore, management support does not appear to have any impact on the mortality rate.

Table 282

Correlation Between MOSSH and HSMR

Hospital Size	#	# Hospitals Not		Correlation HSMR & MOSSH 2005	Correlation HSMR & MOSSH 2007
		Reporting or Report Zero	Reporting Rate		
Teaching	15	6	60%	43%	22%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	15%	-11%

HSMR=Hospitals Standardized Mortality Rate
 MOSSH=% Management & Operational Support Staff Hours

Table 283

MOSSH Relevance Test in Teaching Hospitals versus HSMR, 2005

MOSSH and HSMR in Teaching

m ₁	0.78
r ²	0.5
FDIST	56.25%
t	0.608
TINV	2.364

HSMR=Hospitals Standardized Mortality Rate

MOSSH=% Management & Operational Support Staff Hours

The impact of management support on financial performance, CR, has no apparent correlations except for Small hospitals which are exhibiting large swings in impact from 2005 to 2007 (Table 284). However, the impact of MOSSH on CR fails statistical testing for both periods (Table 285, Table 286).

Table 284

Correlation Between MOSSH and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & MOSSH 2005	Correlation CR & MOSSH 2007
Teaching	15	1	93%	-11%	0%
Small	31	24	23%	48%	-37%
Community	63	10	84%	-16%	5%

CR=Current Ratio

MOSSH=% Management & Operational Support Staff Hours

Table 285

MOSSH Relevance Test in Small Hospitals versus CR, 2005

MOSSH and CR in Small

m ₁	0.183
r ²	0.23
FDIST	0.36%
t	0.595
TINV	2.447

CR=Current Ratio

MOSSH=% Management & Operational Support Staff Hours

Table 286

MOSSH Relevance Test in Small Hospitals versus CR, 2007

MOSSH and CR in Small

m ₁	-0.063
r ²	0.136
FDIST	2.88%
t	-0.354
TINV	2.201

CR=Current Ratio

MOSSH=% Management & Operational Support Staff Hours

The management support activity, MOSSH, has a weak favourable correlation with PST for 2007 for Teaching hospitals but it fails statistical testing. (Table 287, Table 288). Therefore, management support has no impact on the absenteeism rate in Emergency Departments.

Table 287

Correlation Between MOSSH and PST

Hospital Size	#	# Hospitals		Correlation PST & MOSSH 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	0	100%	-24%
Small	31	17	45%	3%
Community	63	3	95%	16%

PST=% Sick Time

MOSSH=% Management & Operational Support Staff Hours

Table 288

MOSSH Relevance Test in Teaching Hospitals versus PST, 2007

MOSSH and PST in Teaching

m ₁	-0.007
r ²	0.004
FDIST	84.06%
t	-0.206
TINV	2.228

PST=% Sick Time

MOSSH=% Management & Operational Support Staff Hours

Overall, analysis is demonstrating that there is no impact of the MOSSH activity on either patient or financial outcomes. This raises the question of the value of tracking this activity if it does not lead to superior performance in any outcome.

The TWH metric examines the percentage of time that medical staff spend involved in the direct operation of the Emergency Department. Training, education, and sick time are examples of activities that would reduce this metric. Examination of Emergency Department TWH activity illustrate that there is no significant difference between hospital types from 2005 to 2007 (Table 289, Table 290) with levels remaining largely unchanging. In fact, there is also no significant difference in PST, sick time, between types over the same period (Table 13). Ideally, if hospitals efficiently and effectively use TWH hours Emergency Department outcomes should improve.

Table 289

TWH in Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	TWH 2005 Average	TWH 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	87%	3%	1%	85%	88%
Small	31	14	55%	89%	5%	2%	87%	92%
Community	63	7	89%	87%	3%	1%	86%	88%

TWH=% Total Worked Hours

Table 290

TWH in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	TWH 2007 Average	TWH 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	85%	2%	1%	84%	87%
Small	31	2	94%	88%	5%	2%	86%	90%
Community	63	1	98%	86%	3%	1%	86%	87%

TWH=% Total Worked Hours

The impact of TWH on Emergency Department patient outcomes has mixed correlations from 2005 to 2007 (Table 291, Table 292) however none of the relationships pass significance testing (Table 293, Table 294, Table 295, and Table 296). The low reporting rate with highly variable levels of activity and outcomes continue to influence the statistical analysis of Small hospitals.

Table 291

Correlation Between TWH and Emergency Performance, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & TWH 2005	Correlation RVRAb & TWH 2005
Teaching	15	3	80%	17%	30%
Small	31	25	19%	18%	24%
Community	63	11	83%	11%	6%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

TWH=% Total Worked Hours

Table 292

Correlation Between TWH and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & TWH 2007	Correlation RVRAb & TWH 2007	Correlation XRRAFIPc & TWH 2007
Teaching	15	2	87%	-14%	-14%	19%
Small	31	19	39%	43%	-30%	5%
Community	63	13	79%	9%	5%	-25%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

TWH=% Total Worked Hours

Table 293

TWH Relevance Test in Teaching Hospitals versus RVRAb, 2005

TWH and RVRAb in Teaching

m_1	0.039
r^2	0.0.9
FDIST	34.79%
t	0.985
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

TWH=% Total Worked Hours



Table 294

TWH Relevance Test in Small Hospitals versus RVRAa, 2007

TWH and RVRAa in Small

m_1	0.228
r^2	0.188
FDIST	1.43%
t	0.793
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

TWH=% Total Worked Hours

Table 295

TWH Relevance Test in Small Hospitals versus RVRAb, 2007

TWH and RVRAb in Small

m_1	-0.117
r^2	0.09
FDIST	4.37%
t	-1.139
TINV	2.160

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

TWH=% Total Worked Hours

Table 296

TWH Relevance Test in Community Hospitals versus XRRAFIPc, 2007

TWH and XRRAFIPc in
Community

m_1	-0.244
r^2	0.043
FDIST	15.48%
t	--1.446
TINV	2.012

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

TWH=% Total Worked Hours

The impact of the activity TWH on the first birth metric, RLD, is only statistically significant for Community hospitals in the latest reporting period (Table 297, Table 298, Table 299, and Table 300). This relationship passes significance testing and is a potentially favourable relationship, indicating that as the medical staff becomes more effective due to effective investment in training time, RLD improves. This relationship

is important for management to understand as PST is virtually identical across all hospital types (Table 13).

Table 297

Correlation Between TWH and RLD

Hospital Size	# Hospitals	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & TWH 2005	Correlation RLD & TWH 2007
Teaching	15	4	73%	26%	-15%
Small	31	24	23%	4%	25%
Community	63	10	84%	21%	34%

RLD=Readmissions Labour and Delivery
TWH=% Total Worked Hours

Table 298

TWH Relevance Test in Teaching Hospitals versus RLD, 2005

TWH and RLD in Teaching

m_1	0.024
r^2	0.07
FDIST	46.45%
t	0.768
TINV	2.306

RLD=Readmissions Labour and Delivery
TWH=% Total Worked Hours

Table 299

TWH Relevance Test in Small Hospitals versus RLD, 2007

TWH and RLD in Small

m_1	0.457
r^2	0.69
FDIST	22.24%
t	-0.310
TINV	4.303

RLD=Readmissions Labour and Delivery
TWH=% Total Worked Hours

Table 300

TWH Relevance Test in Community Hospitals versus RLD, 2007

TWH and RLD in Community

m ₁	0.070
r ²	0.12
FDIST	1.09%
t	2.642
TINV	2.007

RLD=Readmissions Labour and Delivery

TWH=% Total Worked Hours

The effect of TWH on the second birth outcome, AELAD, appears highly variable across hospital types (Table 301). The apparent relationship between TWH and AELAD in 2007 for Teaching hospitals is not relevant (Table 304). The low reporting rate of Small hospitals is reflected again in high TINV values, making the statistical analysis difficult (Table 302, Table 305). Community hospitals have a significant relationship between TWH and AELAD for 2005 (Table 303) that disappears in 2007 (Table 301), indicating that some training may have had a positive effect but is now gone.

Table 301

Correlation Between TWH and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & TWH 2005	Correlation AELAD & TWH 2007
Teaching	15	4	73%	20%	-39%
Small	31	24	23%	-71%	-83%
Community	63	10	84%	33%	15%

AELAD=Adverse Events Labour And Delivery

TWH=% Total Worked Hours



Table 302

TWH Relevance Test in Small Hospitals versus AELAD, 2005

TWH and AELAD in Small

m_1	-0.219
r^2	0.504
FDIST	13.84%
t	-0.193
TINV	2.571

AELAD=Adverse Events Labour And Delivery
TWH=% Total Worked Hours

Table 303

TWH Relevance Test in Community Hospitals versus AELAD, 2005

TWH and AELAD in Community

m_1	0.166
r^2	0.11
FDIST	1.64%
t	2.485
TINV	2.009

AELAD=Adverse Events Labour And Delivery
TWH=% Total Worked Hours

Table 304

TWH Relevance Test in Teaching Hospitals versus AELAD, 2007

TWH and AELAD in Teaching

m_1	-0.333
r^2	0.15
FDIST	23.24%
t	-1.281
TINV	2.262

AELAD=Adverse Events Labour And Delivery
TWH=% Total Worked Hours

Table 305

TWH Relevance Test in Small Hospitals versus AELAD, 2007

TWH and AELAD in Small

m_1	-0.189
r^2	0.683
FDIST	2.73%
t	-0.071
TINV	2.364

AELAD=Adverse Events Labour And Delivery
TWH=% Total Worked Hours

There appears to be reasonable correlations between TWH and the mortality outcome, HSMR, across all years. A focus on operating the Emergency Department has resulted in correlations that indicate that more effort and time placed on operating the Emergency Department results in lower death rates (Table 306). However, this is not proven as none of these relationships pass statistical testing (Table 307, Table 308, and Table 309). This effort is therefore ineffective.

Table 306

Correlation Between TWH and HSMR

Hospital Size	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & TWH 2005	Correlation HSMR & TWH 2007
Teaching	15	60%	-40%	-42%
Small	31	0%	N/A	N/A
Community	63	41%	-23%	-33%

HSMR=Hospital Standardized Mortality Rate
TWH=% Total Worked Hours

Table 307

TWH Relevance Test in Teaching Hospitals versus HSMR, 2005

TWH and HSMR in Teaching

m_1	-0.878
r^2	0.16
FDIST	32.94%
t	-1.061
TINV	2.447

HSMR=Hospital Standardized Mortality Rate
TWH=% Total Worked Hours

Table 308

TWH Relevance Test in Teaching Hospitals versus HSMR, 2007

TWH and HSMR in Teaching

m_1	-2.21
r^2	0.17
FDIST	26.26%
t	-1.218
TINV	2.364

HSMR=Hospital Standardized Mortality Rate
TWH=% Total Worked Hours

Table 309**TWH Relevance Test in Community Hospitals versus HSMR, 2007**

TWH and HSMR in Community

m_1	-2.067
r^2	0.108
FDIST	10.16%
t	-1.702
TINV	2.064

HSMR=Hospital Standardized Mortality Rate

TWH=% Total Worked Hours

The impact of TWH on financial performance, CR, is generally favourable across all types across both years (Table 310). This is expected as a component of funding for Ontario hospitals is based on the actual activity experienced by each Emergency Department (Ontario Hospital Association, 2007). This means that more patients in the Emergency Department mean more time to service them but staffing levels are fixed so this leaves less time for training but revenue is gathered on a per patient basis. Training costs are reduced because it does not happen as much and the positive intake of revenue results in superior financial performance. The potential concern is that reducing training over time will reduce the medical staff's effectiveness which will increase negative patient outcomes. The importance of picking the right training and implementing it effectively becomes a major management issue if this strategy is to be followed (Walshe, Shortell, 2004). Analysis indicates that only Community hospitals have made this relationship consistently relevant over time (Table 311, Table 312, Table 313, and Table 314). The latest r^2 is not large at 8.2% but this is none the less favourable to the operation of the Community hospitals as it generates financial resources. Community hospitals have the same level of PST as the other types and are in the middle in terms of overall Emergency Department performance of hospital types (Table 4). Given the funding pressure that Ontario hospitals face this is an investigation opportunity for the

managers of the other hospital types to understand what Community hospitals are doing to generate positive financial performance (Ontario Hospital Association, 2008).

Table 310

Correlation Between TWH and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & TWH 2005	Correlation CR & TWH 2007
Teaching	15	1	93%	32%	42%
Small	31	14	55%	13%	10%
Community	63	7	89%	34%	29%

CR=Current Ratio
TWH=% Total Worked Hours

Table 311

TWH Relevance Test in Teaching Hospitals versus CR, 2005

TWH and CR in Teaching

m_1	0.061
r^2	0.055
FDIST	28.80%
t	1.116
TINV	2.201

CR=Current Ratio
TWH=% Total Worked Hours

Table 312

TWH Relevance Test in Community Hospitals versus CR, 2005

TWH and CR in Community

m_1	0.126
r^2	0.116
FDIST	1.03%
t	2.660
TINV	2.005

CR=Current Ratio
TWH=% Total Worked Hours

Table 313

TWH Relevance Test in Teaching Hospitals versus CR, 2007

TWH and CR in Teaching

m_1	0.097
r^2	0.20
FDIST	14.07%
t	1.600
TINV	2.228

CR=Current Ratio
TWH=% Total Worked Hours

Table 314

TWH Relevance Test in Community Hospitals versus CR, 2007

TWH and CR in Community

m_1	0.093
r^2	0.082
FDIST	2.5%
t	2.301
TINV	2.001

CR=Current Ratio
TWH=% Total Worked Hours

The relationship between the TWH activity and sick time, PST, has reasonable correlations for the Community hospitals only (Table 315). This relationship passes both F and t-tests (Table 316). Given that sick time, PST, is statistically identical across hospital types this indicates that Community hospitals may be implementing more effective training, requiring fewer hours, which may be resulting in a culture where medical staff is more committed to the success of the hospital and its patients. This relationship needs to be explored by hospital management to understand what Community hospitals are doing to generate this performance and how it might be better utilized to impact patient and financial outcomes.

Table 315

Correlation Between TWH and PST

Hospital Size	#	# Hospitals		Correlation PST & TWH 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	0	100%	-2%
Small	31	3	90%	-14%
Community	63	1	98%	-41%

PST=% Sick Time
TWH=% Total Worked Hours

Table 316

TWH Relevance Test in Community Hospitals versus PST, 2007

TWH and PST in Community

m_1	-0.210
r^2	0.169
FDIST	0.09%
t	-3.492
TINV	2.000

PST=% Sick Time
TWH=% Total Worked Hours

Overall, the impact of the activity TWH on patient and financial outcomes is inconsistent. TWH has no impact on the performance of the Emergency Department. TWH is showing a correlation of opportunity with the RLD birth metric in Community hospitals only for the latest period and this should be investigated by management. Community hospitals have favourable relationships with TWH on financial performance, CR, and sick time, PST, that need to be examined by management to understand how these might be replicated in the other hospital types.

The next activity associated with H7 is % Nursing Worked Hours, NWH, which focuses on the percentage of time that nurses spend in direct patient care versus administrative duties. Examination of the level of NWH in each hospital type shows that Small hospitals for the most recent period, 2007, almost have a significantly different level of NWH versus the other hospital types (Table 317, Table 318). This is not unexpected as

Small hospitals generally have lower levels of resources however given that sick time, PST, is statistically identical (Table 13, Ontario Hospital Association, 2008), it is an item of concern if nurses in Small hospitals are not being given enough training to stay up-to-date in their profession.

Table 317

NWH in Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	NWH 2005 Average	NWH 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	86%	3%	1%	85%	88%
Small	31	13	58%	89%	6%	3%	86%	91%
Community	63	7	89%	87%	3%	1%	86%	87%

NWH=% Nursing Worked Hours

Table 318

NWH in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	NWH 2007 Average	NWH 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	85%	3%	1%	83%	86%
Small	31	1	97%	88%	5%	2%	86%	90%
Community	63	1	98%	86%	3%	1%	85%	86%

NWH=% Nursing Worked Hours

The activity NWH has apparent mixed impact on the Emergency Department performance outcomes for each hospital type (Table 319, Table 320). However, only the Community hospital relationships between NWH versus RVRAa and XRRAFIPc pass statistical testing (Table 321, Table 322, Table 323, Table 324, Table 325, Table 326, and Table 327). The relationship for both outcomes indicates that greater percentages of NWH result in more unfavourable performance. This may mean that some Community hospitals are either not doing enough training of nursing staff or the training is not effective. It may also mean that other Community hospitals have taken the time to

effectively implement the right training or are using non-nurse staff to perform these tasks, resulting in superior performance. Management in these hospitals needs to investigate these relationships so that the learning is shared with the other hospital types to improve their performance (Savary, Crawford-Mason, 2006).

Table 319

Correlation Between NWH and Emergency Performance, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & NWH 2005	Correlation RVRAb & NWH 2005
Teaching	15	1	93%	19%	29%
Small	31	25	19%	19%	27%
Community	63	10	84%	17%	6%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

NWH=% Nursing Worked Hours

Table 320

Correlation Between NWH and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & NWH 2007	Correlation RVRAb & NWH 2007	Correlation XRRAFIPc & NWH 2007
Teaching	15	2	87%	-11%	43%	3%
Small	31	19	39%	39%	-28%	6%
Community	63	13	79%	30%	-3%	31%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

NWH=% Nursing Worked Hours

Table 321

NWH Relevance Test in Teaching Hospitals versus RVRAb, 2005

NWH and RVRAb in Teaching

m_1	0.036
r^2	0.083
FDIST	36.27%
t	0.954
TINV	2.228

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

NWH=% Nursing Worked Hours

Table 322

NWH Relevance Test in Small Hospitals versus RVRAb, 2005

NWH and RVRAb in Small

m_1	0.051
r^2	0.07
FDIST	39.80%
t	1.314
TINV	2.776

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
NWH=% Nursing Worked Hours

Table 323

NWH Relevance Test in Small Hospitals versus RVRAa, 2007

NWH and RVRAa in Small

m_1	0.183
r^2	0.149
FDIST	2.52%
t	0.934
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
NWH=% Nursing Worked Hours

Table 324

NWH Relevance Test in Community Hospitals versus RVRAa, 2007

NWH and RVRAa in Community

m_1	0.107
r^2	0.088
FDIST	2.11%
t	2.371
TINV	2.002

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
NWH=% Nursing Worked Hours

Table 325

NWH Relevance Test in Teaching Hospitals versus RVRAb, 2007

NWH and RVRAb in Teaching

m_1	0.072
r^2	0.185
FDIST	14.23%
t	1.580
TINV	2.201

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
NWH=% Nursing Worked Hours

Table 326

NWH Relevance Test in Small Hospitals versus RVRAb, 2007

NWH and RVRAb in Small

m_1	-0.106
r^2	0.078
FDIST	5.65%
t	-1.242
TINV	2.145

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)
 NWH=% Nursing Worked Hours

Table 327

NWH Relevance Test in Community Hospitals versus XRRAFIPc, 2007

NWH and XRRAFIPc in
 Community

m_1	0.331
r^2	0.093
FDIST	3.30%
t	2.196
TINV	2.012

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 NWH=% Nursing Worked Hours

NWH has a widely differing impact on the first birth metric, RLD, from 2005 to 2007 (Table 328). Teaching hospitals have had a major change in correlation from 2005 to 2007 however the change fails significance testing (Table 329, Table 330). Small hospitals have weak correlations with Community hospitals having a correlation that is significant (Table 331). This is similar to the impact of NWH on Emergency Department outcomes, given that PST is statistically identical across hospital types, indicating a potential opportunity with training level and effectiveness. This behaviour was also identified in the examination of the TWH activity (Table 300). Given the consistency of this issue it is a priority issue to be investigated by Community hospital management as taking time to do the right training and implementing effectively is having a favourable outcome.

Table 328

Correlation Between NWH and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & NWH 2005	Correlation RLD & NWH 2007
Teaching	15	4	73%	26%	-23%
Small	31	24	23%	-12%	-14%
Community	63	10	84%	20%	32%

RLD=Readmissions Labour and Delivery
NWH=% Nursing Worked Hours

Table 329

NWH Relevance Test in Teaching Hospitals versus RLD, 2005

NWH and RLD in Teaching

m_1	0.023
r^2	0.068
FDIST	46.8%
t	0.762
TINV	2.306

RLD=Readmissions Labour and Delivery
NWH=% Nursing Worked Hours

Table 330

NWH Relevance Test in Teaching Hospitals versus RLD, 2007

NWH and RLD in Teaching

m_1	-0.013
r^2	0.05
FDIST	49.57%
t	-0.710
TINV	2.262

RLD=Readmissions Labour and Delivery
NWH=% Nursing Worked Hours

Table 331

NWH Relevance Test in Community Hospitals versus RLD, 2007

NWH and RLD in Community

m_1	0.059
r^2	0.105
FDIST	1.66%
t	2.475
TINV	2.007

RLD=Readmissions Labour and Delivery
NWH=% Nursing Worked Hours

In spite of large swings in correlations in Teaching hospitals and very large correlations in Small hospitals for the relationship between NWH and the second birth outcome, AELAD, the only relationships that pass statistical testing are those for the Community hospitals (Table 332, Table 333, Table 334, Table 335, Table 336, and Table 337). Low reporting rates in Small hospitals continue to be an analysis issue and are a critical item that the MOH needs to address with Small hospital management. Community hospitals appear to have lost their 2005 relevant relationship between NWH and AELAD in 2007. This is similar to the 2005 to 2007 relationship with TWH and AELAD (Table 301, Table 303). Given that sick time, PST, is not a variable of concern (Table 13), this needs to be investigated to understand how some Community hospitals found superior performance in AELAD but were unable to replicate it for the latest period.

Table 332

Correlation Between NWH and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & NWH 2005	Correlation AELAD & NWH 2007
Teaching	15	4	73%	36%	-37%
Small	31	24	23%	-74%	-83%
Community	63	10	84%	37%	19%

AELAD=Adverse Events Labour And Delivery
NWH=% Nursing Worked Hours

Table 333

NWH Relevance Test in Teaching Hospitals versus AELAD, 2005

NWH and AELAD in Teaching

m_1	0.278
r^2	0.126
FDIST	31.33%
t	1.076
TINV	2.306

AELAD=Adverse Events Labour And Delivery
NWH=% Nursing Worked Hours

Table 334

NWH Relevance Test in Small Hospitals versus AELAD, 2005

NWH and AELAD in Small

m_1	-0.250
r^2	0.553
FDIST	12.44%
t	-0.182
TINV	2.571

AELAD=Adverse Events Labour And Delivery
NWH=% Nursing Worked Hours

Table 335

NWH Relevance Test in Community Hospitals versus AELAD, 2005

NWH and AELAD in Teaching

m_1	0.169
r^2	0.139
FDIST	0.64%
t	2.843
TINV	2.009

AELAD=Adverse Events Labour And Delivery
NWH=% Nursing Worked Hours

Table 336

NWH Relevance Test in Teaching Hospitals versus AELAD, 2007

NWH and AELAD in Teaching

m_1	-.251
r^2	0.135
FDIST	26.57%
t	-1.187
TINV	2.262

AELAD=Adverse Events Labour And Delivery
NWH=% Nursing Worked Hours

Table 337

NWH Relevance Test in Small Hospitals versus AELAD, 2007

NWH and AELAD in Small

m_1	-0.184
r^2	0.697
FDIST	2.29%
t	-0.062
TINV	2.306

AELAD=Adverse Events Labour And Delivery
NWH=% Nursing Worked Hours

The relationship with the mortality metric seems to indicate that as NWH increases HSMR decreases (Table 338). The opposite, as NWH decreases HSMR increases, may also be true. However, none of these relationships pass relevance testing so it appears that NWH has no impact on the mortality rate (Table 339, Table 340, Table 341, and Table 342).

Table 338

Correlation Between NWH and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & NWH 2005	Correlation HSMR & NWH 2007
Teaching	15	6	60%	-28%	-22%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	-28%	-30%

HSMR=Hospital Standardized Mortality Rate
NWH=% Nursing Worked Hours

Table 339

NWH Relevance Test in Teaching Hospitals versus HSMR, 2005

NWH and HSMR in Teaching

m_1	-0.627
r^2	0.08
FDIST	49.62%
t	-0.724
TINV	2.447

HSMR=Hospital Standardized Mortality Rate
NWH=% Nursing Worked Hours

Table 340

NWH Relevance Test in Community Hospitals versus HSMR, 2005

NWH and HSMR in Community

m_1	-1.815
r^2	0.080
FDIST	17.17%
t	-1.411
TINV	2.069

HSMR=Hospital Standardized Mortality Rate
NWH=% Nursing Worked Hours

Table 341

NWH Relevance Test in Teaching Hospitals versus HSMR, 2007

NWH and HSMR in Teaching

m_1	-1.062
r^2	0.048
FDIST	56.94%
t	-0.597
TINV	2.364

HSMR=Hospital Standardized Mortality Rate

NWH=% Nursing Worked Hours

Table 342

NWH Relevance Test in Community Hospitals versus HSMR, 2007

NWH and HSMR in Community

m_1	-1.632
r^2	0.089
FDIST	13.89%
t	-1.531
TINV	2.064

HSMR=Hospital Standardized Mortality Rate

NWH=% Nursing Worked Hours

The relationship between NWH and financial performance, CR, is similar to the TWH versus CR relationship (Table 310, Table 343). Community hospitals are again showing a consistent relationship which indicates that CR improves as NWH increases. Community hospitals may be demonstrating efficient implementation of effective training as their Emergency Department performance is mid range (Table 4). It appears that for 2007 Teaching hospitals are approaching relevance with their NWH versus CR relationship (Table 346). Since it is unknown if they are mimicking the behaviour of Community hospitals to achieve this, an investigation should be performed in an effort to improve total system performance.

Table 343

Correlation Between NWH and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & NWH 2005	Correlation CR & NWH 2007
Teaching	15	1	93%	28%	46%
Small	31	12	61%	4%	12%
Community	63	7	89%	37%	29%

CR=Current Ratio

NWH=% Nursing Worked Hours

Table 344

NWH Relevance Test in Teaching Hospitals versus CR, 2005

NWH and CR in Teaching

m_1	0.051
r^2	0.077
FDIST	35.79%
t	0.959
TINV	2.201

CR=Current Ratio

NWH=% Nursing Worked Hours

Table 345

NWH Relevance Test in Community Hospitals versus CR, 2005

NWH and CR in Community

m_1	0.124
r^2	0.136
FDIST	0.51%
t	2.920
TINV	2.005

CR=Current Ratio

NWH=% Nursing Worked Hours

Table 346

NWH Relevance Test in Teaching Hospitals versus CR, 2007

NWH and CR in Teaching

m_1	0.086
r^2	0.21
FDIST	8.25%
t	1.881
TINV	2.160

CR=Current Ratio

NWH=% Nursing Worked Hours

Table 347

NWH Relevance Test in Community Hospitals versus CR, 2007

NWH and CR in Community

m ₁	0.086
r ²	0.085
FDIST	2.28%
t	2.338
TINV	2.001

CR=Current Ratio

NWH=% Nursing Worked Hours

The relationship between the NWH activity and sick time, PST, again has similar outcomes versus the TWH activity (Table 315, Table 316, Table 348, and Table 349). The Community hospital relationship again passes both F and t-tests (Table 349). Given that sick time, PST, is statistically identical across hospital types and that the TWH relationship is similar it may be that Community hospitals are implementing more effective training which may be resulting in a culture where medical staff is more committed to the success of the hospital and its patients. This relationship needs to be explored by hospital management to understand what Community hospitals are doing to generate this performance and how it might be better utilized to impact patient and financial outcomes (Wagner, 2003).

Table 348

Correlation Between NWH and PST

Hospital Size	#	# Hospitals		Correlation PST & NWH 2007
		Not Reporting or Report Zero	Reporting Rate	
Teaching	15	0	100%	-5%
Small	31	3	90%	-11%
Community	63	1	98%	-38%

CR=Current Ratio

NWH=% Nursing Worked Hours



Table 349

NWH Relevance Test in Community Hospitals versus PST, 2005

NWH and PST in Community

m_1	-0.178
r^2	0.145
FDIST	0.23%
t	-3.187
TINV	2.000

CR=Current Ratio

NWH=% Nursing Worked Hours

The percentage of NWH that are worked by registered nurses (RNs) is not statistically different across all hospital types (Table 350, Table 351). However, Teaching and Community hospitals did statistically improve their level of hours worked by RNs from 2005 to 2007.

Table 350

RNH Emergency Department Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	RNH 2005 Average	RNH 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	91%	7%	4%	87%	94%
Small	31	14	55%	91%	9%	5%	87%	96%
Community	63	7	89%	90%	9%	2%	88%	93%

RNH=% Registered Nurse Hours

Table 351

RNH in Emergency Department Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	RNH 2007 Average	RNH 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	0	100%	98%	6%	3%	95%	101%
Small	31	1	97%	97%	6%	2%	95%	99%
Community	63	1	98%	96%	6%	2%	94%	97%

RNH=% Registered Nurse Hours

In spite of this statistical change in percentage of nursing hours worked from 2005 to 2007 for Teaching and Community hospitals there are no apparent relevant relationships

between RNH and Emergency Department patient outcomes (Table 352, Table 353, Table 354, and Table 355).

Table 352

Correlation RNH and Emergency Performance, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & RNH 2005	Correlation RVRAb & RNH 2005
Teaching	15	3	80%	-7%	15%
Small	31	24	23%	5%	-11%
Community	63	10	84%	2%	2%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

RNH=% Registered Nurse Hours

Table 353

Correlation Between RNH and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & RNH 2007	Correlation RVRAb & RNH 2007	Correlation XRRAFIPc & RNH 2007
Teaching	15	2	87%	24%	8%	-1%
Small	31	19	39%	70%	-11%	-16%
Community	63	13	79%	-3%	22%	-6%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

RNH=% Registered Nurse Hours

Table 354

RNH Relevance Test in Teaching Hospitals versus RVRAa, 2007

RNH and RVRAa in Teaching

m_1	0.027
r^2	0.05712
FDIST	43.19%
t	0.816
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RNH=% Registered Nurse Hours

Table 355

RNH Relevance Test in Small Hospitals versus RVRAa, 2007

RNH and RVRAa in Small

m_1	0.098
r^2	0.115
FDIST	4.37%
t	0.755
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RNH=% Registered Nurse Hours

However, the impact of RNH on the first birth metric, RLD, is favourably significant for Community hospitals in 2007 (Table 356, Table 359). Small hospitals have large fluctuations in their performance from 2005 to 2007 (Table 356) but the low reporting rate combined with the highly variable outcomes results in these correlations not being significant (Table 357, Table 358). The change in RNH from 2005 to 2007 appears to have no impact to RLD in Teaching hospitals.

Table 356

Correlation Between RNH and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & RNH 2005	Correlation RLD & RNH 2007
Teaching	15	4	73%	7%	-3%
Small	31	24	23%	-75%	64%
Community	63	10	84%	9%	-29%

RLD=Readmissions Labour and Delivery

RNH=% Registered Nurse Hours

Table 357

RNH Relevance Test in Small Hospitals versus RLD, 2005

RNH and RLD in Small

m_1	-0.039
r^2	0.555
FDIST	56.87%
t	-0.037
TINV	3.182

RLD=Readmissions Labour and Delivery

RNH=% Registered Nurse Hours



Table 358

RNH Relevance Test in Small Hospitals versus RLD, 2007

RNH and RLD in Small

m ₁	0.468
r ²	0.413
FDIST	15.30%
t	0.604
TINV	2.571

RLD=Readmissions Labour and Delivery
RNH=% Registered Nurse Hours

Table 359

RNH Relevance Test in Community Hospitals versus RLD, 2007

RNH and RLD in Community

m ₁	-0.027
r ²	0.082
FDIST	3.60%
t	-2.153
TINV	2.007

RLD=Readmissions Labour and Delivery
RNH=% Registered Nurse Hours

In spite of an apparent unfavourable correlation for Teaching hospitals in 2005 there are no relevant relationships between RNH and the second birth metric, AELAD (Table 360, Table 361). Small and Community hospitals show insignificant correlation levels between RNH and AELAD (Table 360).

Table 360

Correlation Between RNH and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & RNH 2005	Correlation AELAD & RNH 2007
Teaching	15	4	73%	44%	15%
Small	31	24	23%	-15%	6%
Community	63	10	84%	1%	8%

AELAD=Adverse Events Labour And Delivery
RNH=% Registered Nurse Hours

Table 361

RNH Relevance Test in Teaching Hospitals versus AELAD, 2005

RNH and AELAD in Teaching

m ₁	0.156
r ²	0.19
FDIST	20.39%
t	1.383
TINV	2.306

AELAD=Adverse Events Labour And Delivery
RNH=% Registered Nurse Hours

The relationship between RNH and the mortality outcome, HSMR, shows a strong correlation for both 2005 and 2007 for Teaching hospitals only (Table 362). However, when tested these relationships both fail and are hence not relevant (Table 363, Table 364).

Table 362

Correlation Between RNH and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & RNH 2005	Correlation HSMR & RNH 2007
Teaching	15	6	60%	52%	43%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	-8%	1%

HSMR=Hospital Standardized Mortality Rate
RNH=% Registered Nurse Hours

Table 363

RNH Relevance Test in Teaching Hospitals versus HSMR, 2005

RNH and HSMR in Teaching

m ₁	0.53
r ²	0.27
FDIST	16.58%
t	1.494
TINV	2.447

HSMR=Hospital Standardized Mortality Rate
RNH=% Registered Nurse Hours

Table 364

RNH Relevance Test in Teaching Hospitals versus HSMR, 2007

RNH and HSMR in Teaching

m ₁	11.347
r ²	0.18
FDIST	25.15%
t	1.250
TINV	2.364

HSMR=Hospital Standardized Mortality Rate
 RNH=% Registered Nurse Hours

The effect that RNH has on the financial outcome, CR, exhibits a strong correlation for Teaching hospitals only in 2005 that disappears in 2007 (Table 365). However, this relationship fails statistical testing and is not relevant (Table 365).

Table 365

Correlation Between RNH and CR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation CR & RNH 2005	Correlation CR & RNH 2007
Teaching	15	1	93%	-44%	-14%
Small	31	14	55%	10%	-1%
Community	63	7	89%	-9%	-9%

CR=Current Ratio
 RNH=% Registered Nurse Hours

Table 366

RNH Relevance Test in Teaching Hospitals versus CR, 2005

RNH and CR in Teaching

m ₁	-0.013
r ²	0.02
FDIST	61.95%
t	-0.509
TINV	2.160

CR=Current Ratio
 RNH=% Registered Nurse Hours

The final outcome to be tested by RNH is the level of sick time, PST. While there is an apparent favourable correlation for Teaching hospitals for 2007 (Table 367), it fails

statistical testing (Table 368). Therefore, RNH seems to have no relationship with PST across the hospital types.

Table 367

Correlation Between RNH and PST

Hospital Size	# Hospitals		Reporting Rate	Correlation PST & RNH 2007
	#	Not Reporting or Report Zero		
Teaching	15	0	100%	-36%
Small	31	3	90%	-20%
Community	63	1	98%	4%

PST=% Sick Time
RNH=% Registered Nurse Hours

Table 368

RNH Relevance Test in Teaching Hospitals versus PST, 2007

RNH and PST in Teaching

m_1	-0.051
r^2	0.127
FDIST	19.28%
t	-1.374
TINV	2.160

PST=% Sick Time
RNH=% Registered Nurse Hours

The RNH activity is measured at the Emergency Department level. When tested against the RNHH activity which is the percent of nursing hours that are executed by RNs at the Hospital level there is only a strong relationship for Teaching hospitals (Table 369). This relationship is relevant (Table 370) and not unexpected as Teaching hospitals have higher levels of RNs in the general hospital population to ensure that students can learn without harming patients (Ms Bowers, RN, Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010).

Table 369

Correlation Between RNH and RNHH

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RNHH & RNH 2007
Teaching	15	0	100%	83%
Small	31	2	94%	20%
Community	63	1	98%	20%

PST=% Sick Time
RNH=% Registered Nurse Hours

Table 370

RNH Relevance Test in Teaching Hospitals versus RNHH, 2007

RNH and RNHH in Teaching

m_1	1.522
r^2	0.687
FDIST	0.01%
t	5.340
TINV	2.160

PST=% Sick Time
RNH=% Registered Nurse Hours

In summary, the RNH activity impact is confined to a favourable relationship with RLD for Community hospitals only for 2007 (Table 359). The MOH has published a large number of reports indicating that there is a critical shortage of RNs in Ontario hospitals (Ontario Hospital Association, 2008). However this research demonstrates, in terms of Emergency Departments, that the percentage of nursing hours worked, using MOH data, is almost all exclusively trained and qualified RNs, independent of hospital type (Table 351) and has impact on only one patient outcome type at one type of hospital. As the analysis of NWH and TWH illustrates, further investigation by hospital management as to what the nurses are doing in terms of the tasks they are performing and how they are performing them, such as using SOPs, might be more important than measuring the hourly percentage contribution of various skills. This investigation will likely unlock opportunities for improvement (Drucker, 2002).

The final activity to be examined to determine impact on patient and financial outcomes is % Equipment Expense, PEE, which is the proportion of total expenses dedicated to the acquisition and operation of technology used in the treatment of patients.

While there is no difference in the level of PEE across hospital types for 2005 (Table 371) there has been an increase in PEE for 2007 in Teaching hospitals that is significant (Table 372) as compared to 2005 and for 2007 Teaching hospitals have a statistically higher level of PEE than the other hospital types.

Table 371

PEE Based Upon Size/Type, 2005

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	PEE 2005 Average	PEE 2005 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	6.4%	1.7%	0.9%	5.5%	7.3%
Small	31	12	61%	6.0%	1.4%	0.6%	5.4%	6.7%
Community	63	4	94%	6.4%	1.3%	0.3%	6.0%	6.7%

PEE=% Equipment Expense

Table 372

PEE Based Upon Size/Type, 2007

alpha= 0.05

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	PEE 2007 Average	PEE 2007 Std Dev	Confidence	Lower Range	Upper Range
Teaching	15	1	93%	8.5%	1.6%	0.8%	7.7%	9.3%
Small	31	2	94%	6.9%	1.9%	0.7%	6.2%	7.6%
Community	63	1	98%	6.7%	1.3%	0.3%	6.4%	7.0%

PEE=% Equipment Expense

The effect of PEE on Emergency Department patient outcomes appears to demonstrate that as PEE increases patient outcomes improve (Table 373, Table 374). However, all of these relationships fail relevance testing (Table 375, Table 376, Table 377, Table 378, and Table 379). The only relationships that are approaching relevance are those between PEE and XRRAFIPc in Teaching hospitals (Table 379) and Small hospitals and RVRAA

(Table 378) for 2007. The equipment that was purchased and how it is being used needs to be examined to determine if a “best practice” can be developed which can be shared with the other hospital types.

Table 373

Correlation Between PEE and Emergency Performance, 2005

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & PEE 2005	Correlation RVRAb & PEE 2005
Teaching	15	3	80%	-34%	-10%
Small	31	25	19%	-57%	10%
Community	63	10	84%	5%	8%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

PEE=% Equipment Expense

Table 374

Correlation Between PEE and Emergency Performance, 2007

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RVRAa & PEE 2007	Correlation RVRAb & PEE 2007	Correlation XRRAFIPc & PEE 2007
Teaching	15	2	87%	-28%	-10%	-46%
Small	31	19	39%	-27%	-2%	8%
Community	63	13	79%	-5%	30%	19%

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

RVRAb=Return Visit Rate for Asthma (24 to 72 hours, Adult 20-64 years old)

PEE=% Equipment Expense

Table 375

PEE Relevance Test in Teaching Hospitals versus RVRAa, 2005

PEE and RVRAa in Teaching

m_1	-0.105
r^2	0.12
FDIST	28.04%
t	-1.141
TINV	2.228

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

PEE=% Equipment Expense

Table 376

PEE Relevance Test in Small Hospitals versus RVRAa, 2005

PEE and Small in Small

m_1	-0.941
r^2	0.3232
FDIST	0.24%
t	-1.217
TINV	2.179

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
PEE=% Equipment Expense

Table 377

PEE Relevance Test in Teaching Hospitals versus RVRAa, 2007

PEE and RVRAa in Teaching

m_1	-0.130
r^2	0.078
FDIST	35.46%
t	-0.966
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
PEE=% Equipment Expense

Table 378

PEE Relevance Test in Small Hospitals versus RVRAa, 2007

PEE and Small in Small

m_1	-0.382
r^2	0.073
FDIST	9.92%
t	-6.201
TINV	2.262

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
PEE=% Equipment Expense

Table 379

PEE Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007

PEE and XRRAFIPc in Teaching

m_1	-0.122
r^2	0.21
FDIST	10.09%
t	-1.777
TINV	2.179

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
PEE=% Equipment Expense

The influence that PEE has on the first birth outcome, RLD, while showing large correlations for 2005, has insignificant correlations for 2007 (Table 380). The large correlations for 2005 all fail relevance testing (Table 381, Table 382) therefore PEE seems to have no impact on RLD.

Table 380

Correlation Between PEE and RLD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation RLD & PEE 2005	Correlation RLD & PEE 2007
Teaching	15	4	73%	-31%	12%
Small	31	24	23%	47%	-5%
Community	63	10	84%	12%	-11%

RLD=Readmissions Labour and Delivery
PEE=% Equipment Expense

Table 381

PEE Relevance Test in Teaching Hospitals versus RLD, 2005

PEE and RLD in Teaching

m_1	-0.056
r^2	0.098
FDIST	34.90%
t	-0.988
TINV	2.262

RLD=Readmissions Labour and Delivery
PEE=% Equipment Expense

Table 382

PEE Relevance Test in Small Hospitals versus RLD, 2005

PEE and RLD in Small

m_1	0.263
r^2	0.224
FDIST	34.98%
t	0.976
TINV	2.571

RLD=Readmissions Labour and Delivery
PEE=% Equipment Expense

Using technology to improve performance on the second birth outcome, AELAD, appears to show favourable outcomes for some hospital types in 2005 and 2007 (Table

383) however none of these relationships pass relevance testing (Table 384, Table 385).

Therefore, it appears that PEE does not influence the outcomes on either birth metric.

Table 383

Correlation Between PEE and AELAD

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation AELAD & PEE 2005	Correlation AELAD & PEE 2007
Teaching	15	4	73%	-23%	-36%
Small	31	24	23%	-38%	13%
Community	63	10	84%	-5%	15%

AELAD=Adverse Events Labour And Delivery

PEE=% Equipment Expense

Table 384

PEE Relevance Test in Small Hospitals versus AELAD, 2005

PEE and AELAD in Small

m_1	-0.278
r^2	0.141
FDIST	31.02%
t	-1.977
TINV	2.447

AELAD=Adverse Events Labour And Delivery

PEE=% Equipment Expense

Table 385

PEE Relevance Test in Teaching Hospitals versus AELAD, 2007

PEE and AELAD in Teaching

m_1	-0.497
r^2	0.128
FDIST	28.05%
t	-1.148
TINV	2.262

AELAD=Adverse Events Labour And Delivery

PEE=% Equipment Expense

Using technology to reduce the mortality rate is having a favourable effect in Community hospitals (Table 386) that is relevant (Table 387). There appears to be no significant impact in Teaching hospitals, in spite of a statistically higher level of spending in the recent period (Table 372). In fact, the correlation for Teaching hospitals

switched from favourable to unfavourable from 2005 to 2007. While the correlations are currently small management should monitor this to ensure that increased equipment expense does not result in increased mortality. This would indicate an ineffective application of technology.

The technology that Community hospitals have implemented to favourably effect the mortality rate needs to be determined to establish if it can be implemented in the other types of hospitals to reduce the mortality rate.

Table 386

Correlation Between PEE and HSMR

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation HSMR & PEE 2005	Correlation HSMR & PEE 2007
Teaching	15	6	60%	-9%	18%
Small	31	31	0%	N/A	N/A
Community	63	37	41%	3%	-46%

HSMR=Hospital Standardized Mortality Rate
PEE=% Equipment Expense

Table 387

PEE Relevance Test in Community Hospitals versus HSMR, 2007

PEE and HSMR in Community

m_1	-6.71
r^2	0.213
FDIST	1.75%
t	-2.552
TINV	2.064

HSMR=Hospital Standardized Mortality Rate
PEE=% Equipment Expense

The relationship between PEE and financial outcome, CR, is favourable for Community hospitals (Table 388) and relevant (Table 389). The r^2 level is not large at 8.8% but it appears that Community hospitals have not only found a way to improve their mortality rate through technology they have also done it in a way that improves their financial performance. This needs to be investigated for application into the other hospital types.

The correlations for Teaching and Small hospitals are low between PEE versus CR and below the examination threshold.

Table 388

Correlation Between PEE and CR

Hospital Size	# Hospitals	# Hospitals		Reporting Rate	Correlation CR & PEE 2005	Correlation CR & PEE 2007
		Not Reporting or Report Zero	Reporting			
Teaching	15	1	93%	-6%	4%	
Small	31	14	55%	5%	-18%	
Community	63	7	89%	-8%	30%	

CR=Current Ratio
PEE=% Equipment Expense

Table 389

PEE Relevance Test in Community Hospitals versus CR, 2007

PEE and CR in Community

m_1	0.189
r^2	0.088
FDIST	1.93%
t	2.405
TINV	2.000

CR=Current Ratio
PEE=% Equipment Expense

Using technology, PEE, to improve sick time, PST, shows a relatively strong favourable relationship for Teaching hospitals only for 2007 (Table 390). While this relationship is not relevant it is close to being relevant and should be examined by hospital management to determine if effectiveness can be improved for Teaching hospitals initially. If it can and becomes relevant then applying those technologies and implementation techniques to the other hospital types could result in a system improvement.

Table 390

Correlation Between PEE and PST

Hospital Size	#	# Hospitals Not Reporting or Report Zero	Reporting Rate	Correlation PST & PEE 2007
Teaching	15	0	100%	-43%
Small	31	3	90%	12%
Community	63	1	98%	-1%

PST=% Sick Time
PEE=% Equipment Expense

Table 391

PEE Relevance Test in Teaching Hospitals versus PST, 2007

PEE and PST in Teaching

m_1	-0.216
r^2	0.183
FDIST	11.08%
t	-1.711
TINV	2.160

CR=Current Ratio
PEE=% Equipment Expense

Overall the effect that PEE has on Emergency Department outcomes is mixed. With respect to direct Emergency Department outcomes, PEE in Teaching hospitals is only approaching relevance with the XRRAFIPc patient outcome. This needs to be investigated by management to determine how to make PEE more effective so that it does become relevant. There is no impact of PEE on any birth outcome. Regarding the mortality outcome, HSMR, Community hospitals appear to have found a way to improve HSMR with technology. This needs to be investigated for application across the system. Community hospitals have also found a way to favourably influence the financial metric, CR, using technology. Finally, Teaching hospitals are approaching relevance between PEE and PST.

In spite of Teaching hospitals having statistically more PEE than the other hospital types it appears that only the Community hospitals have been able to develop relevant

relationships between PEE and patient and financial outcomes. This merits an investigation to understand what equipment Community hospitals are purchasing and they are using it. Again, the activities surrounding the assets may be of greater importance than the assets themselves (Porter, 1996, Drucker, 2002).

In summary, H7 is states that high performing Emergency Departments have their resources, which include people, skills, and equipment, deployed by management in a manner to optimize patient outcomes and financial performance. The metrics which measure these activities surrounding these resources are; % Management and Operational Support Staff (MOSSH), % Total Worked Hours (TWH), % Nurse Worked Hours (NWH), % Registered Nurse Hours (RNH), and % Equipment Expense (PEE). Overall results indicate that management is not effective in deploying the resources that it has responsibility for.

The only activity which was found to directly impact Emergency Department outcomes is NWH in Community hospitals. Some Community hospitals have demonstrated that as NWH decreases both RVRAa and XRRAFIPc decrease. This may indicate that staff other than nurses is involved in managing these outcomes effectively.

In terms of the RLD outcome MOSSH and PEE had no effect at all. TWH, NWH, and RNH all exhibited trends that could be interpreted as favourable outcomes for RLD in Community hospitals only. There was no effect relevant in the other hospital types.

Overall, all five activities had no relevant impact with respect to the birth outcome AELAD in any type of hospital. For the mortality rate, HSMR, only Community hospitals could demonstrate that more technology, PEE, had a favourable impact on the

mortality rate. The other four activities had no relevant impact on mortality rate in any type of hospital.

In terms of financial performance, CR, Community hospitals were able to demonstrate relevant relationships with TWH, NWH, and PEE versus CR. No other hospital type was able to do so and MOSSH and RNH activities had no impact. TWH, NWH, and RNH all measure separate but related activities and appear to be somewhat redundant. Given the difficult for Small hospitals to report removing one or two of these measures may reduce the reporting workload to allow a higher response rate.

Finally, the sick time outcome, PST, was favourably influenced by TWH and NWH activities in Community hospitals only. Therefore, H7 is not proven as the activities that the MOH has chosen to measure do not have consistent influence on either patient or financial outcomes. In fact, the MOSSH activity has no influence on any outcome and is therefore an irrelevant measure.

For the other four activities, the analysis for H7 demonstrates that Community hospitals have arguably favourable relationships with most of the outcomes. The reasons why Community hospitals have this consistent outcome performance merits more thorough investigation.

Summary

While H1 was not proven conclusively, analysis demonstrated that there was enough variation in outcomes versus type of hospital to mandate that the individual activity versus outcome analysis be performed on a type versus agglomerated basis.

Hypotheses 2 through 7 examined the first major research question which was;

Are there critical activities that determine the effectiveness of an Emergency Department for Ontario public hospitals?

Seventeen major activities were identified and organized into six categories, each of which became a hypothesis. All seventeen activities were compared against eight patient and financial outcomes. None of the Hypotheses were proven conclusively.

However, even though none of the Hypotheses were proven conclusively analysis did prove that:

SOPs are an activity that can favourably influence patient and financial outcomes but there is no consistent use or implementation of SOPs amongst and across hospital types or across the period examined.

There is no activity that measures whether a hospital is employing “best practice” SOPs or not.

Small hospitals have significantly lower reporting rates than Teaching and Community hospitals. This makes effective data analysis problematic as the sample sizes are sometimes insignificant.

The low reporting rates on a critical outcome, mortality rates in Ontario hospitals, reflects the overall lack of transparency in the Ontario hospital system.

The MOH is mandating hospitals to measure activities that have little or no impact on patient or financial outcomes.

The MOH is mandating hospitals to measure redundant activities.

There are some activities which conflict with outcomes, particularly choosing between patient or financial outcomes. The MOH has not mandated efficiency measures to improve one or the other outcome in an effort to resolve the conflict.

In spite of high participation rates, the lack of standardization, best measured through the use and implementation of consistent SOPs, has resulted in ineffective Lean implementations across the Ontario hospital system. The implementation of Lean appears to be focused on improving financial outcomes yet research has demonstrated that both patient and financial outcomes can be statistically improved through an effective Lean implementation (Devane, 2004).

Critical patient outcomes, such as the rate of *C. difficile* bacterial infections, are not measured.

“Outsourcing” health care appears to have no positive benefit for Ontario hospitals and in fact, given the lack of standardization of service and financial pressure from the MOH, may result in poorer patient outcomes. The lack of system-wide measures makes it impossible to determine if it is best for the patient outcome or the government financially to “outsource”. There is no “total delivered cost” measure or system-wide patient outcome measure to allow any comparative analysis.

The management of human resources in the Ontario hospital system is having very little effect on patient and financial outcomes. Research has demonstrated that patient and financial outcomes can be improved through effective and efficient management of an organization’s human capital (Kotter, 1995).

In spite of high participation rates in collecting information, Ontario hospitals are not effective in using this information to positively influence patient or financial outcomes.

Small hospitals in particular need to improve their data collection participation rates as well as improve the use of the information that they collect.

The ineffectiveness of the patient information processes has not been addressed with the implementation of modern information technology, allowing the hospitals to become more ineffective on a larger scale (Office of the Auditor General 2009). The use of modern information systems in the Ontario hospital system is not co-ordinated or consistent within and between hospital types. There is evidence that suggests some hospitals use information and information technology effectively however the implementation across the system has no consistency, standardization, and lacks efficiency.

Management is not effective at deploying the resources that it has responsibility for to improve patient and financial outcomes.

Each of these observations are major issues that the boards of directors of Ontario hospitals need to address. However, the data analysis and research dictate that some of these issues will generate more significant improvement in less time than others and some issues have to be resolved before others are tackled due to precedence requirements (Wagner, 2003, Waldman, 2003, Walshe, Shortell, 2004, Savary, Crawford-Mason, 2006). Research has also demonstrated that if organizations take on too many priorities and set too many goals or objectives they achieve none of them (Porter, 1996). Therefore the objective of the first research question was to determine if there were critical activities which would influence the performance of Emergency Departments and if so, what are they.

Based upon the data analysis outcomes and the literature review, it is proposed that there are three key critical activities which influence the core performance of an Emergency Department and are the foundation for further patient and financial outcome improvements. These three critical activities are:

SOP

CDCD

ICC

SOP is a critical activity because without standardized work processes:

It is extremely difficult to manage quality, which in this case means that people may die or suffer needless permanent disability due to misdiagnosis. Training and qualifying new doctors and nurses without standard approaches to common patient problems results in a wide variation of patient outcomes and may cost the health system needlessly (Larson, 2007).

It is very difficult to become efficient. Government has limited financial resources and it must ensure that the services that it promises to deliver can be delivered in the most effective and efficient means possible. Lack of efficiency will result in higher taxes or longer service waiting times, both of which are unacceptable outcomes (Ontario Hospital Association, 2008).

CDCD is a critical activity because without accurate, timely, and comprehensive data collection with respect to patients and their health issues;

Medical staff has a higher probability of making errors with negative outcomes for patients and generating extra cost to resolve those errors (Savary, Crawford-Mason, 2006).

Medical staff will generate rework by having to gather the same data more than once in an effort to avoid errors, wasting time and possibly generating errors as the data may have changed for good reasons (Savary, Crawford-Mason, 2006).

Staff and management do not have comprehensive data to analyse to evaluate performance or determine if there are any patient trends of significance (Wagner, 2003).

Implementing a technology based information system whose foundation is an ineffective manual data process will result in the hospital being more ineffective on a larger scale, generating more waste (Drucker, 2005).

ICC is a critical activity because without formal improvement programs in place;

Patients will not benefit from the “best practices” for common problems, resulting in a potentially higher level of unsatisfactory outcomes and more cost to the health system due to inadequate treatment (Wagner, 2003).

Hospitals and Emergency Departments will operate less efficiently than they could, resulting in higher cost which may have service and taxation implications (Porter, 1996).

Patient treatment knowledge is not advanced. Research has proven that improvements and innovations are largely discovered by the supply chain that delivers any service or product. While most treatment methodologies are transferable, someone has to discover them (Ahlstrand, et al., 2005; Couturier, 2007). Additionally, each hospital and

Emergency Department has unique population characteristics and other environmental attributes which it must deal with in order to provide the care that the citizens it services expect.

Board Composition and Activities

Introduction

The second research question is:

Are there competencies or skills on a board of an Ontario public hospital which directly influence the performance of the identified critical activities?

The literature review demonstrated that there is a lack of definitive proof that board structure, particularly specific skills, can influence an organization's results. Specifically, there is a lack of research which links board skills to not-for-profit hospital effectiveness and efficiency. As Markarian and Parbonetti stated (Markarian, Parbonetti, 2007), the opportunity is to refine the category the category of the business expert variable.

The purpose of identifying if there were any critical activities that directly influence an Ontario public hospital's Emergency Department's results is to determine if there is a business expert category who is on the board of directors who brings the ability to influence the presence and quality of those activities to improve both the effectiveness and the efficiency of the Emergency Department.

The activity analysis identified that there are three different classes of hospitals in the Ontario public system; Teaching, Small, and Community. Board structure versus level

of presence of the identified critical activities will be compared for each different class of hospital and for the system as a whole to ensure that it is not a variable that significantly influences effectiveness and efficiency. The basic board structure that will be analysed is:

Board Size (BS)

% of Internal Directors (PID)

Board members will then be categorized into different skill sets and analysed to determine if there is a statistically valid relationship which links these classifications to the presence and quality of critical activities (Baysinger, Zardkoohi, 1986). The categories of board members to be examined include:

% of Medical Professionals on Board (PMPB), (“Business experts” per Baysinger, Zardkoohi, 1986)

% of Politicians on Board (PPB), (“Community influentials” per Baysinger, Zardkoohi, 1986)

% of Bureaucrats on Board (PBB), (“Support specialists” per Baysinger, Zardkoohi, 1986)

% of Educators on Board (PEB), (“Support Specialists” per Baysinger, Zardkoohi, 1986)

% of Entrepreneurs on Board (PENB), (“Business experts” per Baysinger, Zardkoohi, 1986)

% of Corporate Managers on Board (PCMB), (“Business experts” per Baysinger, Zardkoohi, 1986)

To further validate the impact of these classifications with respect to the presence and quality of critical activities the actual patient and financial outcomes of the Emergency Departments will be tested directly against the presence of these classifications to determine if they influence outcomes. Based upon the analysis of activities versus patient and financial outcomes in terms of redundancy and relevance the following patient and financial outcomes will be evaluated versus board structure and skills:

RVRAa

XRRAFIPc

RLD

CR

The latest data period for activities and outcomes of 2007 will be used for this analysis as it is far more complete than the activity and outcome data for 2005.

Hypothesis 8 (H8)

The basic board structure of an Ontario public hospital in terms of size and number of inside directors is not relevant to critical activities and/or patient or financial outcomes.

Observations: H8 is proven. Research illustrates that Small hospitals have statistically smaller boards than Teaching and Community hospitals (Table 392). Small hospitals also have the lowest reporting rate on the mandated MOH Balanced Scorecard. A research question that merits further investigation is “does the smaller board result in lower levels of MOH reporting?” It is also noted that 12 of the 31 Small hospitals in Ontario did not report any data regarding the composition of their board of directors,

including size and names of directors, at the time of the research for various reasons (Appendix D).

Table 392

Board Composition Comparison, BS by Hospital Size/Type

Hospital Size	BS Average	BS Std Dev	Confidence	Lower Range	Upper Range
Teaching	20.3	5.2	2.63	17.6	22.9
Small	14.8	3.1	1.40	13.4	16.2
Community	17.9	3.9	0.96	16.9	18.9

alpha= 0.05
BS=Board Size

The comparison of BS versus the level of critical skills indicates that there are some positive correlations (Table 393). However, none of these relationships pass relevance testing (Table 394, Table 395, and Table 396).

Table 393

Correlation BS and Critical Skills

Hospital Size	SOP	CDCD	ICC
Teaching	3%	28%	11%
Small	17%	24%	19%
Community	-9%	22%	21%

SOP=Use of Standard Operating Procedures
CDCD=Clinical Data Collection and Dissemination
ICC=Internal Co-ordination of Care
BS=Board Size

Table 394

BS Relevance Test in Teaching Hospitals versus CDCD, 2007

BS and CDCD in Teaching

m_1	-0.27
r^2	0.076
FDIST	33.92%
t	0.995
TINV	2.179

CDCD=Clinical Data Collection and Dissemination
BS=Board Size

Table 395

BS Relevance Test in Small Hospitals versus CDCD, 2007

BS and CDCD in Small

m ₁	0.32
r ²	0.056
FDIST	37.67%
t	0.913
TINV	2.145

CDCD=Clinical Data Collection and Dissemination

BS=Board Size

Table 396

BS Relevance Test in Community Hospitals versus CDCD, 2007

BS and CDCD in Community

m ₁	0.285
r ²	0.048
FDIST	9.06%
t	1.721
TINV	2.001

CDCD=Clinical Data Collection and Dissemination

BS=Board Size

An examination of the correlations between BS versus patient and financial outcomes appears to show some relationships between those variables (Table 397). As none of these relationships pass statistical testing analysis is proving that BS does not impact the presence of critical skills or Patient and financial outcomes (Table 398, Table 399, Table 400, and Table 401).

Table 397

Correlation BS and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	-23%	-16%	-37%	37%
Small	2%	-21%	47%	-17%
Community	-16%	2%	-7%	11%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RLD=Readmission Labour and Delivery

CR=Current Ratio

BS=Board Size



Table 398

BS Relevance Test in Teaching Hospitals versus RVRAa, 2007

BS and RVRAa in Teaching

m_1	-0.009
r^2	0.053
FDIST	45.10%
t	-0.781
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

BS=Board Size

Table 399

BS Relevance Test in Teaching Hospitals versus RLD, 2007

BS and RLD in Teaching

m_1	-0.003
r^2	0.138
FDIST	26.02%
t	-1.202
TINV	2.262

RLD=Readmission Labour and Delivery

BS=Board Size

Table 400

BS Relevance Test in Small Hospitals versus RLD, 2007

BS and RLD in Small

m_1	0.027
r^2	0.224
FDIST	52.67%
t	0.760
TINV	4.303

RLD=Readmission Labour and Delivery

BS=Board Size

Table 401

BS Relevance Test in Teaching Hospitals versus CR, 2007

BS and CR in Teaching

m_1	0.012
r^2	0.135
FDIST	17.87%
t	1.422
TINV	2.160

CR=Current Ratio

BS=Board Size

The other major component of basic board structure with respect to H8 is % of Internal Directors (PID). Given that there are varying sizes of boards, the percentage of inside directors is used versus the raw number of inside directors was tested. This approach not only tests the value of the presence of insiders but also the impact in relation to total board size as the numbers of both are variable from hospital to hospital. There is no significant difference in PID versus hospital type (Table 402). Testing PID versus the level of critical skills shows some correlations that need to be tested for relevance (Table 403). Testing these relationships for statistical relevance reveals that all of them fail (Table 404, Table 405, and Table 406). Therefore, analysis illustrates that PID does not influence critical skills.

Table 402

Board Composition Comparison, PID by Hospital Size/Type

Hospital Size	PID Average	PID Std Dev	Confidence	Lower Range	Upper Range
Teaching	20.4%	10.2%	5.2%	15.2%	25.6%
Small	22.3%	7.7%	3.5%	18.8%	25.8%
Community	24.7%	8.0%	2.0%	22.7%	26.7%

alpha= 0.05
PID=% Internal Directors

Table 403

Correlation PID and Critical Skills

Hospital Size	SOP	CDCD	ICC
Teaching	6%	23%	9%
Small	36%	10%	-35%
Community	-22%	-15%	6%

SOP=Use of Standard Operating Procedures
CDCD=Clinical Data Collection and Dissemination
ICC=Internal Co-ordination of Care
PID=% Internal Directors

Table 404

PID Relevance Test in Small Hospitals versus SOP, 2007

PID and SOP in Small	
m_1	1.15
r^2	0.132
FDIST	27.26%
t	1.169
TINV	2.262

SOP=Use of Standard Operating Procedures
 PID=% Internal Directors

Table 405

PID Relevance Test in Community Hospitals versus SOP, 2007

PID and SOP in Community	
m_1	-0.528
r^2	0.034
FDIST	24.52%
t	-1.180
TINV	2.023

SOP=Use of Standard Operating Procedures
 PID=% Internal Directors

Table 406

PID Relevance Test in Small Hospitals versus ICC, 2007

PID and ICC in Small	
m_1	-0.94
r^2	0.123
FDIST	24.02%
t	-1.242
TINV	2.201

ICC=Internal Co-ordination of Care
 PID=% Internal Directors

Determining if PID has any relationships with patient or financial outcomes indicates that there are relationships which seem to be relatively strong (Table 407). However, all the relationships fail statistical testing except for PID and RLD (Table 408, Table 409, Table 410, Table 411, and Table 412). The PID versus RLD relationship is suspect as the low reporting rate of Small hospitals results in a very small sample size which may not be representative of actual population performance. For this reason, the relationship

is not considered relevant. The Small hospital relationship of PID versus CR also fails (Table 412).

Table 407

Correlation PID and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	33%	11%	-28%	-11%
Small	58%	11%	-97%	37%
Community	2%	-20%	14%	-10%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RLD=Readmission Labour and Delivery
 CR=Current Ratio
 PID=% Internal Directors

Table 408

PID Relevance Test in Teaching Hospitals versus RVRAa, 2007

PID and RVRAa in Teaching

m_1	0.024
r^2	0.106
FDIST	27.79%
t	1.142
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PID=% Internal Directors

Table 409

PID Relevance Test in Small Hospitals versus RVRAa, 2007

PID and RVRAa in Small

m_1	0.193
r^2	0.342
FDIST	9.83%
t	1.906
TINV	2.364

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PID=% Internal Directors

Table 410

PID Relevance Test in Teaching Hospitals versus RLD, 2007

PID and RLD in Teaching

m_1	-0.005
r^2	0.078
FDIST	40.44%
t	-0.875
TINV	2.262

RLD=Readmission Labour and Delivery

PID=% Internal Directors

Table 411

PID Relevance Test in Small Hospitals versus RLD, 2007

PID and RLD in Small

m_1	-0.072
r^2	0.937
FDIST	3.18%
t	-5.476
TINV	4.303

RLD=Readmission Labour and Delivery

PID=% Internal Directors

Table 412

PID Relevance Test in Small Hospitals versus CR, 2007

PID and CR in Small

m_1	0.064
r^2	0.138
FDIST	12.92%
t	1.600
TINV	2.120

CR=Current Ratio

PID=% Internal Directors

Therefore, Ontario public hospital board structure in terms of board size or ratio of insiders does not impact either critical skills or outcomes. This outcome matches the conflict that researchers have in proving that board structure in terms of size and insider ratios impact performance (Raheja, 2005, Juras, Hinson, 2008).

Hypothesis 9 (H9)

There are “business experts” on the board of directors of an Ontario public hospital whose presence results in greater use of the identified critical activities.

Observations: H9 is proven. Each category of board member, using the Baysinger, Zardkoohi (1986) typology, was tested against the identified critical activities and verified through testing directly against the identified patient and financial outcomes. By testing typology on the board of directors directly against patient and financial outcomes not only is the influence that these “business experts” or other classifications have on the identified critical activities captured but the aggregate impact of other unknown critical activities is also portrayed. This may give additional weighting to prove that certain classifications have greater influence on final patient and financial outcomes than others and therefore have preference to be included in a hospital board.

Given that board sizes vary from hospital to hospital and the raw number of “business experts” varies in each hospital board all statistical testing for relationships is based upon the percentage of the total board which is defined as that unique classification. More sophisticated software would allow other testing methods however this approach matches how the activities and outcomes are measured in the mandated Balanced Scorecard, keeping the statistical analysis within the limitations of the software used.

Research has indicated that board training in Ontario is executed on an aggregate basis, with no differentiation by hospital type (Ontario Hospital Association, 2008). Therefore, given the analytical limitations of the software used and this aggregate approach to improve board capabilities the Baysinger, Zardkoohi (1986) classification analysis will

also be conducted on an aggregate basis so that the MOH and hospital boards can achieve an overall understanding of the impact of these unique classifications.

The first category tested is the % of Medical Professional on the Board (PMPB). This is the number of certified medical doctors and nurses. The nurses included in this category comprise those people who are qualified as either a general nurse or registered nurse. Examination of PMPB by hospital type indicates that Small hospitals have statistically fewer PMPB than Community hospitals but Small hospitals are not statistically different than Teaching hospitals in this board competency (Table 413). Therefore, no one hospital type is statistically different in PMPB from the other two types.

Table 413

Board Composition Comparison, PMPB by Hospital Size/Type

Hospital Size	PMPB Average	PMPB Std Dev	Confidence	Lower Range	Upper Range
Teaching	18.8%	8.9%	4.5%	14.3%	23.3%
Small	13.3%	5.2%	2.3%	10.9%	15.6%
Community	19.1%	6.9%	1.7%	17.4%	20.8%

alpha= 0.05
PMPB=% of Medical Professionals on Board

Comparing PMPB versus the level of critical skills by hospital type results in some correlations that appear meaningful (Table 414). Note that Both Teaching and Small hospitals demonstrate favourable correlations between PMPB and SOP however both fail in statistical testing (Table 415, Table 416). Also both the Small and Teaching hospitals show apparent favourable correlations between PMPB and the critical activity CDCD but these relationships also fail statistical testing (Table 417, Table 418).

The last relationship that bears examination is that of PMPB and ICC in Teaching hospitals. The correlation is favourable and is very close to passing statistical testing (Table 419). This relationship merits investigation given its proximity to being relevant.

Understanding how Teaching hospitals have been able to take PMPB and convert it into higher levels of ICC is worthy of a research effort especially considering the r^2 is relatively high at 28.4% (Table 419).

Table 414

Correlation PMPB and Critical Activities

Hospital Size	SOP	CDCD	ICC
Teaching	21%	24%	41%
Small	52%	31%	1%
Community	3%	-20%	8%
Overall	17%	7%	19%

SOP=Use of Standard Operating Procedures
 CDCD=Clinical Data Collection and Dissemination
 ICC=Internal Co-ordination of Care
 PMPB=% Medical Professionals on Board

Table 415

PMPB Relevance Test in Teaching Hospitals versus SOP, 2007

PMPB and SOP in Teaching

m_1	0.064
r^2	0.138
FDIST	12.92%
t	1.600
TINV	2.120

SOP=Use of Standard Operating Procedures
 PMPB=% Medical Professionals on Board

Table 416

PMPB Relevance Test in Small Hospitals versus SOP, 2007

PMPB and SOP in Small

m_1	1.69
r^2	0.059
FDIST	47.31%
t	0.749
TINV	2.262

SOP=Use of Standard Operating Procedures
 PMPB=% Medical Professionals on Board

Table 417

PMPB Relevance Test in Teaching Hospitals versus CDCD, 2007

PMPB and CDCD in Teaching

m_1	0.368
r^2	0.059
FDIST	40.36%
t	0.866
TINV	2.1792

CDCD=Clinical Data Collection and Dissemination

PMPB=% Medical Professionals on Board

Table 418

PMPB Relevance Test in Small Hospitals versus CDCD, 2007

PMPB and CDCD in Small

m_1	1.422
r^2	0.095
FDIST	24.63%
t	1.210
TINV	2.145

CDCD=Clinical Data Collection and Dissemination

PMPB=% Medical Professionals on Board

Table 419

PMPB Relevance Test in Teaching Hospitals versus ICC, 2007

PMPB and ICC in Teaching

m_1	0.91
r^2	0.284
FDIST	7.50%
t	1.987
TINV	2.228

ICC=Internal Co-ordination of Care

PMPB=% Medical Professionals on Board

When examining PMPB versus actual patient and financial outcomes the result is correlations that are widely dispersed (Table 420). Both Teaching and Small hospitals have unfavourable relationships between PMPB and the patient outcome RVRaA however they are not statistically significant (Table 421, Table 422). The next patient outcome, XRRAFIPc, appears to be favourably impacted by Teaching and Community hospitals (Table 420). Additionally, the hospital system examined as a whole also

appears to have a favourable correlation. When tested, the Teaching hospital is not relevant (Table 423), Community hospitals are almost relevant (Table 424), and the overall system does pass relevance testing (Table 425). Community hospitals seem to have found a means to use PMPB to favourably impact this patient outcome. Even though it fails relevance testing its proximity to passing appears to have had an overall impact on the calculation of PMPB on XRRAFIPc across all hospitals (Table 425). While r^2 is not large for either the Community hospital or Overall the impact on patients is significant. It is recommended that the MOH investigate how Community hospitals are achieving this favourable performance so that a best practice and attendant SOP can be developed to further improve overall system performance. It may be that Community hospitals are using more evidence based medicine, resulting in generally superior performance on this outcome (Larson, 2007).

The apparent strong favourable correlation between PMPB and RLD (Table 420) fails statistical testing (Table 426). The high TINV value is reflective of the continuing low reporting rates for Small hospitals on both board specifics and outcomes. While the other hospital types exhibit minor favourable correlations they are not significant.

Additionally, the unfavourable correlation between Community hospitals and the financial outcome, CR, also fails statistical testing (Table 427). The other hospital types show very small favourable correlations but they are well below our threshold and are not significant. Therefore, the impact that medical staff have on financial outcomes is neither favourable nor unfavourable.

In summary, PMPB does have favourable impact on the critical activity ICC and the patient outcome of XRRAFIPc but only in some hospital types. A research effort needs

to be conducted to understand why Teaching hospitals are able to exhibit a favourable impact on the critical activity ICC and how Community hospitals use PMPB to improve XRRAFIPc patient outcomes. The lack of mandated benchmarking on best practices is not only resulting in the failure to capture the Ontario hospital system's knowledge but it is also a symptom of resistance to evidence based medicine (Larson, 2007).

Table 420

Correlation PMPB and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	36%	-26%	-7%	11%
Small	40%	5%	-78%	8%
Community	-4%	-25%	-18%	-24%
Overall	-8%	-27%	-18%	-22%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RLD=Readmission Labour and Delivery
 CR=Current Ratio
 PMPB=% Medical Professionals on Board

Table 421

PMPB Relevance Test in Teaching Hospitals versus RVRAa, 2007

PMPB and RVRAa in Teaching

m_1	0.029
r^2	0.128
FDIST	23.00 %
t	1.271
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PMPB=% Medical Professionals on Board

Table 422

PMPB Relevance Test in Small Hospitals versus RVRAa, 2007

PMPB and RVRAa in Small

m_1	0.272
r^2	0.16
FDIST	28.54 %
t	1.156
TINV	2.364

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PMPB=% Medical Professionals on Board

Table 423

PMPB Relevance Test in Teaching Hospitals versus XRRAFIPc, 2007

PMPB and XRRAFIPc in Teaching

m_1	-0.013
r^2	0.067
FDIST	37.02 %
t	-0.931
TINV	2.179

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

PMPB=% Medical Professionals on Board

Table 424

PMPB Relevance Test in Community Hospitals versus XRRAFIPc, 2007

PMPB and XRRAFIPc in
Community

m_1	-0.099
r^2	0.065
FDIST	7.41 %
t	-1.826
TINV	2.011

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

PMPB=% Medical Professionals on Board

Table 425

PMPB Relevance Test in All Hospitals versus XRRAFIPc, 2007

PMPB and XRRAFIPc in All

m_1	-0.109
r^2	0.072
FDIST	1.61 %
t	-2.461
TINV	1.991

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

PMPB=% Medical Professionals on Board

Table 426

PMPB Relevance Test in Small Hospitals versus RLD, 2007

PMPB and RLD in Small

m_1	-0.109
r^2	0.609
FDIST	21.98 %
t	-1.764
TINV	4.303

RLD=Readmission Labour and Delivery

PMPB=% Medical Professionals on Board



Table 427

PMPB Relevance Test in Teaching Hospitals versus CR, 2007

PMPB and CR in Teaching

m ₁	0.006
r ²	0.016
FDIST	69.82 %
t	0.396
TINV	2.160

CR=Current Ratio

PMPB=% Medical Professionals on Board

The next unique classification to be examined is that of the % of Politicians on the Board (PPB). Examination of board composition across hospital types indicates that there is a significant difference between the level of Politicians on the boards of Teaching hospitals versus the other two types (Table 428). In fact, PPB at its largest level for Teaching hospitals is less than half the lowest level versus the other hospital types.

Table 428

Board Composition Comparison, PPB by Hospital Size/Type

alpha= 0.05

Hospital Size	PPB Average	PPB Std Dev	Confidence	Lower Range	Upper Range
Teaching	1.1%	2.0%	1.0%	0.1%	2.1%
Small	12.4%	17.5%	7.9%	4.5%	20.3%
Community	6.9%	7.4%	1.8%	5.1%	8.7%

PPB=% of Politicians on Board

The impact that Politicians have on the board with respect to the critical activity SOP appears to be unfavourable (Table 429). Small hospitals in particular appear have relationship between SOP and PPB that is almost statistically significant (Table 430). Viewed Overall, PPB has a negative influence on the critical activity SOP as it does pass F and t testing (Table 431). Even though the r² is low at 5.1% on an Overall basis it is 28% for Small hospitals.

Small hospitals also have an unfavourable relationship with PBB in terms of impacting the critical activity CDCD (Table 429) however this relationship is not relevant (Table 432). This analysis may not be accurate because Small hospitals have significantly lower reporting rates on almost every metric and have far higher averages of Politicians on their boards versus any other hospital type. Given that data activities overall seem lower with a greater number of Politicians on the board it raises the question of how effective Politicians are at getting inside directors to reveal important information (Fama, Jensen, 1983).

The relationship between PPB and ICC is mixed with Teaching hospitals having an apparent favourable correlation and the other two types of hospitals having unfavourable correlations. The system Overall exhibits a negative correlation (Table 429). The favourable relationship for Teaching hospitals and PPB versus ICC fails testing (Table 433) while Small hospitals barely fail (Table 434). Overall, PPB has an unfavourable impact on the critical skill ICC that is relevant (Table 435). The r^2 is of concern at 27% for Small hospitals and 10.6% Overall. Based upon this analysis, politicians do not bring any positive influence to critical activities and in fact appear to have an unfavourable impact on at least 2 of the 3 critical activities. This needs to be investigated by the MOH in terms of board governance, perhaps using agency, stewardship, or resource dependence theory as it is unclear just what benefits Politicians bring to the board (Jensen, Meckling, 1976; Fama, Jensen, 1983, Davis et al., 1997, Pfeffer, 1972; Pfeffer, Salancik, 1978).

Table 429

Correlation PPB and Critical Activities

Hospital Size	SOP	CDCD	ICC
Teaching	-10%	0%	35%
Small	-46%	-30%	-52%
Community	-2%	9%	-9%
Overall	-23%	-20%	-32%

SOP=Use of Standard Operating Procedures
 CDCD=Clinical Data Collection and Dissemination
 ICC=Internal Co-ordination of Care
 PPB=% Politicians on Board

Table 430

PPB Relevance Test in Small Hospitals versus SOP, 2007

PPB and SOP in Small

m_1	-0.755
r^2	0.28
FDIST	7.71 %
t	-1.970
TINV	2.228

SOP=Use of Standard Operating Procedures
 PPB=% Politicians on Board

Table 431

PPB Relevance Test in All Hospitals versus SOP, 2007

PPB and SOP in All

m_1	-0.479
r^2	0.051
FDIST	3.01 %
t	-2.204
TINV	1.987

SOP=Use of Standard Operating Procedures
 PPB=% Politicians on Board

Table 432

PPB Relevance Test in Small Hospitals versus CDCD, 2007

PPB and CDCD in Small

m_1	-0.330
r^2	0.089
FDIST	26.17 %
t	-1.169
TINV	2.145

CDCD=Clinical Data Collection and Dissemination
 PPB=% Politicians on Board

Table 433

PPB Relevance Test in Teaching Hospitals versus ICC, 2007

PPB and ICC in Teaching

m_1	3.072
r^2	0.123
FDIST	21.79 %
t	1.130
TINV	2.179

ICC=Internal Co-ordination of Care

PPB=% Politicians on Board

Table 434

PPB Relevance Test in Small Hospitals versus ICC, 2007

PPB and ICC in Small

m_1	-0.585
r^2	0.270
FDIST	6.85 %
t	-2.019
TINV	2.201

ICC=Internal Co-ordination of Care

PPB=% Politicians on Board

Table 435

PPB Relevance Test in All Hospitals versus ICC, 2007

PPB and ICC in All

m_1	-0.744
r^2	0.106
FDIST	0.21 %
t	-3.166
TINV	1.988

ICC=Internal Co-ordination of Care

PPB=% Politicians on Board

The analysis of PPB versus patient and financial outcomes is also disturbing (Table 436). PPB exhibits an unfavourable correlation for all hospitals and Overall with respect to the outcome RVRAa. While the correlation for Community hospitals is low and the correlation for Small hospitals fails testing (Table 438), the correlation for Teaching hospitals with respect to PPB and RVRAa barely fails statistical testing (Table

437). The Overall correlation does pass testing with r^2 being 12.7%. PPB therefore has a negative impact on the patient outcome RVRAa (Table 439).

While all hospitals exhibit a very small favourable correlation between PPB and XRRAFIPc none of them pass threshold testing. RLD correlations however are of some concern (Table 436). They are all unfavourable, particularly Small hospitals and Overall. While Small hospitals fail testing (Table 440) the Overall test is relevant (Table 441). The Overall correlation is an amalgamation of the 3 types of hospitals and with the low response rate of Small hospitals there may be larger error in this testing but the test is passed with a large margin and r^2 is significant at 22.3%. Therefore, even with the testing limitations this is a governance issue of some concern. The apparent favourable correlation between PPB and the financial outcome CR fails testing and is not relevant (Table 442).

Therefore, analysis on the impact of Politicians on the boards of Ontario hospitals has determined that there are negative impacts on both critical activities and patient outcomes. The question of why Politicians are even on these boards is raised because they appear to bring nothing and in fact reduce the performance of hospital Emergency Departments on the mandated Balanced Scorecard critical activities and outcomes. This is a major governance concern that should be investigated by further research and is of particular concern to Small hospitals.

Table 436

Correlation PPB and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	46%	-16%	5%	32%
Small	50%	-10%	78%	0%
Community	11%	-13%	10%	15%
Overall	36%	8%	53%	21%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RLD=Readmission Labour and Delivery
 CR=Current Ratio
 PPB=% Politicians on Board

Table 437

PPB Relevance Test in Teaching Hospitals versus RVRAa, 2007

PPB and RVRAa in Teaching

m_1	0.151
r^2	0.208
FDIST	11.75%
t	1.699
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PPB=% Politicians on Board

Table 438

PPB Relevance Test in Small Hospitals versus RVRAa, 2007

PPB and RVRAa in Small

m_1	0.078
r^2	0.247
FDIST	17.36%
t	1.515
TINV	2.364

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PPB=% Politicians on Board

Table 439

PPB Relevance Test in All Hospitals versus RVRAa, 2007

PPB and RVRAa in All

m_1	5.952
r^2	0.127
FDIST	0.09%
t	3.433
TINV	1.990

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 PPB=% Politicians on Board



Table 440

PPB Relevance Test in Small Hospitals versus RLD, 2007

PPB and RLD in Small

m_1	0.023
r^2	0.612
FDIST	21.78%
t	1.775
TINV	4.303

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

PPB=% Politicians on Board

Table 441

PPB Relevance Test in All Hospitals versus RLD, 2007

PPB and RLD in All

m_1	2.622
r^2	0.223
FDIST	0.00%
t	4.455
TINV	1.995

RLD=Readmission Labour and Delivery

PPB=% Politicians on Board

Table 442

PPB Relevance Test in Teaching Hospitals versus CR, 2007

PPB and CR in Teaching

m_1	8.41
r^2	0.10
FDIST	24.98%
t	1.205
TINV	2.160

CR=Current Ratio

PPB=% Politicians on Board

The next classification to be analysed is the % of Bureaucrats on the Board (PBB).

Analysis of PBB across the types of hospitals has determined that there are no statistical differences in the level of PBB versus hospital type (Table 443).

Table 443

Board Composition Comparison, PBB by Hospital Size/Type

alpha=		0.05			
Hospital Size	PBB Average	PBB Std Dev	Confidence	Lower Range	Upper Range
Teaching	24.6%	10.1%	5.1%	19.5%	29.7%
Small	33.0%	14.2%	6.4%	26.6%	39.4%
Community	30.6%	13.6%	3.3%	27.3%	34.0%

PBB=% of Bureaucrats on Board

Correlation analysis of PBB and critical activities is generally unfavourable across all hospital types and activities (Table 444). Relevance testing indicates that PBB for Teaching hospitals and the critical activity CDCD is almost relevant (Table 445). The other large correlations between PBB and CDCD in Small hospitals and PBB versus ICC in teaching hospitals both fail relevance testing (Table 446, Table 447).

Therefore, given that there is no difference in the level of PBB across hospital types, the fact that there is nearly significant unfavourable performance with respect to PBB versus CDCD in Teaching hospitals needs to be investigated, especially given the overall unfavourable correlations between PBB and critical activities. Perhaps this is a symptom of Bureaucrats “buying into” the traditional philosophy of the physician being the “captain of the ship” versus emerging proof that evidence based medicine is superior (Larson, 2007).

Table 444

Correlation PBB and Critical Activities

Hospital Size	SOP	CDCD	ICC
Teaching	-6%	-50%	-24%
Small	-9%	-29%	-15%
Community	-19%	2%	6%
Overall	-15%	-14%	-3%

SOP=Use of Standard Operating Procedures
 CDCD=Clinical Data Collection and Dissemination
 ICC=Internal Co-ordination of Care
 PBB=% Bureaucrats on Board

Table 445

PBB Relevance Test in Teaching Hospitals versus CDCD, 2007

PBB and CDCD in Teaching

m_1	-0.646
r^2	0.248
FDIST	6.99%
t	-1.990
TINV	2.179

CDCD=Clinical Data Collection and Dissemination

PBB=% Bureaucrats on Board

Table 446

PBB Relevance Test in Small Hospitals versus CDCD, 2007

PBB and CDCD in Small

m_1	-0.429
r^2	0.084
FDIST	27.51%
t	-1.136
TINV	2.145

CDCD=Clinical Data Collection and Dissemination

PBB=% Bureaucrats on Board

Table 447

PBB Relevance Test in Teaching Hospitals versus ICC, 2007

PBB and ICC in Teaching

m_1	-0.412
r^2	0.059
FDIST	40.34%
t	-0.866
TINV	2.179

ICC=Internal Co-ordination of Care

PBB=% Bureaucrats on Board

The impact of PBB on patient and financial outcomes is mixed (Table 448). The apparent favourable correlation between PBB and RVRAa for Small hospitals fails testing (Table 449). With respect to RLD and PBB, both Teaching and Community hospitals exhibit significantly unfavourable correlations while Small hospitals have a large favourable correlation (Table 449). All of these relationships pass testing but the large TINV value for Small hospitals is a reflection of the small sample size for Small

hospitals due to low levels of reporting (Table 450, Table 451, and Table 452). It is therefore proposed that given the other hospitals have high levels of reporting on this relationship versus Small hospitals, as demonstrated by low TINV values, that the likely impact of bureaucrats on the birth outcome, RLD, is unfavourable. This needs to be investigated by the MOH and more data from Small hospitals are required to perform a valid statistical analysis of the impact of PBB in Small hospitals versus the birth outcome RLD.

The last critical outcome, financial performance in terms of CR, demonstrates that there is no impact between PBB and CR for all hospital types. Given that PBB appears to have a negative impact on at least one critical activity, CDCD, and that at least one patient outcome is negatively impacted, RLD, there needs to be further research to understand what skills bureaucrats are missing that is causing them to have a negative impact on critical activities and outcomes in terms of Emergency Department performance.

Table 448

Correlation PBB and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	-5%	8%	70%	-10%
Small	-46%	9%	-98%	8%
Community	-1%	16%	47%	-3%
Overall	-1%	19%	14%	6%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RLD=Readmission Labour and Delivery

CR=Current Ratio

PBB=% Bureaucrats on Board

Table 449

PBB Relevance Test in Small Hospitals versus RVRAa, 2007

PBB and RVRAa in Small

m_1	-0.094
r^2	0.209
FDIST	21.60%
t	-1.360
TINV	2.364

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

PBB=% Bureaucrats on Board

Table 450

PBB Relevance Test in Teaching Hospitals versus RLD, 2007

PBB and RLD in Teaching

m_1	0.012
r^2	0.485
FDIST	1.73%
t	2.909
TINV	2.262

RLD=Readmission Labour and Delivery

PBB=% Bureaucrats on Board

Table 451

PBB Relevance Test in Small Hospitals versus RLD, 2007

PBB and RLD in Small

m_1	-0.092
r^2	0.969
FDIST	1.56%
t	-7.904
TINV	4.303

RLD=Readmission Labour and Delivery

PBB=% Bureaucrats on Board

Table 452

PBB Relevance Test in Community Hospitals versus RLD, 2007

PBB and RLD in Community

m_1	0.016
r^2	0.191
FDIST	0.11%
t	3.470
TINV	2.008

RLD=Readmission Labour and Delivery

PBB=% Bureaucrats on Board

The fourth type of board classification analysed is % of Educators on the Board (PEB). The only statistical difference observed in board composition with respect to PEB is that Community hospitals have a statistically lower level of PEB versus Teaching hospitals (Table 453).

Table 453

Board Composition Comparison, PEB by Hospital Size/Type

alpha=		0.05			
Hospital Size	PEB Average	PEB Std Dev	Confidence	Lower Range	Upper Range
Teaching	10.9%	7.2%	3.6%	7.2%	14.5%
Small	7.4%	6.7%	3.0%	4.3%	10.4%
Community	4.5%	6.2%	1.5%	2.9%	6.0%

PEB=% of Educators on Board

The correlations between PEB and critical activities are mixed (Table 454). Teaching hospitals have an unfavourable correlation between PEB and SOP but it is not relevant (Table 455). Small hospitals have an apparent opposite relationship with a favourable relationship between PEB and SOP however it also fails relevance testing (Table 456). The Teaching hospital unfavourable relationship between PEB and CDCD fails relevance testing too (Table 457). The last relationship investigated between PEB and critical activities is that of PEB versus ICC in Small hospitals and that fails relevance testing as well (Table 458).

Therefore analysis demonstrates that educators on the board appear have no influence on any critical activities.

Table 454

Correlation PEB and Critical Activities

Hospital Size	SOP	CDCD	ICC
Teaching	-37%	-26%	-3%
Small	36%	20%	23%
Community	9%	-17%	-4%
Overall	2%	-10%	1%

SOP=Use of Standard Operating Procedures
 CDCD=Clinical Data Collection and Dissemination
 ICC=Internal Co-ordination of Care
 PEB=% of Educators on Board

Table 455

PEB Relevance Test in Teaching Hospitals versus SOP, 2007

PEB and SOP in Teaching

m_1	-1.038
r^2	0.136
FDIST	19.50%
t	-1.373
TINV	2.179

SOP=Use of Standard Operating Procedures
 PEB=% of Educators on Board

Table 456

PEB Relevance Test in Small Hospitals versus SOP, 2007

PEB and SOP in Small

m_1	-1.038
r^2	0.136
FDIST	19.50%
t	-1.373
TINV	2.179

SOP=Use of Standard Operating Procedures
 PEB=% of Educators on Board

Table 457

PEB Relevance Test in Teaching Hospitals versus CDCD, 2007

PEB and CDCD in Teaching

m_1	-0.471
r^2	0.068
FDIST	36.82%
t	-0.935
TINV	2.179

CDCD=Clinical Data Collection and Dissemination
 PEB=% of Educators on Board

Table 458

PEB Relevance Test in Small Hospitals versus ICC, 2007

PEB and ICC in Small	
m_1	0.774
r^2	0.052
FDIST	45.47%
t	0.775
TINV	2.201

ICC=Internal Co-ordination of Care

PEB=% of Educators on Board

The impact of PEB on patient and financial outcomes appears limited to Small hospitals with respect to XRRAFIPc and RLD (Table 459). However, both these relationships fail relevance testing (Table 460, Table 461).

Therefore, educators on the board appear to have no impact on either critical activities or outcomes. This raises the question of why are they occupying spaces on hospital boards that could be filled by other “business experts” who could offer a positive contribution. This is a question that the MOH needs to investigate as there may be an opportunity to improve the structure of hospital boards, resulting in superior performance for patients and finance.

Table 459

Correlation PEB and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	-5%	-3%	3%	-2%
Small	-19%	-34%	-47%	19%
Community	-2%	20%	-16%	-1%
Overall	-11%	-4%	-16%	-1%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

RLD=Readmission Labour and Delivery

CR=Current Ratio

PEB=% of Educators on Board

Table 460

PEB Relevance Test in Small Hospitals versus XRRAFIPc, 2007

PEB and XRRAFIPc in Small

m ₁	-0.177
r ²	0.117
FDIST	19.43%
t	-1.363
TINV	2.145

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

PEB=% of Educators on Board

Table 461

PEB Relevance Test in Small Hospitals versus RLD, 2007

PEB and RLD in Small

m ₁	-0.048
r ²	0.223
FDIST	52.72%
t	-0.759
TINV	4.303

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)

PEB=% of Educators on Board

The second last “business expert” category to be investigated is that of % Entrepreneurs on the Board (PENB). Analysis of board composition versus hospital type demonstrates that there is no statistical difference in the level of PENB across all types of hospitals (Table 462).

Table 462

Board Composition Comparison, PENB by Hospital Size/Type

alpha=	0.05				
Hospital Size	PENB Average	PENB Std Dev	Confidence	Lower Range	Upper Range
Teaching	23.2%	6.8%	3.4%	19.8%	26.7%
Small	23.9%	13.2%	6.0%	17.9%	29.8%
Community	19.4%	10.4%	2.6%	16.9%	22.0%

PENB=% of Entrepreneurs on Board

Examination of PENB versus critical activities appears to have some opposing results (Table 463). PENB versus SOP in Teaching hospitals exhibits a favourable correlation but it fails relevance testing (Table 464). The PENB favourable relationship with



respect to CDCD in Small hospitals also fails relevance testing (Table 465). However, the impact of PENB versus ICC in Teaching and Small hospitals is opposing (Table 463). These opposing relationships are relevant with the Teaching hospitals having an unfavourable relationship and Small hospitals having a favourable relationship (Table 466, Table 467). Given that these relationships are both relevant and their r^2 values are almost identical further research is need to understand why the opposing relationship exists. This is interesting because Teaching hospitals have a statistically higher level of ICC versus Small hospitals (Table 111). It may be that the Entrepreneurs on the boards of Teaching hospitals are challenging improvement programs that have marginal value while Small hospitals are not implementing enough improvement programs so Entrepreneurs on the board are helping management to expand those programs. This also might be because Entrepreneurs on the boards of Teaching hospitals tend to have created very large firms and might have larger egos which tend to side with the traditional medical perspective of the doctor being the “captain of the ship” versus evidence based medicine (Larson, 2007). However, further research is required to understand what is happening.

Table 463

Correlation PENB and Critical Activities

Hospital Size	SOP	CDCD	ICC
Teaching	30%	-12%	-56%
Small	17%	29%	58%
Community	-4%	7%	-19%
Overall	1%	6%	-10%

SOP=Use of Standard Operating Procedures
 CDCD=Clinical Data Collection and Dissemination
 ICC=Internal Co-ordination of Care
 PENB=% of Entrepreneurs on Board

Table 464

PENB Relevance Test in Teaching Hospitals versus SOP, 2007

PNEB and SOP in Teaching

m_1	0.915
r^2	0.088
FDIST	30.27%
t	1.077
TINV	2.179

SOP=Use of Standard Operating Procedures
PENB=% of Entrepreneurs on Board

Table 465

PENB Relevance Test in Small Hospitals versus CDCD, 2007

PNEB and CDCD in Small

m_1	0.440
r^2	0.409
FDIST	30.11%
t	1.077
TINV	2.160

CDCD=Clinical Data Collection and Dissemination
PENB=% of Entrepreneurs on Board

Table 466

PENB Relevance Test in Teaching Hospitals versus ICC, 2007

PNEB and ICC in Teaching

m_1	-1.447
r^2	0.313
FDIST	3.76%
t	-2.337
TINV	2.179

ICC=Internal Co-ordination of Care
PENB=% of Entrepreneurs on Board

Table 467

PENB Relevance Test in Small Hospitals versus ICC, 2007

PNEB and ICC in Small

m_1	1.015
r^2	0.333
FDIST	4.94%
t	2.235
TINV	2.228

ICC=Internal Co-ordination of Care
PENB=% of Entrepreneurs on Board

The impact that PENB has on patient and financial outcomes is also apparently contradictory (Table 468). A noticeable favourable correlation between PENB and patient outcome RVRAa for Teaching hospitals is not relevant (Table 469). The unfavourable relationship between PENB and XRRAFIPc in Small hospitals is also not relevant (Table 470). There are opposing relationships in terms of the impact of PENB on the financial outcome, CR (Table 468). Teaching and Small hospitals exhibit an unfavourable relationship between PENB and CR while Community hospitals show a favourable relationship. The unfavourable relationships between PENB and CR for Teaching and Small hospitals are not relevant (Table 471, Table 472). The favourable relationship between PENB and CR for Community hospitals is relevant but r^2 is 0.1%. Therefore, analysis is demonstrating that PENB has no real impact on the financial outcome, CR.

Overall, PENB appears to have only one relationship of relevance and that is a contradictory impact with the critical activity ICC in Teaching and Small hospitals. This contradiction needs to be further researched to understand why it exists and therefore how the unfavourable relationship in Teaching hospitals with respect to PENB and ICC can be reversed.

Table 468

Correlation PENB and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	-47%	6%	-3%	-42%
Small	-4%	29%	-20%	-22%
Community	15%	18%	-15%	27%
Overall	13%	19%	-8%	8%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RLD=Readmission Labour and Delivery
 CR=Current Ratio
 PENB=% of Entrepreneurs on Board



Table 469

PENB Relevance Test in Teaching Hospitals versus RVRAa, 2007

PNEB and RVRAa in Teaching

m_1	-0.045
r^2	0.22
FDIST	10.62%
t	-1.760
TINV	2.201

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
PENB=% of Entrepreneurs on Board

Table 470

PENB Relevance Test in Small Hospitals versus XRRAFIPc, 2007

PNEB and XRRAFIPc in Small

m_1	0.077
r^2	0.07
FDIST	29.36%
t	1.095
TINV	2.160

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
PENB=% of Entrepreneurs on Board

Table 471

PENB Relevance Test in Teaching Hospitals versus CR, 2007

PNEB and CR in Teaching

m_1	-0.032
r^2	0.178
FDIST	11.69%
t	-1.680
TINV	2.160

CR=Current Ratio
PENB=% of Entrepreneurs on Board

Table 472

PENB Relevance Test in Small Hospitals versus CR, 2007

PNEB and CR in Small

m_1	-0.023
r^2	0.048
FDIST	39.63%
t	-0.873
TINV	2.131

CR=Current Ratio
PENB=% of Entrepreneurs on Board

Table 473

PENB Relevance Test in Community Hospitals versus CR, 2007

PNEB and CR in Community

m ₁	-0.021
r ²	0.001
FDIST	3.26%
t	2.187
TINV	2.000

CR=Current Ratio

PENB=% of Entrepreneurs on Board

The last “business expert” classification to be examined is the % Corporate Managers on the Board. This measure quantifies the percentage of for-profit corporate managers on the board who have successfully led operational or strategic turnarounds of the firms that they were responsible for (Schendel, et al., 1975). Analysis of the level of PCMB across the various types of hospitals reveals that there is a statistical difference between the level of PCMB in Small hospitals versus the other types (Table 474).

Table 474

Board Composition Comparison, PCMB by Hospital Size/Type

alpha= 0.05

Hospital Size	PCMB Average	PCMB Std Dev	Confidence	Lower Range	Upper Range
Teaching	21.3%	12.0%	6.1%	15.2%	27.4%
Small	9.7%	9.8%	4.4%	5.3%	14.1%
Community	19.5%	13.0%	3.2%	16.3%	22.7%

PCMB=% of Corporate Managers on Board

Analysing the impact of PCMB versus critical activities reveals favourably positive correlations across all critical activities and types of hospitals (Table 475). Testing of relevance for PCMB versus SOP uncovers that the relationship between PCMB is not relevant for Small hospitals (Table 476), nearly relevant for Community hospitals (Table 477), and relevant Overall (Table 478). With r² being 9.0% for Community hospitals and 12.0% Overall PCMB does have a positive effect on the critical activity

SOP. This requires further investigation as there may be an opportunity to better develop and share best practice SOPs across the hospital system.

The relationship between PCMB and CDCD is similar in that while the favourable relationship for PCMB versus CDCD is not relevant for Small hospitals (Table 480), it is almost relevant for Teaching hospitals (Table 479) and relevant Overall (Table 481). With r^2 of 21.4% and 8.0% for Teaching hospitals and Overall respectively this relationship is definitely worth further investigation to understand how PCMB can further improve the effectiveness of the CDCD activity.

The last critical activity investigated, ICC, also shows favourable correlations across all hospital types (Table 475). While the Small hospital correlation is not relevant (Table 482) examination of the Overall system indicates that PCMB and ICC do have a relevant relationship (Table 483). Even though r^2 is not large at 7.2%, research has proven that this activity is a fundamental requirement for performance improvement so it is encouraging that a “business expert” has been identified that brings that skill to Ontario public hospitals (Drucker, 2002).

In general, this analysis demonstrates that PCMB has had a favourable affect on all of the critical activities. This affect is more in some types of hospitals versus others, therefore more detailed research needs to be done to understand how to leverage these positive skills which are beneficial to the critical activities. Note that Corporate managers achieve their results through managing others, typically in large, complex organizations, where they are often not the technical experts (Drucker, 1946). It may be that the Corporate managers are very effective at getting the inside directors to reveal critical information that can be used to enhance the implementation effectiveness and

efficiency of critical activities (Fama, Jensen, 1983). Another consideration is that Corporate managers need broad skills to lead their firms to success in today's disruptive environment and it may be these more rounded skills that enhance the communication and governance effectiveness of the entire board, including the inside directors (Drucker, 2002).

Table 475

Correlation PCMB and Critical Activities

Hospital Size	SOP	CDCD	ICC
Teaching	-3%	46%	18%
Small	26%	31%	36%
Community	18%	6%	12%
Overall	22%	27%	27%

SOP=Use of Standard Operating Procedures
 CDCD=Clinical Data Collection and Dissemination
 ICC=Internal Co-ordination of Care
 PCMB=% of Corporate Managers on Board

Table 476

PCMB Relevance Test in Small Hospitals versus SOP, 2007

PCMB and SOP in Small

m_1	0.961
r^2	0.149
FDIST	24.05%
t	1.257
TINV	2.262

SOP=Use of Standard Operating Procedures
 PCMB=% of Corporate Managers on Board

Table 477

PCMB Relevance Test in Community Hospitals versus SOP, 2007

PCMB and SOP in Community

m_1	0.006
r^2	0.09
FDIST	5.30%
t	1.994
TINV	2.021

SOP=Use of Standard Operating Procedures
 PCMB=% of Corporate Managers on Board

Table 478

PCMB Relevance Test in All Hospitals versus SOP, 2007

PCMB and SOP in All

m_1	0.650
r^2	0.12
FDIST	0.46%
t	2.940
TINV	1.998

SOP=Use of Standard Operating Procedures
PCMB=% of Corporate Managers on Board

Table 479

PCMB Relevance Test in Teaching Hospitals versus CDCD, 2007

PCMB and CDCD in Teaching

m_1	0.497
r^2	0.214
FDIST	9.56%
t	1.809
TINV	2.179

CDCD=Clinical Data Collection and Dissemination
PCMB=% of Corporate Managers on Board

Table 480

PCMB Relevance Test in Small Hospitals versus CDCD, 2007

PCMB and CDCD in Small

m_1	0.692
r^2	0.097
FDIST	25.95%
t	1.179
TINV	2.160

ICC=Internal Co-ordination of Care
PCMB=% of Corporate Managers on Board

Table 481

PCMB Relevance Test in All Hospitals versus CDCD, 2007

PCMB and CDCD in All

m_1	0.409
r^2	0.08
FDIST	0.89%
t	2.679
TINV	1.989

CDCD=Clinical Data Collection and Dissemination
PCMB=% of Corporate Managers on Board

Table 482

PCMB Relevance Test in Small Hospitals versus ICC, 2007

PCMB and ICC in Small

m_1	0.802
r^2	0.129
FDIST	25.06%
t	1.219
TINV	2.228

ICC=Internal Co-ordination of Care

PCMB=% of Corporate Managers on Board

Table 483

PCMB Relevance Test in All Hospitals versus ICC, 2007

PCMB and ICC in All

m_1	0.502
r^2	0.072
FDIST	1.27%
t	2.546
TINV	1.989

ICC=Internal Co-ordination of Care

PCMB=% of Corporate Managers on Board

The correlations between PCMB and patient or financial outcomes also exhibit the same general favourable relationships (Table 484). The beneficial impact that PCMB has on RVRAa Small hospitals is not relevant (Table 485) but the Overall relationship is relevant (Table 486). The value of r^2 is very low at 0.6% so the impact that PCMB has on this outcome is low. It is recommended that the MOH monitor this relationship for changes in r^2 as board changes are made to determine if further investigation is needed to understand those hospitals that are more effective than others in the use of Corporate managers on their boards, these hospitals are easy to identify when comparing PCMB and RVRAa.

A similar situation exists between PCMB and XRRAFIPc on an Overall basis that is also relevant (Table 487). However the relationship has a much higher r^2 of 6.6% therefore creating a governance opportunity for the MOH to examine how PCMB can

be used to improve the overall performance of the hospital system on this patient outcome.

The relationship between PCMB and RLD has favourable correlations across all hospital types (Table 484). While the relationship between PCMB and RLD is not significant in Small hospitals (Table 489) it is significant for Teaching hospitals and Overall (Table 488, Table 490). PCMB does have a beneficial impact on RLD and the r^2 values are significant at 28.0% for Teaching hospitals and 12%.0 Overall.

While PCMB has had a favourable impact on the 3 patient outcomes it has no significant relationship with the financial outcome, CR. In fact this research has been unable to identify any “business expert” category that can have a definitive effect on the financial outcome, CR.

Table 484

Correlation PCMB and Outcomes

Hospital Size	RVRAa	XRRAFIPc	RLD	CR
Teaching	2%	14%	-53%	20%
Small	-27%	-10%	-45%	1%
Community	-14%	-19%	-18%	-8%
Overall	-25%	-26%	-35%	-17%

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
 XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
 RLD=Readmission Labour and Delivery
 CR=Current Ratio
 PCMB=% of Corporate Managers on Board

Table 485

PCMB Relevance Test in Small Hospitals versus RVRAa, 2007

PCMB and RVRAa in Small

m_1	-0.061
r^2	0.073
FDIST	51.71%
t	-0.688
TINV	2.447

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
PCMB=% of Corporate Managers on Board

Table 486

PCMB Relevance Test in All Hospitals versus RVRAa, 2007

PCMB and RVRAa in All

m_1	-2.515
r^2	0.006
FDIST	2.55%
t	-2.276
TINV	1.989

RVRAa=Return Visit Rate for Asthma (24 hours, Adult 20-64 years old)
PCMB=% of Corporate Managers on Board

Table 487

PCMB Relevance Test in All Hospitals versus XRRAFIPc, 2007

PCMB and XRRAFIPc in All

m_1	-0.064
r^2	0.066
FDIST	2.24%
t	-2.331
TINV	1.991

XRRAFIPc=Return X-Ray Rate for Ankle or Foot Injury Patients (7 Days)
PCMB=% of Corporate Managers on Board

Table 488

PCMB Relevance Test in Teaching Hospitals versus RLD, 2007

PCMB and RLD in Teaching

m_1	-0.008
r^2	0.280
FDIST	9.41%
t	-1.872
TINV	2.262

RLD=Readmission Labour and Delivery
PCMB=% of Corporate Managers on Board

Table 489

PCMB Relevance Test in Small Hospitals versus RLD, 2007

PCMB and RLD in Small

m_1	-0.43
r^2	0.20
FDIST	55.31%
t	-0.707
TINV	4.303

RLD=Readmission Labour and Delivery
PCMB=% of Corporate Managers on Board

Table 490

PCMB Relevance Test in All Hospitals versus RLD, 2007

PCMB and RLD in All

m_1	-0.016
r^2	0.12
FDIST	0.29%
t	3084
TINV	1.994

RLD=Readmission Labour and Delivery
PCMB=% of Corporate Managers on Board

In summary, H9 is proven. This analysis demonstrates that there are unique classifications of “business experts” whose presence on the board of directors does influence improved performance in critical activities. The presence of these “business experts” can also be measured in terms of improved patient outcomes. It is also noted that the opposite is true as well, that the presence of certain unique classifications on the board of directors of an Ontario public hospital results in performance degradation of certain critical activities and patient outcomes.

Summary

H8 proved that the basic structure of a board of directors of an Ontario public hospital in terms of size or the percent of inside directors has no impact on the execution of critical activities or on patient and financial outcomes.

The hypothesis, H9, testing whether unique classifications or “business experts” could influence the identified critical activities has been proven. In fact, further testing of these unique classifications made evident that they were indeed able to influence patient outcomes, both favourably and unfavourably. The analysis also established that not all hospital types were able to effectively employ “business experts” to positively impact either critical activities or patient outcomes, some hospital types were more effective than others. This reason for this needs to be investigated in detail by the MOH as there are clearly “best practices” that some hospital types have employed with “business experts” which, if found to be relatively portable, could be transferred to hospitals which are not employing them, resulting in a system wide performance improvement. As Mintzberg (1994) has discovered, performance improvement can be achieved through strategic learning, which in his definition is a focus on understanding and resolving real life concerns. Ontario hospitals have not followed Kotter’s (1995) advice of institutionalizing the “best practices” which individual hospitals have developed, leaving a performance improvement opportunity unharvested. Additionally, the MOH has not supported these proven approaches, only on a voluntary basis.

A detailed analysis review of H9 has proven that:

Medical Professionals on the board of directors, PMPB, favourably influence the critical activity of ICC in Teaching hospitals and the patient outcome of XRRAFIPc in

Community hospitals. In fact, PMPB positively influences the XRRAFIPc patient outcome in the Overall system. Therefore Medical Professionals on the board, doctors and nurses, have a beneficial impact on both critical activities and patient outcomes.

Politicians, PPB, have an in general have an adverse impact on both critical activities and patient outcomes, especially in Small hospitals. In particular PPB has a negative influence on the level of SOP in Small hospitals and Overall as well as a harmful influence on ICC in Small hospitals and Overall. This damaging impact extends directly to the patient outcome of RVRAa in Teaching hospitals and Overall and the birth metric RLD Overall. Research has shown that Teaching hospitals have the best system Emergency Department performance (Table 4) and have a statistically lower level of Politicians versus the other hospital types (Table 428). Since Ontario hospitals do not set strategy and have funds allocated to them by government and their LHIN the question of what value a Politician brings to the board versus other classifications arises.

Bureaucrats, PBB, generally have either a neutral or an unfavourable impact on critical activities and patient outcomes. Specifically PBB has a negative influence on CDCD in Teaching hospitals and a negative influence on RLD in Teaching and Community hospitals.

Educators, PEB, have no impact on critical activities or outcomes.

Entrepreneurs, PENB, have their impact limited to an opposing relationship for ICC in Teaching and Small hospitals that needs to be better understood through further research.

Corporate Managers, PCMB, specifically those with turnaround experience, have a consistently favourable impact on almost all critical activities and outcomes. This impact is greatest in Teaching and Community hospitals as they have a statistically higher level of PCMB than Small hospitals.

No “business expert” category has been able to influence the financial performance outcome, CR.

Therefore there are best governance practices with respect to board member skills that exist in Ontario hospitals and hence board configuration can be improved. The hospital types have been identified that have been able to employ specific “business experts” effectively to influence critical activities and outcomes need to be investigated in more detail in order to understand how to more broadly implement the effect of those “business experts” across all the hospital boards. The “business experts” on the boards of Ontario public hospitals that have been identified as having positive impacts on critical activities and patient outcomes include Medical Professionals, Entrepreneurs, and Corporate managers. Corporate managers in particular have a large overall positive impact on critical activities and patient outcomes. In retrospect this should not be surprising as the key to getting results in a resource constrained environment is the ability to “do the right things right” which successful Corporate managers have to be able to do (Drucker, 2002).

Additionally several unique classifications have no or negative impact on critical activities and outcomes. Politicians in particular bring nothing positive and negatively impact both critical activities and outcomes. The question of why are Politicians on the board of an Ontario public hospital needs to be investigated because there are no

traditional reasons, such as funds acquisition, that a board would require the skills of a Politician to achieve.

Bureaucrats also have some negative effect on critical activities and outcomes, perhaps suggesting that their training or experience is not adequate to achieving results in a resource-constrained environment. This needs to be researched in more depth as Bureaucrats are needed to operate a public health system and if their skills are not adequate to the environment then the situation needs to be addressed in order to achieve any sustainable improvement. Perhaps more in-depth education in proven turnaround or improvement methodologies such as those researched by Kotter (1995) and Kanter (2003) may be appropriate.

Educators have no real impact on the execution of critical activities or on outcomes across all hospital types. This may be because Ontario public hospitals are focused on execution. Strategy, resource allocation, and goals have been set at higher levels in the health system so a hospital board needs to be able to guide management on execution with constrained resources. While it makes sense to have Educators on the boards of Teaching hospitals to ensure that curriculum development is on track and effective doctors are being trained, Educators may be occupying positions on other types of hospital boards that are best filled by other classifications or “business experts” in order to improve the performance of those hospitals.

Unfortunately this research has not been able to definitively identify a class of “business expert” that can positively influence the financial outcome metric, current ration (CR). It may be that use of more sophisticated analytical software will be able to uncover a

relationship between board member classification or “business expert” and financial performance.

Conclusions

This research has validated that there are different types of hospitals in Ontario that have differing performance of critical activities and board skills. The classifications of Teaching, Small, and Community have been useful in terms of understanding the impact that critical activities and board skills have on outcomes. In particular, Small hospitals have several issues that need to be addressed by their boards and the MOH. First, the significantly lower reporting rate of activities and outcomes in Small hospitals, including their complete lack of reporting on the mortality metric, is of key concern. The reporting of most of these measures is mandated by the MOH yet they have not been reported consistently by many Small hospitals, consequently their actual performance cannot be evaluated by all stakeholders. This poor result reporting not only violates the MOH mandate but the inability to report consistently from 2005 to 2007 brings into question the resolve of the MOH to ensure that it happens. Resource allocation decisions are made based upon results and needs however if these cannot be reported using the approved public Balanced Scorecard then how can effective decisions be made? (Ontario Hospital Association, 2008) This lack of transparency has caused significant friction between the MOH and the citizens of Ontario and potentially inferior Emergency Department performance (CUPE, 2008)

Second, Small hospitals may have similar levels of critical activities versus the other hospital types but they are not as effective at executing them. This suggests that there is

a potential training deficiency or a communication failure in the inability of Small hospitals to copy the “best practice” Standard Operation Procedures, for example, from the other hospital types. It may be that the communication failure is a larger system issue as this research clearly identifies activities which some hospital types are better at which improve outcomes yet there is no Balanced Scorecard measure for a hospital to motivate the acquisition and implementation of “best practices”.

Third, Small hospitals have more significant board composition weaknesses versus the other hospital types. Small hospital boards are statistically smaller, perhaps reflecting the support of a smaller population base but could also magnify the impact of missing critical board skills. Smaller hospitals, in addition to the smaller board size, have fewer Medical Professionals on the board, a higher level of Politicians on average, and fewer Corporate Managers. While Medical Professionals and Corporate managers enhance performance, Politicians cause performance detraction, putting Small hospitals in a worse case inferior position in terms of result capability.

If nothing else, this research has identified that the board composition of Small hospitals in Ontario is inferior yet it can be improved through superior board make-up.

This research has validated the efforts by other researchers that there are critical activities which improve hospital performance outcomes (Savary, Crawford-Mason, 2006). Even though results were not consistent across hospital types in this analysis, which may be a limitation of the analytical software used, activities such as Standard Operating Procedures, Clinical Data Collection and Dissemination and Internal Coordination of Care have a positive influence on the performance outcomes of an Emergency Department. The “best practices” associated with these activities need to be

defined and shared with all Ontario hospitals so that they optimize their performance based upon the resources that they have. In particular the use of SOPs has been demonstrated through research to be one of the most effective activities that a for-profit firm can use to dramatically improve its performance and recent research is proving that this approach works for hospitals as well (Kotter, 1995, Savary, Crawford-Mason, 2006).

This research has identified that Ontario public hospitals are significantly deficient in “best practices” associated with collecting, analysing, and disseminating information to positively influence patient or financial outcomes. Small hospitals are particularly deficient with data collection participation rates as well as using the information that they collect.

This ineffectiveness of the patient information processes has not been addressed with the implementation of modern information technology, allowing the hospitals to become more ineffective on a larger scale. The use of modern information systems in the Ontario hospital system is not co-ordinated or consistent within and between hospital types (Office of the Auditor General, 2009). The Ministry of Health must address this situation as there is no consistency, standardization, and lacks efficiency. Perhaps the research results of this effort into board configuration might assist the Ministry of Health in achieving that because this effort substantiates Ahlstrand et al. (2005) in that separating strategy from implementation is a difficult problem.

This research has also proven that for Ontario public hospitals there are activities which are measured and pressed that have little or no impact on patient or financial outcomes. Mandated Scorecard activities such as “outsourcing” and human resource management

are two examples of activities which need to be removed from the Balanced Scorecard. Since the Ministry of Health does not measure system performance, which includes “outsourcing”, measuring it at the hospital level only does not provide a true measure of effectiveness. The human resource measures may be the wrong measures. Other researchers have proposed more innovative human resource measures which may better reflect how effective the human capital is being managed (Jones, Roos, Womack, 1990, Kaplan, Norton, 1992, Kearns, 1996, Kaplan, Norton, 2001). The Ministry of Health should investigate these measures in order to be able to better manage cause and effect. Some of the specific SOP programs measured in this research have been proven to have no effectiveness versus patient or financial outcomes and they may be needless work that hospital staff are performing

Additionally, there are measures which are redundant, such as RVRAa and RVRAb. Analysis has demonstrated that the correlation between those patient outcomes is high and returning to a hospital for respiratory treatment because it was not done properly the first time is the real issue. Patient outcome measures for the Emergency Department are weak, perhaps reflecting the political sensitivity of healthcare in Ontario. However, crucial outcome measures that have been identified by others as critical which not been included, such as the level of C. difficile or “best practice” implementation needs to be included (Zelman, Pink, Matthias, 2003, Voelker, Rakich, French, 2005). A task force that is composed of hospital board members who are Medical Professionals and Corporate Managers, with only a few Bureaucrats to ensure the Ministry is represented, may be very effective in developing a superior Balanced Scorecard which may be more effective than the existing version for hospitals.

The ability of “business experts” or specific competencies on the board of an Ontario public hospital to influence results has been proven. The primary objective of the research was to determine if board members with turnaround or accomplished improvement experience and skills could improve the performance of an Emergency Department. It has been demonstrated that the variable, % of Corporate managers on the Board, has a positive benefit across almost all critical activities and outcomes. While board managers with turnaround experience may seem to be a narrow definition this research into Ontario hospital board composition demonstrated that all high performing hospitals had this skill across several members, indicating that, particularly in the current economic climate, the skills may be relatively widespread. The boards of Ontario public hospitals need to improve the number of members they have on their board who have this skill.

It has also been demonstrated that Politicians have a general negative impact on activities and outcomes. This research questions the need for Politicians on the boards of Ontario public hospitals as decisions like resource allocation, coverage areas, services offered, etc. are all made at higher levels in the healthcare system, specifically at the LHIN and MOH levels. The boards of Ontario public hospitals are given a budget by the LHIN and MOH and expected to perform therefore the emphasis on board competencies needs to be execution versus strategy or politically oriented.

This focus on execution is also illustrated by the lack of impact that Educators have on the board of an Ontario public hospital. Notwithstanding the need to have Educators on the boards of Teaching hospitals in order to ensure curriculum development and medical training effectiveness there appears to be no benefit to having Educators on the

boards of Small and Community hospitals, unless they bring particular execution or turnaround skills and experiences. There may be a benefit to bring Educators onto the boards of non-teaching hospitals who are experts in evidence based medicine. This could result in improved patient outcomes and possibly financial performance (Larson, 2007).

This research demonstrates that Bureaucrats have an apparent skill or competency deficiency. Their performance is measured by a mandated Balanced Scorecard but they have no effectiveness with respect to influencing either critical activities or outcomes. The MOH needs to examine the skills required to deliver the results measured and expected then compare that to the current skill inventory of the Bureaucrats which it has tasked to manage this part of the healthcare system. This gap must be analysed and a gap closing strategy developed and implemented in order to ensure that the people tasked with managing the system have the actual skills required to affect positive change.

Unfortunately, this research was unable to develop any definitive recommendations regarding board configuration and financial performance. More sophisticated software may be required in order to be able to understand what specific board competencies, if any, enhance the financial performance of an Ontario public hospital. It may be that the financial performance of Ontario public depends more upon the board configuration and competencies of the LHIN which determines and allocates its budget. That is a subject for further research.

Practical Usefulness and Applicability

It is anticipated that this research will help Ontario public hospitals, their LHINs, and the MOH to evaluate the potential of their hospital boards of directors. By examining their current structure and competencies against this research model developed by analysing all hospital boards in Ontario and hospital performance with respect to critical activities, existing boards can re-configure themselves in order to optimize their potential to perform for all stakeholders. It is apparent that the most critical activities that an Emergency Department can perform are having and using Standard Operating Procedures (SOPs) and accurate and complete documentation of all treatments and tests performed on each patient. This activity will directly improve information management (CDCD) and other operational practices (ICC) which have direct impact on Emergency Department performance. These activities can be performed without a serious impact upon resources if they are managed appropriately (Savary, Crawford-Mason, 2006).

The performance of these activities is directly linked to having certain skill sets on the board. The most important skill set is that of having a person who has executive experience in operationally turning around or dramatically improving a for-profit organization. This skill set, while scarce in the past, is more available today due to the impact of globalization and disruptive technologies in the for-profit world. The current economic climate has also forced many more managers to acquire this skill set. This dissertation contains many other recommendations regarding board composition which should be considered to optimize the performance of Emergency Departments. Over one third of the hospitals in Ontario are running a structural deficit (Hospital CEO, 2009) and as this research demonstrates they are not as effective as they could be.

Ontario hospitals would be wise to consider the advice of Peter Drucker (Drucker, 2002) which is “become effective before you become efficient”. This research offers real opportunities to achieve improved effectiveness without additional monetary cost by reconfiguring the board structure of Ontario public hospitals. The ability to deliver services to the public first more effectively and then more efficiently should be a sought after objective for existing boards and government.

References

Journal Articles

Alexander, J., Lee, S. Y. (2006). Does Governance Matter? Board Configuration and Performance in Not-For-Profit Hospitals. *The Millbank Quarterly*. Vol. 84. No. 4. pp. 733-758.

Alexander, J. A., Weiner, B. J., Griffith, J. (2006) Quality Improvement and Hospital Financial Performance. *Journal of Organizational Behaviour*. 27. pp. 1003-1029.

Agrisano, C., Farrell, D., Kocher, B., Laboissiere, M., Parker, S., (January 2007). Accounting for the Cost of Health Care in the United States. *McKinsey Global Institute*.

Alexander, J., Morlock, L., Gifford, B. (1988). The Effects of Corporate Restructuring on Hospital Policymaking. *Health Services Research*. 23(2). pp. 311.

Allen, R., Helms, M., Takeda, M., White, C., White, C. (2006). A Comparison of Competitive Strategies in Japan and the United States. *SAM Advanced Management Journal*. Winter 2006

Ansoff, H., Slevin, D. (1968). An Appreciation of Industrial Dynamics. *Management Science*. March 1968, Vo. 14, Issue 7, pp383-397

Argyres, N., McGahan, A. (2002). An Interview With Michael Porter, *Academy of Management Executive*, Vol. 16, No. 2.

Audretsch, D. B., Lehmann, E. (2006). Entrepreneurial Access and Absorption of Knowledge Spillovers: Strategic Board and Managerial Composition for Competitive Advantage. *Journal of Small Business Management*. 44(2). Pp. 155-166.

Babbage, M. (2009). More Than On-Third of Ontario Hospitals Didn't Balance Books. *The Canadian Press*. Oct. 12, 2009 1:48PM EDT.

Baker, R. (2001). Healthcare Managers in the Complex World of Healthcare. *Frontiers of Health Services Management*. 18(2)

Barker, V., DuHaime, I. (1997). Strategic Change in the Turnaround Process: Theory and Empirical Evidence. *Strategic Management Journal*. Vol. 18. Pp. 13-38

Baysinger, B. D., Butler, H. (1985). Corporate Governance and the Board of Directors: Performance Effects of Changes in Board Composition. *Journal of Law, Economics, and Organization*. 1. pp. 101-124.

Baysinger, B. D., Hoskisson, R. E. (1990). The Composition of Boards of Directors and Strategic Control: Effects on Corporate Strategy. *Academy of Management Review*. 15. pp. 72-87.

- Baysinger, B. D., Zardkoohi, A. (1986). Technology, Residual Claimants and Corporate Control. *Journal of Law, Economics, and Organization*. 2. pp. 339-344.
- Becker, E., Potter, S. (2002). Organizational Rationality, Performance, and Social Responsibility: Results from the Hospital Industry. *Health Care Finance*. 29(1). pp. 23-48.
- Beckham, J. (1997). Hot Concepts in Strategy. *Healthcare Forum Journal*. Jan/Feb 1997, Vol. 40, Issue 1
- Beekun, R. I., Stedham, Y., Young, G. J. (1998). Board Characteristics, managerial Controls and Corporate Strategy: A Study of U.S. Hospitals. *Journal of Management*. Vol. 24. No. 1 pp. 3-19.
- Beekun, R. I., Ginn, G. O. Young., G. (1992). Governing Board Structure, Business Strategy, and Performance of Acute Care Hospitals: A Contingency Perspective. *Health Services Research*. 27. pp. 543-564.
- Bell, J., Davids, M., Goett, P., Greco, J. (1999). Strategists. *Journal of Business Strategy*. Sept/Oct 1999. pp. 28.
- Bhagat, S., Black, B. (2002). The Non-Correlation Between Board Independence and Long Term Firm Performance. *Journal of Corporation Law*. 27. pp. 231-273.
- Boone, A. L., Field, L. C., Karpoff, J. M. Raheja, C. G. (2007). The Determinants of Corporate Board Size and Composition: An Empirical Analysis. *Journal of Financial Economics*. 85. pp. 66-101.
- Boyd, B. (1990). Corporate Linkages and Organizational Environment: A Test of the Resource Dependence Model. *Strategic Management Journal*. 11. pp. 419-430.
- Boyne, G. A. (2004). A “3R’s” Strategy for Public Service Turnaround: Retrenchment and Renewal. *Public Money and Management*. 24(2). pp. 97-103.
- Bradshaw, P., Murray, V., Wolpin, J. (1992). Do Non-profit Boards Make a Difference? An Exploration of the Relationship Between Board Structure, Process, and Effectiveness. *Non-profit and Voluntary Sector Quarterly*. 21(3). 227-249.
- Brandenburger, A. (2002). Porter’s Added Value: High Indeed! *Academy of Management Executive*. Vol. 16, No. 2
- Bryan, L., Joyce, C. (2005). The 21-st Century Organization. *McKinsey Quarterly*. Issue 3, pp24-33
- Brown, A., Seeman, N. (2006). Remembering Peter Drucker: Inspiring the Quality Revolution in Healthcare. *Healthcare Quarterly*. 9(1). pp. 50-54
- Brown, G., Porter, M., Teisberg, E. (1994). Making Competition in Health Care Work. *Harvard Business Review*, Jul/Aug94, Vol. 72 Issue 4, pp. 131-41
- Brown, W. A., (2005). Exploring the Association Between Board and Organizational Performance in Non-profit Organizations. *Non-profit Management and Leadership*. 15. 317-339.
- Bruhn, J. (1990). Managerial Indecisiveness: When the Monkeys Run The Zoo. *Healthcare Supervisor*. 8(4). pp. 55-64.

- Burbank, R. (2005). The Classic Five Step Turnaround Process: Case Study of ProdiGene. *The Journal of Private Equity*. (Spring 2005)
- Callen, J. L. (1994). Money Donations, Volunteering, and Organizational Efficiency. *Journal of Productivity Analysis*. 5. pp. 215-228.
- Callen, J. L., Falk, H. (1993). Agency and Efficiency in Non-profit Organizations: The Case of "Specific Health Focus" Charities. *The Accounting Review*. 68. pp. 48-65.
- Callen, J. L., Klein, A., Tinkelman, P. (2003). Board Composition, Committees, and Organizational Efficiency: The Case of Non-profits. *Non-profit and Voluntary Sector Quarterly*. Vol. 32. No. 4. pp. 493-520
- Canadian Institute for Health Information. (2007). *Hospital Report, Emergency Department Care 2007*. Toronto, Ont. Canadian Institute for Health Information.
- Canadian Institute for Health Information. (2007). *Hospital Report, Acute Care 2007*. Toronto, Ont. Canadian Institute for Health Information.
- Cazale, L., Denis, J. L., Langley, A. (1996). Leadership and Strategic Change under Ambiguity. *Organizational Studies*. 17/4. pp. 673-699.
- Chaganti, R. S., Mahajan, V., Sharma, S. (1985). Corporate Board Size, Composition and Corporate Failures in Retailing Industry. *Journal of Management Studies*. 22. pp. 400-417.
- Chaganti, R., Sambharya, R. (1987). Strategic Orientation and Characteristics of Upper Management. *Strategic Management Journal*. 8. pp. 393-401.
- Chan Kim, W., Mauborgne, R. (1997). Fair Process: Managing in the Knowledge Economy. *Harvard Business Review*. Jul/Aug 1997, Issue 4, pp. 65-75.
- Chan, K. C., Li, J. (2008). Audit Committee and Firm Value: Evidence on Outside Top Executives as Expert-Independent Directors. *Corporate Governance*. Vol. 16. No. 1. pp. 16-31.
- Chowdhury, S. D. (2002). Turnarounds: A Stage Theory Perspective. *Canadian Journal of Administrative Sciences*. 19(3). pp. 249-266.
- Clarkson, M. (1994). A Risk Based Model of Stakeholder Theory. Proceeding of the Second Toronto Conference on Stakeholder Theory. *Centre for Corporate Social Performance and Ethics, University of Toronto*.
- Closson, T. (2007). Waterloo Hospitals Emergency Services, Investigator's Report (January 2007). *The Hay Group*
- Couturier, J. (2007). Advanced Business Strategy. *International University of Monaco, DOCT705*. September 2007.
- Daily, C. M., Dalton, D. R. (1992). The Relationship Between Governance Structure and Corporate Performance in Entrepreneurial Firms. *Journal of Business Venturing*. 7. pp. 375-386.
- Daily, C. M., Dalton, D. R. (1993). Boards of Directors, Leadership, and Structure: Control and Performance Implications. *Entrepreneurship, Theory and Practice*. 17. pp. 65-81.

- Daily, C. M., Dalton, D. R. (1994). Outsider Directors Revisited: Prescriptions for CEOs and Directors. *Journal of Small Business Strategy*. 5. pp. 57-68.
- Dalton, D. R., Daily, C. M., Ellstrand, A. E., Johnson, J. 1. (1998). Meta-Analytic Reviews of Board Composition, Leadership Structure and Financial Performance. *Strategic Management Journal*. 19. pp. 269-290.
- Daniels, B. (July 1999). Integration of the Supply Chain for Total Through-Cost Reduction. *Total Quality Management*. Abingdon. Vol. 10. Issue 4. pp. 481-491.
- D'Aveni, R. (1989). Dependability and organizational bankruptcy: An application of contingency and prospect theory. *Management Science*. 35:1120-38.
- Davis, J. H., Schoorman, F. D., Donaldson, L. (1997). Toward a Stewardship Theory of Management. *Academy of Management Review*. 22. pp. 20-47.
- Dedman, E. B. (2002). The Cadbury Committee Recommendations on Corporate Governance – A Review of Compliance and Performance Impacts. *International Journal of Management Reviews*. 4. pp. 335-352.
- Deines, E. (1981). Participative Management. *Nursing Management*. 12. pp. 50-53.
- Delbecq, A. L., Gill, S. L. (1988) Developing Strategic Direction for Governing Boards. *Hospital and Health Services Administration*. 33(1). pp. 25-35.
- Dranove, D. (1999). The Costs to Improve Quality. *Medical Care*. 37(10). pp. 1084-1087.
- Drucker, P. (1988). The Coming of the New Organization. *Harvard Business Review*. 66(1). pp. 45-53
- Drucker, P. (2002). They're Not Employees, They're People. *Harvard Business Review*. Feb. 2002
- Drucker, P. (2004). What Makes An Effective Executive? *Harvard Business Review*. Jun 2004, Vol. 82, pp. 58-63
- Drucker, P. (2005). Peter Drucker, A Lifetime of Wisdom. *New Zealand Management*. Oct. 2005, Vol. 52, Issue 9, pp. 42-44.
- Eastwood, W., Ritchie, K. (2006). Executive functional Experience and Its Relationship to Financial Performance of Non-profit Organizations. *Non-profit Management and Leadership*. 17(1). pp. 67-82.
- Eisenhardt, K. (1988). Agency and Institutional Theory Explanations: The Case of Retail Sales Compensation. *Academy of Management Journal*. 31, pp. 488-511
- Emiliani, M. L. (2003). Linking Leader's Beliefs to Their Behaviours and Competencies. *Management Decision*. Vol. 41. Issue 9. pp. 893-910.
- Emiliani, M. L., Stec, D. J. (2004). Using Value-Stream Maps to Improve Leadership. *Leadership and Organization Development Journal*. Vol. 25. Issue 8. pp. 622-645.
- Ettinger, W. (2001). Six Sigma: Adapting GE's Lessons in Health Care. *Trustee*. September 2001.

- Ettinger, W., Kooy, M. (2003). The Art and Science of Winning Physician Support for Six Sigma Change. *The Physician Executive*. Sept-Oct 2003. pp. 34-38.
- Ezzamel, M. A., Watson, R. (1993). Organizational Form, Ownership Structure and Corporate Performance: a Contextual Empirical Analysis of UK Companies. *British Journal of Management*. 4. pp. 161-176.
- Fama, E. (1980). Agency Problems and the Theory of the Firm. *Journal of Political Economy*. 88. pp. 288-307.
- Fama, E. F., Jensen, M. C. (1983). Separation of Ownership and Control. *Journal of Law and Economics*. 26. pp. 301-325.
- Finkler, S., Ward, D. (2003). The Case for the Use of Evidence-Based Management Research for the Control of Hospital Costs. *Health Care Management Review*. 28. pp. 348-65.
- Fredenberger, W., Lipp, A., Watson, H. (1997). Information Requirements of Turnaround Managers at the Beginning of Engagements. *Journal of Management Information Systems*. Vol. 13. No. 4. pp. 167-192.
- Furman, J., McGahan, A. (2002). Turnarounds. *Managerial and Decision Economics*. 23. pp. 283-300
- Ghemawat, P. (2002). Competition and Business Strategy in Historical Perspective, *Business History Review*. 76, Spring 2002, pp. 37-74
- Ghemawat, P. (2004). The Growth Boosters. *Harvard Business Review*. Jul/Aug 2004, Vol. 82, Issue 7/8 pp. 34-40
- Ginn, G. (1990). Strategic adaptation in the hospital industry: An examination of the response of the acute care hospital to the turbulent environment of the 1980s. *Health Services Research*. 26 (4): pp. 565-91
- Goodstein, J. Gautam, K. Boeker, W. (1994). The Effects of Board Size and Diversity on Strategic Change. *Strategic Management Journal*. 15. pp. 241-250.
- Green, J.C., Griesinger, D. W. (1996). Board Performance and Organizational Effectiveness in Non-profit Social Service Organizations. *Non-profit Management and Leadership*. 6. pp. 381-402.
- Greenwood, R. (1981). Management By Objectives: As Developed by Peter Drucker, Assisted by Harold Smiddy, *Academy of Management Review*, Vol. 6, No. 2, pp225-230
- Grinyer, P., Mayes, D., McKiernan, P. (1990). Sharpbenders: Achieving a sustained improvement in performance. *Long Range Planning*. 23(1). Pp. 116-125.
- Grinyer, P., McKiernan, P. (1990). Generating major change in stagnating companies. *Strategic Management Journal*. (Summer). Pp. 131-146.
- Grinyer, P., Spender, J. (1979). Recipes, crises and adaptation in mature businesses. *International Studies of Management and Organization*. 9(3). Pp. 113-133.
- Grunfeld, L., Kassum, S. (1973) Supervisory Style and Organizational Effectiveness in a Paediatric Hospital. *Personnel Psychology*. 26(4). pp. 531-544.

- Gupta, A., Govindarajan, V. (1984). Business Unit Strategy, Managerial Characteristics, and Business Unit Effectiveness at Strategy Implementation. *Academy of Management Journal*. 27. pp. 25-41.
- Hambrick, D., MacMillan, I., Day, D. (1982). Strategic attributes and performance in the four cells of the BCG matrix—A PIMS-based analysis of industrial-product businesses. *Academy of Management Journal*. 25. Pp. 510-531.
- Hambrick, D., Schecter, S. (1983). Turnaround Strategies for Mature Industrial-Product Business Units. *Academy of Management Journal*. Vol. 26, No. 2, pp. 231-248.
- Hamel, G. (1998). Strategy Innovation. *Executive Excellence*. Aug 1998, Vol. 15, Issue 8.
- Hammack, D. (1995). Accountability and Non-Profit Organizations: A Historical Perspective. *Non-profit Management and Leadership*. 6. pp. 127-139.
- Hedberg, B. Nystrom, P., Starbuck, W. (1976). Camping on seesaws : Prescriptions for a self-designing organization. *Administrative Science Quarterly*. 21. pp. 41-65.
- Hermalin, B., Weisbach, M. (1988). The Determinants of Board Composition. *Rand Journal of Economics*. 19. pp. 95-112.
- Hermalin, B., Weisbach, M. (1998). Endogenously Chosen Boards of Directors and Their Monitoring of the CEO. *American Economic Review*. 88. pp. 96-118.
- Hermalin, B., Weisbach, M. (2003). Board of Directors as an Endogenously Determined Institution: A Survey of the Economic Literature. *Economic Policy Review*. 9. pp. 7-26.
- Herman, R., Renz, D. (1997). Multiple Constituencies and the Social Construction of Non-profit Organization Effectiveness. *Non-profit and Voluntary Sector Quarterly*. 26. pp. 185-206.
- Herrod, C. (1978). Participation: A Style of Management. *Nursing Times*. 74. pp. 466-468.
- Hersey, P., Blanchard, K. (1974). So You Want To Know Your Leadership Style? *Training and Development Journal*. 28(2). pp. 22-37.
- Hillman, A. J., Cannella, A. A., Paetzold, R.L. (2000). The Resource Dependence Role of Corporate Directors: Strategic Adaptation of Board Composition in response to Environmental Change. *Journal of Management Studies*. 37. pp. 136-152.
- Hillman, A. J., Dalziel, T. (2003). Boards of Directors and Firm Performance: Integrating Agency and Resource Dependence Perspectives. *Academy of Management Review*. 28. pp. 283-296.
- Hitt, M., Tyler, B. (1991). Strategic Decision Models: Integrating Different Perspectives. *Strategic Management Journal*. 12 (5). pp. 327-351.
- Hofer, C. (1980). Turnaround Strategies. *Journal of Business Strategy* 1 (1) : pp. 19-31.
- Howell, J., Higgins, C. 1990). Champions of Technological Innovation. *Administrative Science Quarterly*. 3. pp. 317-341.

- Hui, C., Lin, Z. (1999). Should Lean Replace Mass Organization Systems? A comparative examination from a management co-ordination perspective. *Journal of International Business Studies*. Washington, Vol. 30. Issue 1. pp. 45-80.
- Hummel, S.J. (2009). Lean Optimization of St. Mary's Hospital Laboratory. *Confidential Project Report, Conestoga College OPER3230*. April 6, 2009
- James, J. F. (1986). Immunity Doctrine, Efficiency Promotion, and the Applicability of Federal Antitrust Law to State-Approved Hospital Acquisitions. *The Journal of Corporation Law*. Fall. pp. 37-72
- Jensen, M. C., Meckling, W. H. (1976). Agency Cost and the Theory of the Firm. *Journal of Financial Economics*. 3. pp. 305-360.
- Jensen, M. (1993). The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems. *Journal of Finance*. 48. pp. 831-880.
- Jiang, H. J., Lockee, C., Bass, K., Fraser, I. (2009). Board Oversight of Quality; Any Differences in Process of Care and Mortality? *Journal of Healthcare Management*. Vol. 54:1 Jan/Feb
- John, K., Senbet, L. W. (1998). Corporate Governance and Board Effectiveness. *Journal of Banking and Finance*. 22. pp. 371-401.
- Johnson, J. L., Daily, C. M., Ellestrand, A. E. (1996). Boards of Directors: A Review and Research Agenda. *Journal of Management*. 22. pp. 409-438.
- Joshi, M. S., Hines, S. C. (2006). Getting the Board on Board: Engaging Hospital Boards in Quality and Patient Safety. *Joint Commission Journal on Quality and Patient Safety*. 32(4). Pp. 179-187.
- Juras, P. E., Hinson, Y. L. (2008). Leaders vs. Laggards: A Study of the Relationship Between Selected Board Composition Characteristics and Selected Banking Performance Measures. *Advances in Accounting, Finance, and Economics*. Vol. 1 No. 1. pp. 1-13.
- Kanter, R. (2003). Leadership and the Psychology of Turnarounds. *Harvard Business Review*. Vol. 81. Issue 6.
- Kaplan, R., Norton, D. (1992). The Balanced Scorecard: Measures That Drive Performance. *Harvard Business Review*. 70. pp. 71-79.
- Karpoff, J. M., Malatesta, P. H., Walkling, R. A. (1996). Corporate Governance and Shareholders Initiatives: Empirical Evidence. *Journal of Financial Economics*. 42. 365-395.
- Kesner, I. F., Victor, B., Lamont, B. (1986). Board Composition and the Commission of Illegal Acts: An Investigation of Fortune 500 Companies. *Academy of Management Review*. 29. pp. 879-899.
- Klein, A. (2002). Audit Committee, Board of Director Characteristics and Earnings Management. *Journal of Accounting and Economics*. 33. pp. 375-400.

- Kotter, J. (1995). Leading Change: Why Transformation Efforts Fail. *Harvard Business Review*. Vol. 73. Issue 2. pp. 59-67
- Kow, G. (2004). Turning Around Business Performance. *Journal of Change Management*. Vol. 4 No. 4. pp. 281-296
- Lampel, J., Mintzberg, H. (1999). Reflecting on the Strategy Process. *Sloan Management Review*. Spring 1999, Vol. 40, Issue 3, pp21-30
- Larson, L. (2007). Physician Autonomy vs. Accountability: Making Quality Standards and Medical Style Mesh. *Trustee*. July/August. pp. 14-21
- Levey, S., Vaughn, T., Koepke, M., Moore, D. Lehrman, W., Sinha, S. (2007). Hospital Leadership and Quality Improvement: Rhetoric Versus Reality. *Journal of Patient Safety*. 3(1). Pp. 9-15.
- Lipton, K., Lorsch, J. W. (1992). A Modest Proposal for the Improvement of Corporate Governance. *Business Lawyer*. 48. pp. 59-77.
- Lynall, M. D., Golden, B. R., Hillman, A. J. (2003). Board Composition from Adolescence to Maturity: A Multitheoretic View. *Academy of Management Review*. Vol. 28. No. 3. pp. 416-431
- Mankins, M. C., Steele, R. (July-August 2005). Turning Great Strategy into Great Performance. *Harvard Business Review*. pp. 1-9.
- Margulies, N., Duval, J. (1984). Productivity Management: A Model For Participative Management in Health Care Organizations. *Health Care Management Review*. Winter 1984. pp. 61-70.
- Markarian, G., Parbonetti, A. (2007) Firm Complexity and Board of Director Composition. *Corporate Governance*. Vol. 15 No. 6. pp. 1224-1243
- Maug, E. (1997). Board of Directors and Capital Structure: Alternative Forms of Corporate Restructuring. *Journal of Corporate Finance*. 3. pp. 113-139
- McKay, N., Deily, M. (2005). Comparing High and Low Performing Hospitals Using Risk Adjusted Excess Mortality and Cost Inefficiency. *Health Care Management Review*. 30(4). 347-360).
- Micklethwait, J., Wooldridge, A. (1996). Peter Drucker: The Guru's Guru. *McKinsey Quarterly*. Issue 3, pp144-159
- Miller, L. E., Weiss, R. M., MacLeod, B. V. (1988). Boards of Directors in Non-profit Organizations: Composition, Activities, and Organizational Outcomes. *Journal of Voluntary Action Research*. 17(3). Pp. 81-89.
- Ministry of Health and Long Term Care. (2005). *Health Results Team First Annual Report 2004-05*. Toronto, Ont. Ministry of Health and Long Term Care.
- Mitchell, R., Agle, B., Wood, D. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *The Academy of Management Review*. Vol. 22. No. 4. pp. 874.
- Muth, M. M., Donaldson, L. (1998). Stewardship Theory and Board Structure: A Contingency Approach. *Corporate Governance: An International Review*. 6. pp. 5-28.

- Olson, D. E. (2000). Agency Theory in the Not-for-profit Sector: Its role at independent Colleges. *Non-profit and Voluntary Sector Quarterly*. 29. pp. 280-296.
- Parrino, R. (1997). CEO Turnover and Outside Succession: A Cross-Sectional Analysis. *Journal of Financial Economics*. 46. pp. 165-197.
- Pearce, J. A., Robbins, K. (1992). Turnaround: Recovery and Retrenchment. *Strategic Management Journal*. 13(4). Pp. 287-309.
- Pearce, J. A., Robbins, K. (1993). Towards Improved Theory and Research on Business Turnaround. *Journal of Management*. 19(3). pp. 613-636.
- Pearce, J., Zahra, S. (1992). Board Composition from a Strategic Contingency Perspective. *Journal of Management Studies*. 29. pp. 411-438.
- Pfeffer, J. (1972). Size and Composition of Corporate Boards of Directors: The Organization and its Environment. *Administrative Science Quarterly*. 17. pp. 218-229.
- Peng, M. W. (2004). Outside Directors and Firm Performance during Institutional Transitions. *Strategic Management Journal*. 25. pp. 453-471.
- Peters, J. (1993). On Gurus. *Management Decision*. Vol. 31 Issue 6
- Pettigrew, A. M. (1992). On Studying Managerial Elites. *Strategic Management Journal*. Vol. 13. pp. 163-182.
- Porter, M. (2003). Innovation is the Key to Success. *Works Management*. June 2003, Vol. 56, Issue 6
- Porter, M., Stern, S. (2001). Innovation: Location Matters. *Sloan Management Review*. Summer 2001.
- Posnett, J. Sandler, T. (1989). Demand for Charity Donations in Private Non-profit Markets: The Case of the U.K. *Journal of Public Economics*. 40. pp. 187-200.
- Prahalad, C., Hamel, G. (1990). The Core Competence of the Corporation. *Harvard Business Review*. 6. pp. 79-93.
- Raheja, C. (2005). Determinants of Board Size and Composition: A Theory of Corporate Boards. *Journal of Financial and Quantitative Analysis*. 40. pp. 283-306.
- Rajagopalan, N., Datta, D. (1996). CEO Characteristics: Does Industry Matter? *Academy of Management Journal*. 39.
- Reddin, W. (1982). The 3-D Management Style Theory: A Typology Based On Task and Relationship Orientations. In H.W. Boles (Ed.). *Interdisciplinary Reading in Leadership*. Lexington, MA: Ginn. pp. 194-201.
- Roberts, N. (1985). Transforming Leadership: A Process of Collective Action. *Human Relations*. 38. pp. 1023-1046.
- Rose-Ackerman, S. (1986). Reforming Public Bureaucracy Through Economic Incentives? *Journal of Law, Economics, and Organization*. Vol. 2, no. 1, Spring 1986. pp. 131-161
- Rosenstein, S., Wyatt, J. G. (1990). Outside Directors, Board Independence, and Shareholder Wealth. *Journal of Financial Economics*. 26. pp. 175-191.

- Savage, G., Nix, T., Whitehead, C., Blair, J. (1991). Strategies for Assessing and Managing Organizational Stakeholders. *Academy of Management Executive*. 5. pp. 61-75.
- Schellenger, M. H., Wood, D. D., Tashakori, A. (1989). Board of Director Composition, Shareholder Wealth, and Dividend Policy. *Journal of Management*. 15. pp. 457-467.
- Schendel, D., Patten, R., Riggs, J. (1975). Corporate turnaround strategies. *Krannert Graduate School of Industrial Administration, Purdue University*. Working Paper 486.
- Schin, J., McClomb, G. (1998). Top Executive Leadership and Organizational Innovation: An Investigation of Non-profit Human Service Organizations. *Social Work Administration*. 22(3). pp. 1-21.
- Schneeweiss, C. (1995). Hierarchical Structures in Organizations: A Conceptual Framework. *European Journal of Operational Research*. 86. pp. 4-31
- Shortell, S. M. (1989). New Directions in Hospital Governance. *Hospital and Health Services Administration*. 34. pp. 7-23.
- Siciliano, J. (1990). Strategic Management and the Board of Directors: A Survey of YMCA Organizations in the Eastern U.S. and Canada. (*Working Paper*). University of Massachusetts-Amherst
- Starbuck, W., Greve, A., Hedberg, B. (1978). Responding to Crisis. *Journal of Business Administration*. 9(2). Pp. 111-137.
- Taylor, J. (1978). Hospitals: Organizational Variables, Productivity, and Efficiency (Doctoral dissertation, Georgia State University, 1978). *Dissertation Abstracts International*. 39. 979A.
- Thomas, A., Litschert, R., Ramaswamy, K. (1991). The Performance Impact of Strategy-Manager Co-alignment: An Empirical Examination. *Strategic Management Journal*. 12. pp. 509-522.
- Tinkelman, D. (1998). Differences in Sensitivity of Financial Statement Users to Joint cost Allocations: The Case of Non-profit Organizations. *Journal of Accounting, Auditing, and Finance*. 13, pp. 377-394.
- Tinkelman, D. (1999). Factors Affecting the Relation Between Donations to Not-for-profit Organizations and an Efficiency Ratio. *Research in Government and Non-profit Accounting*. 10. pp. 135-161.
- Tomasko, R. M. (1987). Running Lean, Staying Lean. *Management Review*. New York. Issue 11. pp. 32-39.
- Vaughn, T., Koepke, M., Kroch, W., Lehrman, W., Sinha, S., Levey, S., (2006). Engagement of Leadership in Quality Improvement Initiatives: Executive Quality Improvement Survey Results. *Journal of Patient Safety*. 2(1). Pp. 2-9.
- Voelker, K., Rakich, J., French, G. (2005). The Balanced Scorecard in Healthcare Organizations: A Performance Measurement and Strategic Planning Methodology. *Hospital Topics*. 79(3). pp. 13-24.

- Wagner, C. (2003). Cost of quality management in long-term organizations: an exploration. *Quality Management Health Care*. 12(2). pp. 106-144.
- Waldman, J. (2003). Corporate Culture: The Missing Piece in the Healthcare Puzzle. *Hospital Topics*. 81(1). pp. 5-14.
- Walshe, K., Harvey, G., Hyde, P., Pandit, N. (August 2004). Organizational Failure and Turnaround: Lessons For Public Services From The For-Profit Sector. *Public Money & Management*. pp. 201-208.
- Walshe, K., Shortell, S. M. (2004). What Happens When Things Go Wrong: How Health Care Organizations Deal With Major Failures In Care. *Health Affairs*. 23(3). pp. 103-111.
- Warther, V. (1998). Board Effectiveness and Board Dissent: A Model of the Board's Relationship to Management and Shareholders. *Journal of Corporate Finance*. 4. pp. 53-70.
- Waterloo Wellington Local Health Integration Network. (2007). Annual Report, 2006/2007. *WWLHIN*. Guelph, Ontario
- Weiner, B. J., Alexander, J. A. (1993). Hospital Governance and Quality of Care: A Critical Review of Transitional Roles. *Medical Care Review*. 50. pp. 375-409.
- Weisbrod, B. A., Dominguez, N. D. (1986). Demand for Collective Goods in Private Markets: Can Fundraising Expenditures Help Overcome Free-rider Behaviour? *Journal of Public Economics*. 30. pp. 83-96.
- Zahra, S. A., Pearce, J. A. (1989). Boards of Directors and Financial Performance: A Review and Integrative Model. *Journal of Management*. 15. pp. 291-334.
- Zaleski, P., Esposto, A. (2007). The Response to Market Power: Non-Profit Hospitals versus For-Profit Hospitals. *International Atlantic Economic Society*. 35. pp. 315-325.
- Zelman, W. N., Pink, G. H., Matthias, C. B. (2003). Use of the Balanced Scorecard in Health Care. *Journal of Health Care Finance*. 2003;29(4). pp. 1-16.

Books

- Ackoff, R. (1999). *Ackoff's Best: His Classic Writings on Management*. New York: Wiley.
- Ahlstrand, B. Lampel, J., Mintzberg, H. (2005). *Strategy Bites Back*. Glasgow: Bell & Bain
- Anheier, H. K. (1999). *When Things Go Wrong: Organizational Failures and Breakdowns*. London: Sage.
- Ansoff, H. (1965). *Corporate Strategy*. New York: McGraw-Hill Book Co.
- Auerback, P. (1988). *Competition: The Economics of Industrial Change*. Oxford: Basil Blackwell

- Bain, J. (1956). *Barriers to New Competition*. Cambridge: Harvard University Press
- Barney, J.B. (2007). *Gaining and Sustaining Competitive Advantage*. (3rd ed.). New Jersey: Pearson Prentice-Hall.
- Bass, B. (1985). *Leadership and Performance Beyond Expectations*. New York: Free Press.
- Bibeault, T. (1982). *Corporate Turnaround: How Managers Turn Losers Into Winners!* Maryland: Beard Books
- Blake, R., Mouton, J. (1964). *The Managerial Grid*. Houston, TX: Gulf.
- Bryman, A. 1992). *Charisma and Leadership in Organizations*. Thousand Oaks, CA: Sage.
- Crossan, M., Fry, J., Killing, J. (2005). *Strategic Analysis and Action 6th ed.* Toronto, On: Pearson Education Canada.
- D'Aunno, T. (1992). The Effectiveness of Human Service Organizations: A Comparison of Models. In Hasenfeld (Ed.). *Human Services as Complex Organizations*. Sage; Newbury Park, CA. pp. 341-361
- Day, G. S., Reibstein D. J. (1997). *Wharton on Dynamic Competitive Strategy*. New Jersey: John Wiley and Sons.
- Devane, T. (2004). *Integrating Lean Six Sigma and High Performance Organizations: Leading the Charge Toward Dramatic, Rapid, and Sustainable Improvement*. Pfeiffer, San Francisco.
- Drucker, P. (1946). *Concept of the Corporation*. New York: The John Day Company.
- Drucker, P. (1954). *The Practice of Management*. New York: Harper Collins.
- Drucker, P. (1973). *Management: Tasks, Responsibilities, Practices*. New York: Harper & Row.
- Drucker, P. (1985). *Innovation & Entrepreneurship: Practice & Principles*. New York: Harper & Row.
- Drucker, P. (1990). *Managing the Non-profit Organization*. New York: Harper-Collins.
- Drucker, P. (1993). *The New Realities*. New York: Harper and Row.
- Fielder, F. (1967). *A Theory of Leadership Effectiveness*. New York: McGraw-Hill.
- Fleishman, E. (1969). *Studies in Personnel and Industrial Psychology*. Homewood, IL: Dorsey Press.
- Foster, R. and Kaplan, S. (2001). *Creative Destruction*. New York: Doubleday. copyright McKinsey & Company.
- Freeman, R. (1984). *Strategic Management: A Stakeholder Approach*. Boston, MA: Pitman.
- Gerstner, L. V. Jr. (2002). *Who Says Elephants Can't Dance?* New York: Harper Business. Ch. 20.

- Gordon, T. (1977). *Leader Effectiveness Training, L.E.T.* Ridgefield, CT: Wyden Books.
- Grinyer, P., Mayes, D., McKiernan, P. (1988). *Sharpbenders: The secrets of unleashing corporate potential.* Oxford: Basil Blackwell.
- Hackman, J. R. (1990). *Groups That Work (And Those That Don't): Creating Conditions for Effective Teamwork.* San Francisco: Jossey-Bass
- Hamel, G. (1999). *Leading the Revolution.* New York: McGraw-Hill
- Hamel, G., Prahalad, C. (1994). *Competing for the Future: Breakthrough Strategies for Seizing Control of Your Future & Creating the Markets of Tomorrow.* Boston: Harvard Business School
- Harris, P. (1985). *Management in Transition.* San Francisco: Jossey-Bass.
- Hemphill, J. (1949). *Situational Factors in Leadership.* Columbus : The Ohio State University, Bureau of Educational Research
- Henderson, B. D. (1979). *Henderson on Corporate Strategy.* Cambridge, Mass.: Abt Books.
- Hersey, P., Blanchard, K. (1972). *Management of Organizational Behaviour.* Englewood Cliffs, NJ: Prentice-Hall.
- Jones, D., Roos, D., Womack, J. (1990). *The Machine That Changed The World.* New York: Rawson Associates
- Kaplan, R., Norton, D. (1996). *The Balanced Scorecard: Translating Strategy Into Action.* Boston: Harvard Business School Press.
- Kaplan, R., Norton, D. (2001). *The Strategy Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment.* Boston: Harvard Business School Press.
- Kaplan, R., Norton, D. (2004). *The Balanced Scorecard: Converting Intangible Assets into Tangible Outcomes.* Boston: Harvard Business School Press.
- Kearns, K. (1996). *Managing for Accountability.* San Francisco: Jossey-Bass.
- Kim, C., Mauborgne, R. (2005). *Blue Ocean Strategy.* Boston: Harvard Business School Press.
- Kotter, J. (1982). *The General Managers.* New York: Free Press.
- Kotter, J., Heskett, J. (1992). *Corporate Culture and Performance.* New York: The Free Press
- Kouzes, J., Posner, B. (1987). *The Leadership Challenge.* San Francisco: Jossey-Bass.
- Kruger, D. A. (1997). *Turnarounds and sustainable competitive advantage: An integration and study of decline and recovery.* Indiana: Purdue University.
- Levin, E. (1979). *Levin's Laws: Tactics for Winning Without Intimidation.* New York: Evans.

- Likert, R. (1967). *The Human Organization: Its Management and Values*. New York: McGraw-Hill
- Mansbridge, J. (1998). On the Contested Nature of the Public Good. In W. Powell and E. Clemens (eds.), *Private Action and the Public Good*. New Haven, CT: Yale University Press.
- McCraw, T. (2007). *Prophet of Innovation: Joseph Schumpeter & Creative Destruction*. Boston: Harvard University Press
- McGregor, D. (1960). *The Human Side of Enterprise*. New York: Harper and Row.
- Meyer, M. W., Zucker, L. G. (1989). *Permanently Failing Organizations*. London: Sage.
- Meyer, M. W. (1999). *When Things Go Wrong: Organizational Failures and Breakdowns*. London: Sage.
- Miles, R. E., & Snow, C. C. (1978). *Organizational Strategy, Structure and Process*. New York- McGraw-Hill.
- Mintzberg, H. (1994). *The Rise and Fall of Strategic Planning*. New York: Free Press.
- Ontario Ministry of Health and Long Term Care. (1999). *Good Nursing, Good Health: An Investment in the 21st Century*. Nursing Task Force, OMHLTC.
- Ouchi, W. (1981). *Theory Z: How American Business Can Meet The Japanese Challenge*. Reading, MA: Addison-Wesley.
- Pfeffer, J., Salancik, G. R. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row.
- Pollitt, C. (2003). *The Essential Public Manager*. Buckingham: Open University Press.
- Porter, M. (1980). *Competitive Strategy*. New York: Simon & Schuster
- Porter, M. (1985). *Competitive Advantage*. New York: Simon & Schuster
- Porter, M., Sakakibara, M., Takeuchi, H. (2000)., *Can Japan Compete?* Cambridge: Perseus Publishing.
- Porter, M., Teisberg, E. (2006). *Redefining Health Care: Creating Value-Based Competition on Results*. Boston: Harvard Business School
- Quinn, R. (1988). *Beyond Rational Management: Mastering the Paradoxes and Competing Demands of High Performance*. San Francisco: Jossey-Bass.
- Savary, L. M., Crawford-Mason, C. (2006). *The Nun and the Bureaucrat*. Washington: CC-M Productions
- Shook, C. L. (1997). *Fit and organizational turnaround: An examination of the performance implications of strategy content and process fit and strategy and cause of decline fit*. Baton Rouge: Louisiana State University and Agricultural & Mechanical College.
- Starbuck, W., Hedberg, B. (1977). Saving an organization from a stagnating environment. In H. Thorelli (ed), *Strategy + Structure = Performance*. Indiana University Press. Bloomington, IN. pp. 249-258

Stern, C. W., Deimler M. S. (1997). *The Boston Consulting Group on Strategy*, New Jersey: John Wiley and Sons.

Useem, M. (1993). *Executive Defence: Shareholder Poser and Corporate Re-organization*. Cambridge: Harvard University Press.

World Wide Web Documents

Alix, J., Marshall, J. (Winter 2003). *Learning Success From Distress, Strategy+Business*. Retrieved March 16, 2007 from <http://www.strategy+business.com/resilience/rr00049>

Beever, C., Burns, H., Karbe, M. (March 2004). *U.S. Health Care's Technology Cost Crisis, Strategy+Business*. Retrieved Jan. 10, 2007 from <http://www.strategy-business.com/press/article/04214?pg=0>

Center for Health Design. (n.d.) Retrieved March 15, 2007 from <http://www.healthdesign.org>

Canadian Institute for Health Information. (2007). *Understanding Emergency Department Wait Times: How Long Do People Spend in Emergency Departments in Ontario?* Retrieved July 5, 2010 from http://www.cihi.ca/cihiweb/dispPage.jsp?cw_page=PG_1331_E&cw_topic=1331&cw_rel=AR_1266_E

Canadian Institute for Health Information (2008). *HSMR: Information for the Public*. Retrieved July 5, 2010 from http://www.cihi.ca/cihiweb/en/downloads/HSMR_InfoSheet_What_is_HSMR_for_public_May2008.pdf

CUPE. (2008). *Scottish health minister rejects contracting out of cleaning services – so why are Ontario hospitals outsourcing cleaning jobs as infections grow?*. Retrieved July 5, 2010 from <http://cupe.ca/healthcare-associated-infections/Scottish-health-mini>

Flower, J. (Spring 2006). *Five-Star Hospitals, Strategy+Business*. Retrieved March 16, 2007 from <http://strategy-business.com/press/article/06108?pg=0>

Harvard Business School. (2008). *Faculty and Research*. Retrieved July 23, 2008 from <http://drfd.hbs.edu/fit/public/facultyInfo.do?facInfo=bio&facEmId=mporter>

Health Canada (2009). *Minister's speech before the Canadian Medical Association's Annual General Meeting*. Retrieved July 5, 2010 from http://www.hc-sc.gc.ca/ahc-asc/minist/speeches-discours/_2009/2009_08_17-eng.php

Health Canada (2010). *C. difficile (Clostridium difficile)*. Retrieved July 5, 2010 from <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/cdifficile-eng.php>

Hospital CEO. (2009). *Ontario Hospitals Running Deficits*. Hospital CEO. Retrieved Dec. 30, 2009 from <http://www.hospitalceo.com/ontario-hospitals-deficits/2009/10/>

- Hummel, S. (2005). *The Life of a Disposable Hero*. Retrieved June 16, 2008 from <http://wlu.ca/hummel/presentation/fall2005bu481/turnaround>
- MacMillan Dictionary. (2010). *Definition of Bureaucrat*. Retrieved Jan. 17, 2010 from <http://www.macmillandictionary.com/dictionary/british/bureaucrat>
- McGlynn, E. (2004). *The First National Report Card on Quality of Health Care in America*. RAND Corporation. Retrieved March 15, 2007 from <http://www.rand.org/publications/RB/RB9053-1/>
- Neilson, G., Sharma, D. (1998). *New-Wave Restructuring, Strategy+Business*, Retrieved March 16, 2007 from <http://www.strategy-business.com/press/article/13321?pg=0>
- Office of the Auditor General (2009) *Ontario's Electronic Health Records Initiative*. Retrieved July 5, 2010 from http://www.auditor.on.ca/en/reports_en/ehealth_en.pdf
- Ontario Association of Community Care Access Centres (2010). *Ideas and Opportunities for Bending the Health Care Cost Curve*, Retrieved Nov. 11, 2010 from [http://www.ccac-ont.ca/Upload/on/General the Health Care Cost Curve \(Final Report – April 13, 2010\).pdf](http://www.ccac-ont.ca/Upload/on/General%20the%20Health%20Care%20Cost%20Curve%20(Final%20Report%20-%20April%2013,%202010).pdf)
- Ontario Hospital Association. (2005). *Acute Care Hospitals*. Retrieved July 5, 2010 from <http://www.oha.com/KnowledgeCentre/Library/HospitalReports/Documents/Hospital%20Reports%202005/Acute%20Care.pdf>
- Ontario Hospital Association. (2006). *Health Figures and Facts*. Retrieved July 14, 2008 from http://www.healthsystemfacts.com/Client/OHA/HSF_LP4W_LND_WebStation.nsf/page/System+Performance
- Ontario Hospital Association. (2006). *Acute Care Hospitals*. Retrieved July 5, 2010 from http://www.cihi.ca/cihiweb/dispPage.jsp?cw_page=PG_574_E&cw_topic=574&cw_rel=AR_1070_E
- Ontario Hospital Association. (2006). *Patient Safety Practices*. Retrieved July 5, 2010 from <http://www.oha.com/KnowledgeCentre/Library/Documents/2006%20Patient%20Safety%20Leading%20Practice.pdf>
- Ontario Hospital Association. (2007). *Acute Care Hospitals*. Retrieved July 5, 2010 from <http://www.oha.com/KnowledgeCentre/Library/HospitalReports/Documents/Hospital%20Reports%202007/Acute%20Care.pdf>
- Ontario Hospital Association. (2007). *Health Figures and Facts*. Retrieved July 14, 2008 from http://www.healthsystemfacts.com/Client/OHA/HSF_LP4W_LND_WebStation.nsf/page/Percent+of+population+that+rates+medical+care+received+as+very+good+or+excellent

Ontario Hospital Association. (2008). *2007-2008 Annual Report*. Retrieved July 5, 2010 from

<http://www.oha.com/KnowledgeCentre/Library/AnnualReportArchive/Documents/OHA%20Annual%20Report%202007-2008.pdf>

Ontario Ministry of Health and Long Term Care (2010). *Excellent Care for All Act, 2010* Retrieved July 5, 2010 from <http://www.health.gov.on.ca/en/ms/ecfa/public/>

Oxford Dictionaries. (2008). *AskOxford.com*. Retrieved July 23, 2008 from http://www.askoxford.com/concise_oed/strategy?view=uk

Porter, M. (March 1979). *How Competitive Forces Shape Strategy*, Harvard Business Review, Retrieved March 10, 2007 from http://harvardbusinessonline.hbsp.harvard.edu/b02/en/common/item_detail.jhtml?id=79208

Porter, M. (November 1996). *What is Strategy?*, Harvard Business Review, Retrieved March 10, 2007 from http://harvardbusinessonline.hbsp.harvard.edu/b02/en/common/item_detail.jhtml?id=96608

Porter, M. (2006). *Competitiveness Index. Council on Competitiveness*, Retrieved Nov. 27, 2007 from http://www.compete.org/publications/competitive_index.asp

Interviews

Board of Directors. (2008). Board of Directors of Grand River Hospital, personal interview, May 14, 2008.

Ms Bowers, P., RN,(2010). Head of Emergency Nursing Training, Grand River Hospital, personal communication, Apr. 5 and May. 18, 2010).

Dr. Maurice, M. (2006). Head of Surgery, Grand River Hospital, personal communication, Dec. 2 and Dec. 15, 2006.

Ms. Nieminen, T. (2008). Health Finance & Research, Ontario Hospital Association, personal communication, Nov. 6 through Dec. 1, 2008

Ms. Taylor, M. (2009). President, St. Mary's Hospital, personal communication, Jan. 15, 2009

Appendix A, LINEST Function Description in EXCEL

Source: EXCEL 2007 “?” key, search for description “LINEST”

Calculates the statistics for a line by using the "least squares" method to calculate a straight line that best fits your data, and then returns an array that describes the line. You can also combine LINEST with other functions to calculate the statistics for other types of models that are linear in the unknown parameters, including polynomial, logarithmic, exponential, and power series. Because this function returns an array of values, it must be entered as an array formula.

The equation for the line is:

$$y = mx + b \text{ or}$$

$$y = m_1x_1 + m_2x_2 + \dots + b \text{ (if there are multiple ranges of x-values)}$$

where the dependent y-value is a function of the independent x-values. The m-values are coefficients corresponding to each x-value, and b is a constant value. Note that y, x, and m can be vectors. The array that LINEST returns is {m_n,m_{n-1},...,m₁,b}. LINEST can also return additional regression statistics.

Syntax

LINEST(known_y's,known_x's,const,stats)

Known_y's is the set of y-values you already know in the relationship $y = mx + b$.

↓ If the array known_y's is in a single column, then each column of known_x's is interpreted as a separate variable.

↓ If the array known_y's is in a single row, then each row of known_x's is interpreted as a separate variable.

Known_x's is an optional set of x-values that you may already know in the relationship $y = mx + b$.

↓ The array known_x's can include one or more sets of variables. If only one variable is used, known_y's and known_x's can be ranges of any shape, as long as they have equal dimensions. If more than one variable is used, known_y's must be a vector (that is, a range with a height of one row or a width of one column).

↓ If known_x's is omitted, it is assumed to be the array {1,2,3,...} that is the same size as known_y's.

Const is a logical value specifying whether to force the constant b to equal 0.

↓ If const is TRUE or omitted, b is calculated normally.

↓ If const is FALSE, b is set equal to 0 and the m-values are adjusted to fit $y = mx$.

Stats is a logical value specifying whether to return additional regression statistics.

↓ If stats is TRUE, LINEST returns the additional regression statistics, so the returned array is {mn,mn-1,...,m1,b;sen,sen-1,...,se1,seb;r2,sey;F,df;ssreg,ssresid}.

↓ If stats is FALSE or omitted, LINEST returns only the m-coefficients and the constant b.

The additional regression statistics are as follows.

Statistic	Description
se1,se2,...,sen	The standard error values for the coefficients m1,m2,...,mn.
seb	The standard error value for the constant b (seb = #N/A when const is FALSE).
r2	The coefficient of determination. Compares estimated and actual y-values, and ranges in value from 0 to 1. If it is 1, there is a perfect correlation in the sample — there is no difference between the estimated y-value and the actual y-value. At the other extreme, if the coefficient of determination is 0, the regression equation is not helpful in predicting a y-value. For information about how r2 is calculated, see "Remarks" later in this topic.
sey	The standard error for the y estimate.
F	The F statistic, or the F-observed value. Use the F statistic to determine whether the observed relationship between the dependent and independent variables occurs by chance.
df	The degrees of freedom. Use the degrees of freedom to help you find F-critical values in a statistical table. Compare the values you find in the table to the F statistic returned by LINEST to determine a confidence level for the model. For information about how df is calculated, see "Remarks" later in this topic. Example 4 below shows use of F and df.
ssreg	The regression sum of squares.
ssresid	The residual sum of squares. For information about how ssreg and ssresid are calculated, see "Remarks" later in this topic.

The following illustration shows the order in which the additional regression statistics are returned.

	A	B	C	D	E	F
1	m_n	m_{n-1}	...	m_2	m_1	b
2	se_n	se_{n-1}	...	se_2	se_1	se_b
3	r^2	se_y				
4	F	d_f				
5	ss_{reg}	ss_{resid}				

Remarks

↓ You can describe any straight line with the slope and the y-intercept:

Slope (m):

To find the slope of a line, often written as m, take two points on the line, (x1,y1) and (x2,y2); the slope is equal to $(y_2 - y_1)/(x_2 - x_1)$.

Y-intercept (b):

The y-intercept of a line, often written as b, is the value of y at the point where the line crosses the y-axis.

The equation of a straight line is $y = mx + b$. Once you know the values of m and b, you can calculate any point on the line by plugging the y- or x-value into that equation. You can also use the TREND function.

↓ When you have only one independent x-variable, you can obtain the slope and y-intercept values directly by using the following formulas:

Slope:

=INDEX(LINEST(known_y's,known_x's),1)

Y-intercept:

=INDEX(LINEST(known_y's,known_x's),2)

↓ The accuracy of the line calculated by LINEST depends on the degree of scatter in your data. The more linear the data, the more accurate the LINEST model. LINEST uses the method of least squares for determining the best fit for the data. When you have only one independent x-variable, the calculations for m and b are based on the following formulas:

$$m = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

$$\bar{b} = \bar{y} - m\bar{x}$$

where \bar{x} and \bar{y} are sample means, i.e., $\bar{x} = \text{AVERAGE}(\text{known } x\text{'s})$ and $\bar{y} = \text{AVERAGE}(\text{known } y\text{'s})$.

↓ The line- and curve-fitting functions LINEST and LOGEST can calculate the best straight line or exponential curve that fits your data. However, you have to decide which of the two results best fits your data. You can calculate TREND(known_y's,known_x's) for a straight line, or GROWTH(known_y's, known_x's) for an exponential curve. These functions, without the new_x's argument, return an array of y-values predicted along that line or curve at your actual data points. You can then compare the predicted values with the actual values. You may want to chart them both for a visual comparison.

↓ In regression analysis, Microsoft Excel calculates for each point the squared difference between the y-value estimated for that point and its actual y-value. The sum of these squared differences is called the residual sum of squares, ssresid. Microsoft Excel then calculates the total sum of squares, sstotal. When const = TRUE, or omitted, the total sum of squares is the sum of the squared differences between the actual y-values and the average of the y-values. When const = FALSE, the total sum of squares is the sum of the squares of the actual y-values (without subtracting the average y-value from each individual y-value). Then regression sum of squares, ssreg, can be found from: $ssreg = sstotal - ssresid$. The smaller the residual sum of squares is, compared with the total sum of squares, the larger the value of the coefficient of determination, r^2 , which is an indicator of how well the equation resulting from the regression analysis explains the relationship among the variables. r^2 equals $ssreg/sstotal$.

↓ In some cases, one or more of the X columns (assume that Y's and X's are in columns) may have no additional predictive value in the presence of the other X columns. In other words, eliminating one or more X columns might lead to predicted Y values that are equally accurate. In that case these redundant X columns should be omitted from the regression model. This phenomenon is called "collinearity" because any redundant X column can be expressed as a sum of multiples of the non-redundant X columns. LINEST checks for collinearity and removes any redundant X columns from the regression model when it identifies them. Removed X columns can be recognized in LINEST output as having 0 coefficients as well as 0 se's. If one or more columns are removed as redundant, then df is affected because df depends on the number of X columns actually used for predictive purposes. For details on the computation of df, see Example 4 below. If df is changed because redundant X columns are removed, values of sey and F are also affected. Collinearity

should be relatively rare in practice. However, one case where it is more likely to arise is when some X columns contain only 0's and 1's as indicators of whether a subject in an experiment is or is not a member of a particular group. If const = TRUE or omitted, LINEST effectively inserts an additional X column of all 1's to model the intercept. If you have a column with a 1 for each subject if male, or 0 if not, and you also have a column with a 1 for each subject if female, or 0 if not, this latter column is redundant because entries in it can be obtained from subtracting the entry in the "male indicator" column from the entry in the additional column of all 1's added by LINEST.

↓ df is calculated as follows when no X columns are removed from the model due to collinearity: if there are k columns of known_x's and const = TRUE or omitted, then $df = n - k - 1$. If const = FALSE, then $df = n - k$. In both cases, each X column removed due to collinearity increases df by 1.

↓ Formulas that return arrays must be entered as array formulas.

↓ When entering an array constant such as known_x's as an argument, use commas to separate values in the same row and semicolons to separate rows. Separator characters may be different depending on your locale setting in **Regional and Language Options** in **Control Panel**.

↓ Note that the y-values predicted by the regression equation may not be valid if they are outside the range of the y-values you used to determine the equation.

↓ The underlying algorithm used in the LINEST function is different than the underlying algorithm used in the SLOPE and INTERCEPT functions. The difference between these algorithms can lead to different results when data is undetermined and collinear. For example, if the data points of the known_y's argument are 0 and the data points of the known_x's argument are 1:

- LINEST returns a value of 0. The LINEST algorithm is designed to return reasonable results for collinear data, and in this case at least one answer can be found.
- SLOPE and INTERCEPT return a #DIV/0! error. The SLOPE and INTERCEPT algorithm is designed to look for one and only one answer, and in this case there can be more than one answer.

↓ In addition to using LOGEST to calculate statistics for other regression types, you can use LINEST to calculate a range of other regression types by entering functions of the x and y variables as the x and y series for LINEST. For example, the following formula:

=LINEST(yvalues, xvalues^COLUMN(\$A:\$C))

works when you have a single column of y-values and a single column of x-values to calculate the cubic (polynomial of order 3) approximation of the form:

$$y = m1*x + m2*x^2 + m3*x^3 + b$$

You can adjust this formula to calculate other types of regression, but in some cases it requires the adjustment of the output values and other statistics.

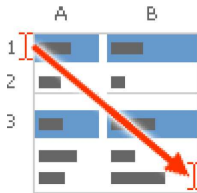
Example 1 Slope and Y-Intercept

The example may be easier to understand if you copy it to a blank worksheet.

 How to copy an example

1. Create a blank workbook or worksheet.
2. Select the example in the Help topic.

NOTE Do not select the row or column headers.



Selecting an example from Help

3. Press CTRL+C.
4. In the worksheet, select cell A1, and press CTRL+V.
5. To switch between viewing the results and viewing the formulas that return the results, press CTRL+` (grave accent), or on the **Formulas** tab, in the **Formula Auditing** group, click the **Show Formulas** button.

	A	B
1	Known y	Known x
2	1	0
3	9	4
4	5	2
5	7	3
	Formula	Formula

=LINEST(A2:A5,B2:B5,,FALSE)

NOTE The formula in the example must be entered as an array formula. After copying the example to a blank worksheet, select the range A7:B7 starting with the formula cell. Press F2, and then press CTRL+SHIFT+ENTER. If the formula is not entered as an array formula, the single result is 2.

When entered as an array, the slope (2) and the y-intercept (1) are returned.

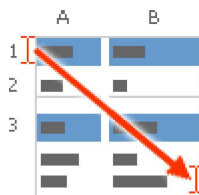
Example 2 Simple Linear Regression

The example may be easier to understand if you copy it to a blank worksheet.

 How to copy an example

1. Create a blank workbook or worksheet.
2. Select the example in the Help topic.

NOTE Do not select the row or column headers.



Selecting an example from Help

3. Press CTRL+C.

4. In the worksheet, select cell A1, and press CTRL+V.
5. To switch between viewing the results and viewing the formulas that return the results, press CTRL+` (grave accent), or on the **Formulas** tab, in the **Formula Auditing** group, click the **Show Formulas** button.

	A	B
1	Month	Sales
2	1	3100
3	2	4500
4	3	4400
5	4	5400
6	5	7500
7	6	8100
	Formula	Description (Result)
	=SUM(LINEST(B2:B7, A2:A7)*{9,1})	Estimate sales for the ninth month (11000)

In general, $SUM(\{m,b\}*\{x,1\})$ equals $mx + b$, the estimated y-value for a given x-value. You can also use the TREND function.

Example 3 Multiple Linear Regression

Suppose a commercial developer is considering purchasing a group of small office buildings in an established business district.

The developer can use multiple linear regression analysis to estimate the value of an office building in a given area based on the following variables.

Variable	Refers to the
y	Assessed value of the office building
x1	Floor space in square feet
x2	Number of offices
x3	Number of entrances
x4	Age of the office building in years

This example assumes that a straight-line relationship exists between each independent variable (x_1 , x_2 , x_3 , and x_4) and the dependent variable (y), the value of office buildings in the area.

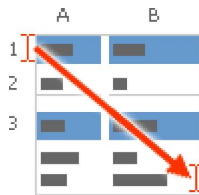
The developer randomly chooses a sample of 11 office buildings from a possible 1,500 office buildings and obtains the following data. "Half an entrance" means an entrance for deliveries only.

The example may be easier to understand if you copy it to a blank worksheet.

 How to copy an example

1. Create a blank workbook or worksheet.
2. Select the example in the Help topic.

NOTE Do not select the row or column headers.



Selecting an example from Help

3. Press CTRL+C.
4. In the worksheet, select cell A1, and press CTRL+V.
5. To switch between viewing the results and viewing the formulas that return the results, press CTRL+' (grave accent), or on the **Formulas** tab, in the **Formula Auditing** group, click the **Show Formulas** button.

	A	B	C	D	E
1	Floor space (x1)	Offices (x2)	Entrances (x3)	Age (x4)	Assessed value (y)
2	2310	2	2	20	142,000
3	2333	2	2	12	144,000
4	2356	3	1.5	33	151,000
5	2379	3	2	43	150,000
6	2402	2	3	53	139,000
7	2425	4	2	23	169,000
8	2448	2	1.5	99	126,000
9	2471	2	2	34	142,900
10	2494	3	3	23	163,000
11	2517	4	4	55	169,000
12	2540	2	3	22	149,000
	Formula				
	=LINEST(E2:E12,A2:D12,TRUE,TRUE)				

NOTE The formula in the example must be entered as an array formula. After copying the example to a blank worksheet, select the range A14:E18 starting with the formula cell. Press F2, and then press CTRL+SHIFT+ENTER. If the formula is not entered as an array formula, the single result is -234.2371645.

When entered as an array, the following regression statistics are returned. Use this key to identify the statistic you want.

	A	B	C	D	E	F
1	m_n	m_{n-1}	...	m_2	m_1	b
2	se_n	se_{n-1}	...	se_2	se_1	se_b
3	r^2	se_y				
4	F	d_f				
5	ss_{reg}	ss_{resid}				

The multiple regression equation, $y = m_1*x_1 + m_2*x_2 + m_3*x_3 + m_4*x_4 + b$, can now be obtained using the values from row 14:

$$y = 27.64*x_1 + 12,530*x_2 + 2,553*x_3 - 234.24*x_4 + 52,318$$

The developer can now estimate the assessed value of an office building in the same area that has 2,500 square feet, three offices, and two entrances and is 25 years old, by using the following equation:

$$y = 27.64*2500 + 12530*3 + 2553*2 - 234.24*25 + 52318 = \$158,261$$

Or you can copy the following table to cell A21 of the example workbook.

Floor space (x1)	Offices (x2)	Entrances (x3)	Age (x4)	Assessed value (y)
2500	3	2	25	=D14*A22 + C14*B22 + B14*C22 + A14*D22 + E14

You can also use the TREND function to calculate this value.

Example 4 Using the F and r2 Statistics

In the previous example, the coefficient of determination, or r2, is 0.99675 (see cell A17 in the output for LINEST), which would indicate a strong relationship between the independent variables and the sale price. You can use the F statistic to determine whether these results, with such a high r2 value, occurred by chance.

Assume for the moment that in fact there is no relationship among the variables, but that you have drawn a rare sample of 11 office buildings that causes the statistical analysis to demonstrate a strong relationship. The term "Alpha" is used for the probability of erroneously concluding that there is a relationship.

F and df in LINEST output can be used to assess the likelihood of a higher F value occurring by chance. F can be compared with critical values in published F-distribution tables or Excel's FDIST can be used to calculate the probability of a larger F value occurring by chance. The appropriate F distribution has v1 and v2 degrees of freedom. If n is the number of data points and const = TRUE or omitted, then v1 = n - df - 1 and v2 = df. (If const = FALSE, then v1 = n - df and v2 = df.) Excel's FDIST(F,v1,v2) will return the probability of a higher F value occurring by chance. In Example 4, df = 6 (cell B18) and F = 459.753674 (cell A18).

Assuming an Alpha value of 0.05, v1 = 11 - 6 - 1 = 4 and v2 = 6, the critical level of F is 4.53. Since F = 459.753674 is much higher than 4.53, it is extremely unlikely that an F value this high occurred by chance. (With Alpha = 0.05, the hypothesis that there is no relationship between known_y's and known_x's is to be rejected when F exceeds the critical level, 4.53.) Using Excel's FDIST you can obtain the probability that

an F value this high occurred by chance. $FDIST(459.753674, 4, 6) = 1.37E-7$, an extremely small probability. You can conclude, either by finding the critical level of F in a table or by using Excel's $FDIST$, that the regression equation is useful in predicting the assessed value of office buildings in this area. Remember that it is critical to use correct values of v_1 and v_2 computed in the previous paragraph.

Example 5 Calculating the t-Statistics

Another hypothesis test will determine whether each slope coefficient is useful in estimating the assessed value of an office building in example 3. For example, to test the age coefficient for statistical significance, divide -234.24 (age slope coefficient) by 13.268 (the estimated standard error of age coefficients in cell A15). The following is the t-observed value:

$$t = m_4 \div se_4 = -234.24 \div 13.268 = -17.7$$

If the absolute value of t is sufficiently high, it can be concluded that the slope coefficient is useful in estimating the assessed value of an office building in Example 3. The table below shows the absolute values of the 4 t-observed values.

If you consult a table in a statistics manual, you will find that t-critical, two tailed, with 6 degrees of freedom and $\alpha = 0.05$ is 2.447. This critical value can also be found using Excel's $TINV$ function. $TINV(0.05,6) = 2.447$. Because the absolute value of t, 17.7, is greater than 2.447, age is an important variable when estimating the assessed value of an office building. Each of the other independent variables can be tested for statistical significance in a similar manner. The following are the t-observed values for each of the independent variables.

Variable	t-observed value
Floor space	5.1
Number of offices	31.3
Number of entrances	4.8
Age	17.7

These values all have an absolute value greater than 2.447; therefore, all the variables used in the regression equation are useful in predicting the assessed value of office buildings in this area.

Appendix B, Ontario Hospital Association Emergency Department Data

2005 Emergency Department Activities and Outcomes

<http://www.oha.com/KnowledgeCentre/Library/HospitalReports/Documents/Hospital%20Reports%202005/Emergency%20Department%20Care.pdf>

2007 Emergency Department Activities and Outcomes

<http://www.oha.com/KnowledgeCentre/Library/HospitalReports/Documents/Hospital%20Reports%202007/Emergency%20Department%20Care.pdf>

Appendix C, Ontario Hospital Association Hospital Level Data

2005 Hospital Level Activities and Outcomes

<http://www.oha.com/KnowledgeCentre/Library/HospitalReports/Documents/Hospital%20Reports%202005/Acute%20Care.pdf>

2007 Hospital Level Activities and Outcomes

<http://www.oha.com/KnowledgeCentre/Library/HospitalReports/Documents/Hospital%20Reports%202007/Acute%20Care.pdf>

Appendix D Hospital Board of Directors Data¹

Board Configuration

Hospital (Teaching)	Board Size (people)	# of Inside Directors	# of Doctors on Board	# of Nurses on Board	# of Politicians on Board	# of Bureaucrats on Board	# of Educators on Board	# of Entrepreneurs on Board	# of Corporate Managers on Board
Children's Hospital of Eastern Ontario	17	4	3	1	0	6	1	3	3
Hamilton Health Sciences Corporation	19	1	3	0	1	6	2	3	4
Hopital regional de Sudbury Regional Hospital	10	2	1	0	0	3	1	3	2
Hotel Dieu Hospital , Kingston	18	5	3	0	0	6	2	5	2
Kingston General Hospital	20	6	3	0	0	5	6	3	3
London Health Sciences Centre	19	4	3	0	0	5	2	6	3
Mount Sinai Hospital	33	5	2	0	1	5	3	12	10
St. Joesph's Health Care London	21	4	4	0	0	3	1	5	8
St. Joesph's Healthcare Hamilton	21	8	6	2	1	4	0	4	4
St. Michael's Hospital	28	5	6	0	1	6	2	6	7
Sunnybrook and Women's College Health Sciences Centre	22	4	5	0	0	3	1	5	8
The Hospital for Sick Children	20	0	0	1	0	2	3	5	9
The Ottawa Hospital	20	2	3	1	0	8	2	6	0
Thunder Bay Regional Health Sciences Centre	15	4	3	0	0	6	3	2	1
University Health Network	21	7	6	1	0	3	3	4	4
Hospital (Small)									
Alexandra Hospital	13	2	2	0	0	3	2	6	
Alexandra Marine and General Hospital	12	4	2	1	0	3	2	2	2
Almonte General Hospital	18	6	3	0	7	4	0	4	
Arnprior and District Memorial Hospital	19	4	2	0	0	5	1	7	4
Atikokan General Hospital	11	2	1	0	1	5	0	3	1
Campbellford Memorial Hospital	18	3	2	0	1	7	1	6	1
Carleton Place and District Memorial Hospital	20	4	3	0	4	8	0	2	3
Deep River and District Hospital	N/A				N/A	N/A	N/A		
Dryden Regional Health Centre	N/A				N/A	N/A	N/A		
Glengarry Memorial Hospital	11	2	1	0	1	4	0	5	
Haldimand War Memorial Hospital	N/A				N/A	N/A	N/A		
Haliburton Highlands Health Services	17	3	3	0	0	5	2	7	
Hanover and District Hospital	16	5	3	0	4	3	1	5	
Kemptville District Hospital	17	4	2	0	1	4	2	3	5
Lady Dunn Health Centre	10	1	0	0	0	6	2	1	1
Lennox and Addington County General Hospital	14	3	2	0	1	7	1	1	2
Listowel and Wingham Hospitals Alliance	N/A				N/A	N/A	N/A		
Mattawa General Hospital	N/A				N/A	N/A	N/A		
McCausland Hospital	14	5	2	0	3	7	1	1	
MICs Group of Health Services	N/A				N/A	N/A	N/A		
Nipigon District Memorial Hospital	N/A				N/A	N/A	N/A		
North Wellington Health Care	N/A				N/A	N/A	N/A		
Sensenbrenner Hospital	15	3	2	0	4	3	0	3	3
Services de sante de Chapleau Health Services	N/A				N/A	N/A	N/A		
Sioux Lookout Meno-Ya-Win Health Centre	18	2	2	0	12	1	0	3	
Smooth Rock Falls Hospital	11	2	1	1	0	6	2	1	
South Huron Hospital	N/A				N/A	N/A	N/A		
St. Francis Memorial Hospital	12	4	1	0	0	4	1	5	1
Stevenson Memorial Hospital	16	4	1	1	0	4	1	5	4
The Willett Hospital	N/A				N/A	N/A	N/A		
Wilson Memorial General Hospital	N/A				N/A	N/A	N/A		

Appendix D Hospital Board of Directors Data, Continued¹

Board Configuration

Hospital (Community)	Board Size (people)	# of Inside Directors	# of Doctors on Board	# of Nurses on Board	# of Politicians on Board	# of Bureaucrats on Board	# of Educators on Board	# of Entrepreneurs on Board	# of Corporate Managers on Board
Bluewater Health	14	4	3	0	0	5	2	1	3
Brockville General Hospital	21	7	3	1	0	11	1	5	
Cambridge Memorial Hospital	13	3	3	0	0	1	0	3	6
Chatham-Kent Health Alliance	29	3	3	0	0	12	4	4	6
Collingwood General and Marine Hospital	15	3	1	1	3	4	0	2	4
Cornwall Community Hospital	17	5	3	0	1	5	1	3	4
Grand River Hospital	18	2	1	0	3	3	0	3	8
Grey Bruce Health Services	21	4	3	0	0	9	0	7	2
Groves Memorial Community Hospital	19	4	2	0	4	4	2	4	3
Guelph Hospital	16	5	3	0	2	6	1	2	2
Halton Healthcare	17	7	4	2	3	3	0	2	3
Headwaters Health Care Centre	17	3	2	0	1	4	2	4	4
Hopital General de Hawkesbury & District General Hospital	15	3	2	0	0	7	2	2	2
Hopital Montfort Hospital	24	6	4	0	4	14	0		2
Hotel-Dieu Grace Hospital	21	5	5	0	2	9	0	3	2
Humber River Regional Hospital	20	4	4	0	0	1	3	2	10
Huron Perth Healthcare Alliance	16	5	5	0	2	4	0	4	1
Huron District Hospital-North Simcoe Hospital Alliance	13	5	4	0	0	2	1	5	1
Joseph Brant Memorial Hospital	18	4	3	0	1	4	2	4	4
Kirkland and District Hospital	16	4	2	1	0	9	0	3	1
Lake of the Woods District Hospital	15	4	3	0	0	8	0	1	3
Lakeridge Health	21	4	3	2	1	5	5	3	2
Leamington District Memorial Hospital	17	4	3	0	0	3	0	7	4
Markham Stouffville Hospital	24	4	3	0	6	4	0	2	9
Muskoka Algonquin Healthcare	17	4	3	0	2	3	2	3	4
Niagara Health System	22	4	3	1	0	6	1	7	4
Norfolk General Hospital	17	5	2	1	0	10	1	2	1
North Bay General Hospital	16	3	2	2	0	6	2	1	3
North York General Hospital	30	5	3	0	0	8	1	9	9
Northumberland Hills Hospital	18	5	3	0	2	7	0	1	5
Orillia Soldier's Memorial Hospital	19	3	2	1	2	8	0	6	
Pembroke Regional Hospital	17	8	4	1	1	8	0	2	1
Perth and Smiths Falls District Hospital	14	5	3	0	1	3	0	5	2
Peterborough Regional Health Centre	20	4	3	0	1	4	2	3	7
Queensway Carleton Hospital	17	4	3	1	0	6	0	6	1
Quinte Health Care	6	0	1	0	1	1	0	1	2
Renfrew Victoria Hospital	17	4	2	0	2	7	0	5	1
Riverside Health Care Facilities Inc.	14	6	3	0	1	7	0	2	1
Ross Memorial Hospital	16	5	3	0	1	4	0	5	3
Rouge Valley Health System	21	4	3	0	0	5	0	5	8
Royal Victoria Hospital	15	5	3	0	2	4	0	4	2
Sault Area Hospital	16	5	4	0	1	6	0	2	3
South Bruce Grey Health Centre	17	2	1	0	1	3	1	8	3
Southlake Regional Health Centre	22	4	3	0	5	5	0	5	4

Appendix D Hospital Board of Directors Data, Continued¹

Board Configuration

Hospital	Board Size (people)	# of Inside Directors	# of Doctors on Board	# of Nurses on Board	# of Politicians on Board	# of Bureaucrats on Board	# of Educators on Board	# of Entrepreneurs on Board	# of Corporate Managers on Board
St. Joseph's Health Centre Toronto	19	6	4	0	0	10	0	3	2
St. Mary's General Hospital	20	6	4	2	3	4	0	2	5
St. Thomas-Elgin General Hospital	14	4	3	0	3	5	1	1	1
Strathroy Middlesex General Hospital	14	4	5	1	0	1	1	3	3
Temiskaming Hospital	14	5	4	0	0	5	3		2
The Brantford General Hospital	18	5	3	1	0	8	0	5	1
The Credit Valley Hospital	19	4	3	0	0	4	0	3	9
The Scarborough Hospital	17	4	5	0	0	2	1	2	7
Tillsonburg District Memorial Hospital	26	6	3	1	5	7	1	9	
Timmins and District Hospital	18	4	3	0	2	8	0	3	2
Toronto East General Hospital	18	4	3	0	0	2	1	4	8
Trillium Health Centre	18	5	3	0	0	6	0	2	7
West Lincoln Memorial Hospital	17	3	2	0	3	5	0	3	4
West Parry Sound Health Centre	14	3	1	0	1	7	1	4	
William Osler Health Centre	13	4	3	0	0	4	0	2	4
Winchester District Memorial Hospital	19	5	3	1	2	6	0	6	1
Windsor Regional Hospital	18	4	3	1	0	5	4		5
Woodstock General Hospital	20	6	3	0	2	6	1	5	3
York Central Hospital	24	5	4	1	2	4	1	6	6

N/A=Hospital board data not available due to reasons such as Provincial Supervision, board restructuring, or data unobtainable
¹= Hospital Annual Reports, Hospital Websites, Board Member C.V.s