THE IMPACT OF INDICATOR SELECTION PROCESSES ON HEALTH CARE MANAGERS' MOTIVATION TO IMPROVE PERFORMANCE

HEALTH CARE INDICATOR SELECTION PROCESSES AND THEIR IMPACT ON CLINICAL UNIT MANAGERS' MOTIVATION AND SELF-EFFICACY TO IMPROVE PERFORMANCE

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Lay Abstract

Over the past two decades, health care organizations have been mandated to monitor hundreds of performance indicators. Unintended consequences of these mandates have included over-measurement and paralyzed decision making. Health policy agencies have called for a reduction in the number of indicators monitored by health care organizations such as hospitals. Before one can reduce the number of indicators one monitors, one must first understand how indicators are selected, and how those processes motivate managers to improve performance. This dissertation addresses the research question, "How does the process of selecting indicators and their targets impact clinical unit managers' motivation and self-efficacy to improve overall performance?" Following a three-study approach, a scoping review on indicator selection processes; a qualitative multiple-case study of hospital indicator selection practices; and a qualitative multiple-case study on the role front-line managers have in indicator selection processes were completed. The paper develops a standardized indicator selection process framework; identifies deficiencies in hospital indicator selection processes; and uncovers that front-line clinical unit managers are not involved in, and by extension, are not motivated by hospital-wide indicator selection processes. This dissertation concludes that to increase clinical unit managers' motivation and self-efficacy to improve performance, indicator selection processes should involve them as participants, consider process indicators that measure quality, patient safety and clinical practice, and provide them training and more time to focus on performance improvement.

Abstract

Objective: It is unclear what processes health care organizations use to identify the performance indicators they use, how targets are set, who is involved, and what impact these processes have on performance. This dissertation develops a standardized indicator selection process framework, researches its applicability within real world-settings, and seeks to understand the impact those processes have on clinical unit managers' motivation and self-efficacy to improve performance.

Methods: Three studies, including a scoping review on international indicator selection processes; a qualitative multiple-case study of four hospital indicator selection practices; and a qualitative multiple-case study on the impact indicator selection processes have on 22 front-line clinical unit managers, were undertaken.

Results: Study One developed the 5-P Indicator Selection Process Framework; a practical structure health care agencies can use to design indicator selection processes. Study Two identified deficiencies in hospital indicator selection processes and proposed the need for adopting evidence-based selection criteria, considering finance and human resources indicators in addition to clinical indicators, adopting clearer approaches to target setting, and engaging a broader set of end-users in the process. Study Three found that clinical unit managers are often not involved in indicator selection, want to learn more about measurement, and are more likely to be motivated by process indicators that measure clinical quality and patient safety compared to outcome or business-based indicators that measure financial and human resources performance.

Conclusion: This dissertation's contributions include a new indicator selection process framework. It highlights that current processes have not sufficiently considered business-based indicators despite the economics of health care. It uncovers that front-line clinical unit managers are not involved in, and by extension, are not motivated by hospital-wide indicator selection processes. To increase clinical unit managers' motivation and self-efficacy to improve performance, indicator selection processes should involve them as participants, consider process indicators that measure quality, patient safety and clinical practice, and provide them training, orientation, and more time to focus on performance improvement.

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Five-plus years ago, I would never have imagined I would reach this point in my academic and professional career. While in the middle of a career transition, a coffee meeting with Dr. Glen Randall changed everything. It was then that Glen encouraged me to enter academia at the doctoral level, presenting the case that a terminal degree and its training would complement my career in health care management. After entering class in September 2017, completing comprehensive exams and this research though the COVID-19 pandemic, and successfully receiving a cardiac stent in my heart in 2021, here I am defending a piece of work and associated training I have grown to adore.

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List of Tables, Figures and Appendices

List of Abbreviations

AHP	Allied Health Professional
AIRE	Appraisal of Indicators through Research and Evaluation
CEO	Chief Executive Officer
CIHI	Canadian Institute for Health Information
COVID-19	Coronavirus Disease 2019
EHR	Electronic Health Record
HANYS	Hospital Association of New York State
HR	Human Resources
IOM	Institute of Medicine
KPI	Key Performance Indicator
NICE	National Institute for Clinical Excellence
NQF	National Quality Forum
OHA	Ontario Health Association
PPE	Personal Protective Equipment
PQI	Performance Quality Indicator
PRISMA-ScR	Preferred Reporting Items for Systematic reviews and Meta-Analyses – Scoping Review
QICA	Quality Indicator Critical Appraisal
QI	Quality Indicator
REB	Research Ethics Board
RN	Registered Nurse
WHO	World Health Organization

Declaration of Academic Achievement

This dissertation is comprised of five chapters: an introduction, three original research studies, and a conclusion. I, Michael A. Heenan, am the lead researcher and author of all five chapters. I was responsible for the conception, design, research, and writing of all studies, with support from my Ph.D. supervisor, Dr. Glen E. Randall. I was also supported by Dr. Jenna M. Evans and Dr. Erin M. Reid, who as members of my Ph.D. supervisory committee, provided advice on study methodologies and writing suggestions.

Study One (Chapter 2) was published in 2022. My co-authors were Dr. Randall and Dr. Evans. The paper's citation is:

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Chapter 1: Introduction

Background

Performance measurement in health care can be traced over 100 years to the works of Dr. Ernest Codman. In 1914, Dr. Codman, a surgeon at Massachusetts General Hospital, advocated for the collection and monitoring of clinical performance data using a concept he termed "end results cards". The idea was then as it is today: use data to identify opportunities to change practices and improve outcomes. At the time, Dr. Codman was alone in his view. Fellow medical staff who did not want to be evaluated or have their outcomes shared widely threatened to revoke Dr. Codman's medical staff privileges. As a result, Dr. Codman resigned and opened his own hospital to implement his vision. The American College of Surgeons adopted Codman's methods as a national standard in 1916.[1]

The modern equivalent to Dr. Codman's advocacy for measurement arguably begins over 23 years ago with the release of the Institute of Medicine's 1999 report that demonstrated that between 44,000-98,000 Americans lose their lives each year due to medical error.[2] In Canada, a 2004 research study reported approximately 7.5% of all Canadian hospital admissions resulted in an adverse event.[3] Since these reports, health care agencies in the United States, Canada and internationally have promoted the use of several best practices to improve and sustain quality patient care. One such practice is performance measurement, defined as the collection, use and public reporting of data for the purpose of quality improvement, accountability, and transparency.[4]

Multiple governments, regulatory agencies, accreditation institutes, and funding bodies mandate the monitoring of hundreds of indicators by health service organizations such as hospitals.[5-7] In the United States, the Centre for Medicare and Medicaid Services (CMS) monitors over 1700 indicators[8] and the National Quality Forum (NQF) approved indicator list

grew from 200 in 2005 to over 700 in 2011.[9] In Canada, over 300 quality indicators are reported by Ontario hospitals.[10] Measurement requirements are also mandated in the United Kingdom and Australia.[11]

Arbitrary, top-down mandates to collect and monitor indicators by central agencies contributes to the over-measurement of processes and often leads to unintended consequences. Large volumes of indicators can lead to mistrust between these regulatory bodies and front-line health service providers; data that does not necessarily reflect local contexts; and paralyzed decision making.[7,8,12-17]As a result, front-line clinical unit managers responsible for implementing changes at the point of care often do not understand the rationale for an indicator and feel inadequately prepared to implement action plans.[18-19]

These findings have led to calls for a more balanced approach to measurement in health care, suggesting that indicators should focus on measuring strategic goals and end-user value versus simply accounting for every process or input.[9-12] In recent years, the World Health Organization (WHO) urged health service organizations to prioritize measures that align with the specific information needs of those who use indicators for improvement.[20] The Institute of Medicine (IOM), National Quality Forum (NQF), and Canadian Institute for Health Information (CIHI) each completed indicator review exercises and recommended reducing the number of indicators monitored by health service organizations.[21-23] While these agencies share the same goal of reducing the number of indicators health service organizations should monitor, they do not use identical indicator selection criteria, do not include the same professional groups or end-users in their selection processes, and do not share similar validation processes.

Theoretical Framework: Goal-Setting Theory of Motivation

Goal-setting theory of motivation emphasizes the relationship between goals and performance.[24] The theory hypothesizes that the level of task performance a manager puts forth is influenced by a goal's content, intensity, and duration; the manager's ability; the manager's self-efficacy and confidence; the professional goals of the manager; or, a combination of all four of these attributes.[25] The theory states that the benefit to managers participating in goal setting processes is that they will provide greater effort toward achieving stated goals as they will have understood what is important and why.[24-25] The theory also states that when managers feel part of a broader team and are supported by leadership, their self-efficacy and motivation to improve performance is positively impacted.[24-26] Self-efficacy is an individual's belief and confidence in their capacity positively impact performance.[27]

Gaps in Literature and Theoretical Connection

Taking into consideration goal setting theory of motivation, this dissertation will address three gaps within the current literature on health care indicator selection processes.

The first gap is that while there have been several processes used to select indicators and targets, none share a common framework. While some selection processes utilize a Delphi consensus building methodology and may use criteria selection sets, such as the appraisal of indicators through research and evaluation (AIRE) instrument,[28] processes vary in how they set their aims, what guiding principles serve as their foundation, how they are governed, who participates in the process, and how they validate their decisions.

The second gap is that the vast majority of indicator and target selection processes in health care have only focused on selecting access, quality and patient experience indicators for

clinical disciplines or departments such as, but not limited to, emergency services, oncology, cardiology, surgery, obstetrics, and psychiatry. Little literature has been published on how health care organizations such as hospitals select their indicators at the organizational, corporate or governance level, or how these organizations select business-related indicators such as those that monitor finance, human resources, supply management and operational efficiency.

The third gap in the current literature relates to goal-setting theory of motivation. Given front-line, clinical unit managers are the management leaders closest to the delivery of care, the selection of indicators and targets must be informed and accepted by those who understand the local clinical context.[29-32] Process improvement is not only about adopting evidence prescribed by central agencies or authoritarian bodies, but includes the process of engaging those responsible for implementing the prescribed change.[29,33,34] Limited literature explores how indicator and target selection processes impact front-line clinical unit managers' motivation and self-efficacy to improve performance.

Research Questions

To address these gaps, this dissertation deployed a three-study approach focused on the overarching research question:

> How does the process of selecting indicators and their targets impact clinical unit managers' motivation and self-efficacy to improve performance?

Study One is a scoping review of indicator and target selection processes that summarizes what is currently known about the topic and results in the presentation of a new indicator selection process framework. Study Two is a qualitative, multiple-case study that uses the framework from Study One to analyze the indicator and target selection processes of hospitals.

Study Three is a qualitative, multiple-case study that investigates the role front-line clinical unit managers have in indicator and target selection, their perceptions of those processes, and the impact those processes have on their motivation and self-efficacy to use indicators to drive performance improvement. The populations for the three studies were designed like an inverted triangle (see Figure 1) with Study One focused on international evidence; Study Two focused on acute care hospital settings in Ontario, Canada; and Study Three focused on front-line, clinical unit managers within the same hospitals from Study Two.

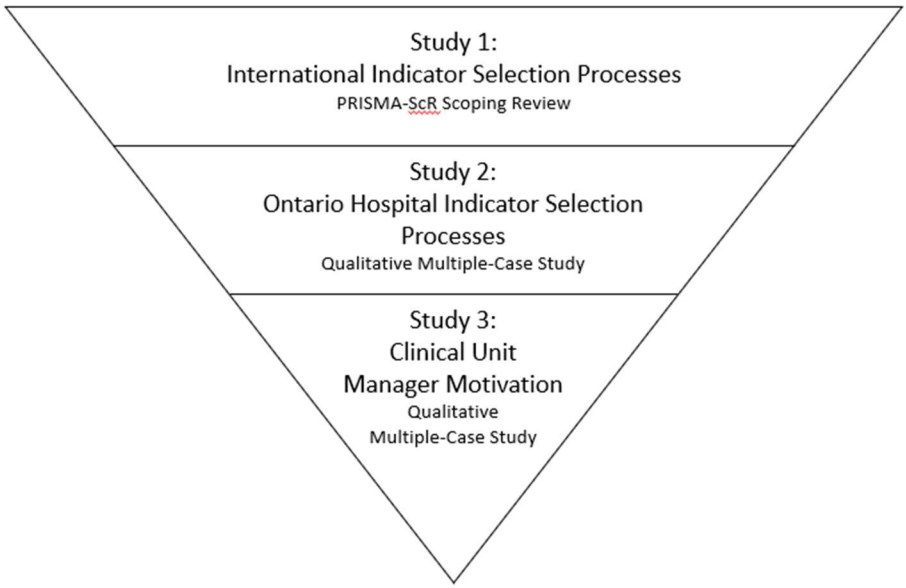

Figure 1: Dissertation Study Cascade - Macro, Meso, Micro Perspectives of Indicator Selection Processes

In focusing on these populations, the research question in each respective study were:

S1: How and by whom are health care performance indicators and targets selected in Commonwealth Fund countries?

S2: What processes do acute care hospitals in Ontario, Canada use to select performance indicators and how do they align with the 5-P Indicator Selection Process Framework?

S3: What role do acute care hospital clinical unit managers in Ontario, Canada have in selecting indicators and targets, what are their perceptions of the process, and how might the process impact their motivation and self-efficacy to improve performance?

In addressing these questions, Study One addresses gap 1 by creating a common indicator selection process framework. Study Two addresses gap 2 by examining how hospitals as organizational entities select performance indicators and compares them to the framework developed in Study One. Study Three is a follow-on study from Study Two and addresses gap 2 and gap 3 by studying how front-line, clinical unit managers are involved in indicator selection and what impact these processes have on their motivation ad self-efficacy to improve performance. The dissertation concludes with a summary of the three studies, the contributions the studies make to the literature, the management implications hospital leaders should consider in the selection and use of performance indicators and their targets, and what future research in this area might examine.

Taken collectively, this dissertation offers a new process framework and engagement approach to indicator selection that if used by organizations will result in the greater engagement of, and motivation and self-efficacy of front-line, clinical unit managers to improve performance.

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Chapter 2: Selecting performance indicators and targets in health care: An international scoping review and standardized process framework.

Abstract

Objective: Health care organizations monitor hundreds of performance indicators. It is unclear what processes and criteria organizations use to identify the indicators they use, who is involved in these processes, how performance targets are set, and what the impacts of these processes are. The purpose of this study is to synthesize international approaches to indicator selection and develop a standardized process framework.

Methods: Using the PubMed and Web of Science search engines, a scoping review of peer reviewed and grey literature following PRISMA-ScR guidelines was conducted to identify documents describing indicator selection processes used by health systems. English-language papers from 11 countries published from 2010-2020 were included. Papers were thematically analyzed to develop a standardized process framework.

Results: The review included 33 peer-reviewed papers and 11 grey-literature documents. While there are common practices used in health care to select indicators, no single standardized indicator selection process framework exists. Arbitrary or incomplete indicator selection processes risk over-measurement, lack of alignment with strategic and operational goals, lack of support by end-users, and paralyzed decision-making ability. By consolidating international practices, we developed the 5-P Indicator Selection Process Framework to mitigate process risks and support high quality indicator selection processes.

Conclusion: The 5-P Indicator Selection Process Framework consists of five domains and 17 elements and offers health care agencies a practical structure they can use to design indicator selection processes. The framework also provides researchers a basis by which the implementation of these processes may be evaluated.

Introduction

Over the past 20 years, governments and health care agencies have mandated the collection and monitoring of hundreds of indicators by health service organizations such as hospitals.[1,2] Indicators are defined as "measurable elements of practice performance" that relate to clinical, population health, financial, or organizational performance.[3] In the USA, the National Quality Forum (NQF) approved indicator list grew from 200 in 2005 to over 700 in 2011.[4] In Canada, over 300 quality indicators are reported by Ontario hospitals.[6] Health system managers in the USA and Canada, as well as the UK and Australia, submit that the emergence of over-measurement has negative consequences.[4-6] Arbitrary, top-down approaches to mandating the collecting and monitoring of indicators continue to contribute to over-measurement and data that does not necessarily reflect local context and stakeholder needs.[7-10] Large volume of measures can paralyze decision making.[1,11] The development of indicators without local input creates a lack of trust between providers, health service organizations and political bodies, and invites the gaming of metrics given organizations may economically benefit from higher comparative rankings.[6,9] The building of the information technology and data infrastructure required to support measurement has amplified the amount of data available, complicated decision making, and increased the financial cost of data collection to health care organizations.[4]

These findings have led to calls for a more balanced approach to measurement focusing on how indicators advance strategic goals and user-value.[4,11] The World Health Organization (WHO) urged organizations to prioritize measures that align with the specific information needs of those who use indicators for improvement.[7] The Institute of Medicine (IOM), National Quality Forum (NQF), Canadian Institute for Health Information (CIHI), and Statistics Canada completed indicator review exercises and recommended reducing the number of indicators

monitored by health care organizations.[12-14] Research papers also share indicator selection processes in areas like emergency medicine and primary care.[9,15,16] These reports describe different methods used to select indicators at the system or clinical service level. Despite these calls, inconsistent, arbitrary approaches to selecting indicators and targets may lead to variable quality and a lack of engagement that could prohibit those responsible for improving performance from taking action.[1,5,7,11,9]

Study Purpose

The following paper describes a scoping review to answer the question, "How and by whom are health care performance indicators and targets selected in Commonwealth Fund countries?" The review synthesizes different approaches used to select health care indicators and targets and proposes a standardized indicator selection process framework.

Methodology

A scoping review was completed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guideline.[17] PubMed and Web of Science search engines were utilized given their focus on biomedicine and health care, and coverage of multiple databases. Inclusion criteria consisted of articles published from 2010-2020, written in English, with a focus on acute care hospital services. Articles from the 11 countries in the Commonwealth Fund's annual comparison of health system outcomes (www.commonweathfund.org) were included. These countries, comprised of Australia, Canada, France, Germany, The Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom, and the United States, were selected given their health systems comparability. Key

words used within the literature search are in Appendix A. Exclusion criteria consisted of articles that were study protocols or systematic reviews; did not describe a selection process; involved non-hospital-based services; were not written in English; or were from non-Commonwealth Fund comparator countries.

A grey-literature search was conducted by identifying publicly available documents on government agency and health policy institutes' websites from each of the 11 Commonwealth Fund countries. Hand searching of 24 policy health institute websites resulted in identifying 83 documents for review of which 11 were included in this review. A listing of the institutes is available in Appendix B. In total, forty-four documents (thirty-three peer-reviewed and 11 grey-literature) met the criteria for final review. Figure 1 illustrates the PRISMA-ScR peer-reviewed literature search decision tree.

Figure 1: Peer Literature PRISMA-ScR Decision Tree

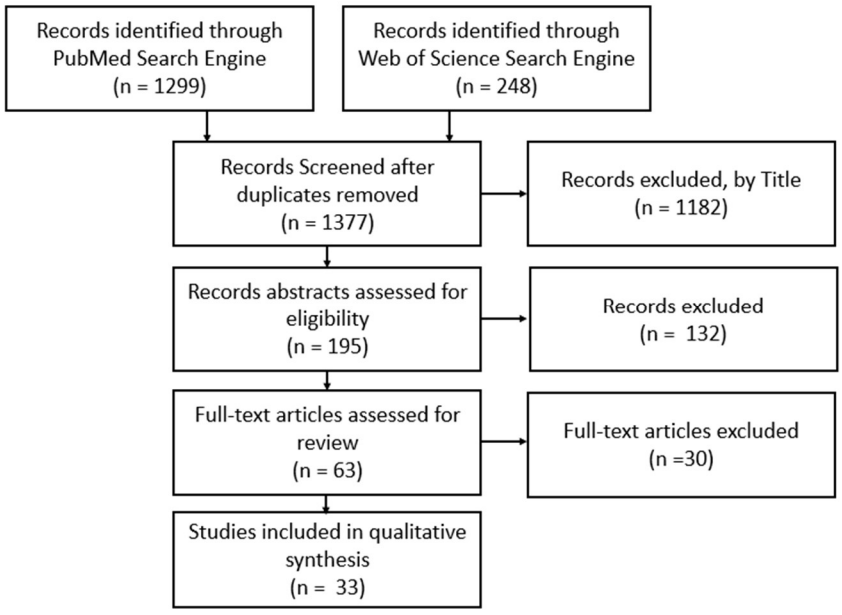

Figure Legend

Figure 1: The flow of study identification and selection according to PRISMA-ScR guidelines. PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

Data were systematically extracted from each of the included papers and was used to inform the development of a standardized process framework. This process included identifying common themes arising from the literature and arranging them under preliminary categories.[14] Initial categories included what is being selected (clinical indicators, business indicators, targets), rationale for the selection process, individuals involved in the process, steps used to prepare for the process, methods and criteria used to select indicators, and post-selection activities. The development of the framework was iterative with changes to categorization and wording as data extraction and thematic analysis progressed.

Results

Tables 1 and 2 summarize the country of origin and field of study of included papers, respectively. Tables 3 and 4 summarize the content of the peer-reviewed and grey-literature, respectively. Five themes emerged from the analysis of peer-reviewed and grey-literature documents: aim; governance; preparation; methodologies; and validation.

Table 1: Peer Reviewed and Grey Literature by Country

Country	Peer Reviewed Literature	Grey Literature
Australia	3	0
Canada	8	3
France	2	0
Germany	3	0
Netherlands	3	0
New Zealand	1	1
Norway	0	0
Sweden	0	0
Switzerland	1	0
United Kingdom	1	3
United States	11	4
Total	33	11

Table 2: Peer Reviewed and Grey Literature by Field of Study

Acute Care Clinical Area	Peer Reviewed Literature	Grey Literature
Cancer	4	0
Cardiology	4	0
Critical Care	1	0
Emergency Care	2	0
Geriatrics	1	0
Hospital or Health Systems	6	11
Infection Control	4	0
Maternity	2	0
Mental Health	1	0
Patient Safety	2	0
Pediatrics	3	0
Surgery	3	0
Total	33	11

Table 3: Scoping Review Peer-Reviewed Literature Summary

Article Info				Indicators Addressed			Consensus Method Used	Article Summary
First Author	**Year**	**Jurisdiction**	**Field of Study**	**Clinical Quality**	**Business Based**	**Target Setting**		
Aktaa[19]	2020	UK	Cardiology	Yes	No	No	Not Applicable	Paper proposes a 4-step process for KPI selection in cardiology, including identification of domains of care by constructing a conceptual framework; construction of candidate QIs via a systematic review of the literature; selection of a final set of QIs by obtaining expert opinions using the modified-Delphi method; and validation. Paper noted that expert panels have inherent bias. Therefore, expansion of participants is important mitigation.
Bianchi[20]	2013	Switzerland	Cancer	Yes	No	No	Modified-Delphi	Colorectal Cancer Quality Indicator (QI) selection process governed by an expert panel identified 27 QIs from an original list of 149. QIs were rated using a Likert Scale and within clinical categories that followed the care continuum. Validation of the final QI set of was led by an academic researcher. Noted limitation of physician only panel. Offers a template for indicator definition sheets.
Bramesfeld[21]	2015	Germany	Infection Prevention and Control	Yes	No	No	Modified-Delphi	Study identified 32 indicators for measuring the prevention and management of Catheter Related Blood Stream Infections. Process considered relevance and feasibility criteria. Panelists participated in a pre-survey workshop. QIs were classified as

								process, outcome or structural. Likert scale was used to rate QIs.
Casey[22]	2013	USA	Hospital System	Yes	No	No	Modified-Delphi	Paper summarizes a panel process that examined the relevance of nationally reportable indicators to rural hospitals. Process included an expert panel that voted on the indicators to give Rural hospitals direction on which indicators are best to be used and how they align to national indicator reporting. Categorized the indicators into clinical categories; Voting was noted but scale not described.
Chrusch[23]	2016	Canada	Critical Care	Yes	No	Yes	Nominal Group Technique	Paper describes a multiple case study in which conferences were held to have experts select indicators for comparing ICU performance. Organizations test indicators and report back on how they were used and the data results. Results identified 22 ICU indicators. Validation of indicators conducted.
Elliot[24]	2018	Australia	Hospital System	Yes	Yes	No	Modified-Delphi	Paper describes a 5-step process used to systematically select 20 indicators to monitor hospital strategic plan. 725 indicators were narrowed down to 110 by staff. Executives selected 20 clinical and business indicators. Five phases: (1) identification of potential indicators; (2) consolidation into a pragmatic set; (3) analysis of potential indicators against criteria; (4) mapping indicators to strategic plan; (5) key stakeholder presentation
Emond[25]	2015	Netherlands	Surgery	Yes	No	No	Modified-Delphi	Article describes a process that selected patent safety indicators in surgery. Process was governed by steering

								committee and expert panel of hospital leaders. 11 indicators were selected and validated in 8 hospitals. Patients and managers were on the panel.
Fekri[26]	2017	Canada	Hospital System	Yes	No	No	Modified-Delphi	Paper describes process used to select a national set of indicators. Technical group narrowed first set of metrics via quantitative survey followed by a consensus conference of end-users. 37 of 56 indicators were selected. Process included clear guiding principles.
Goldfarb[27]	2018	USA	Cardiology	Yes	No	No	Modified-Delphi	Systematic review of cardiology quality indicators was completed ahead of an international expert panel survey. Fifteen QIs were selected from an original list of 108, using a Likert scale. QIs were categorized as process, outcome or structural. Expert panel consisted of only physicians.
Grace[28]	2014	Canada	Cardiology	Yes	No	No	Modified-Delphi	Study identified quality indicators in cardiac rehabilitation. Process has three stages including ratings by working groups and validation of final QIs by stakeholders. Process resulted in a final list of 5 QIs from a list of 37. Qualitative and Quantitative validation of QIs was completed.
Gurvitz[29]	2013	USA	Cardiology	Yes	No	No	Modified-Delphi	Paper describes indicators selection process aimed at monitoring quality improvement for Adults with Congenital Heart Disease conditions. Expert Panel only included Physicians. 55 of 61 indicators were selected based on literature review and clinical guidelines. Indicators were not independently validated.

Guth[30]	2016	USA	Patient Safety	Yes	No	No	Kepner-Tregoe Decision Analysis	Case study report on process used to select indicators for a hospital quality scorecard. Governing committee and working groups, narrowed 750 indicators to 25. Process included metric collection; harm evaluation; metric viability; ability to implement; categorizing metrics; assess impact; and risk assessment.
Mangione-Smith[31]	2011	USA	Pediatrics	Yes	No	Yes	Modified-Delphi	Paper summarizes a process that selected quality indicators for a health insurance program. Voting on a Likert scale resulted in 25 of 199 indicators being chosen. Noted field testing was needed to set targets.
Martinez[32]	2018	USA	Hospital System	Yes	No	No	Participatory Design Approach	Article describes how a hospital prioritized metrics for an electronic dashboard. Resulted in 10 indicators mapped to the Donabedian framework of process, outcome, and structure. Process asked end-users about barriers to using indicators. Noted that different audiences need different indicators.
Mazzone[33]	2014	USA	Cancer	Yes	No	No	Modified-Delphi	Panel of physicians selected Quality Indicators (QIs) to evaluate lung cancer processes of care. Narrowed original list of 18 QIs to 7. Assessed indicators using clearly defined criteria. Assessed indicators using defined criteria. Validity included testing QIs in 3 organizations. Paper noted bias of physician only panel.
Moehring[34]	2017	USA	Infection Prevention and Control	Yes	No	No	Modified-Delphi	Study selected indicators to aid decision making in Antimicrobial Stewardship Programs. Process governed by a panel of physicians and pharmacists. Panel

								rated QIs against 4 questions versus defined criteria. 14 metrics were selected from an original list of 90 using a Likert scale.
Morris[35]	2012	Canada	Infection Prevention and Control	Yes	No	No	Modified-Delphi	Paper describes process where expert panel rated potential indicators using a set of criteria. Panelists rated indicators on a Likert scale and could add anonymous comments. Four indicators from an original list of 14 were selected. No patient or family member participated in process.
Perera[36]	2012	New Zealand	Hospital System	Yes	No	Yes	Not Applicable	Paper describes indicator framework. Framework includes prioritization of indicators; delineation of intent; implementation requirements; development of indicator specifications; assessment of indicator purpose, and target development. Paper notes indicators for one purpose may be inappropriate for another. indicator credibility relies on having defined purpose. Targets need to be developed based on current performance and understanding of barriers to attaining targets.
Profit[37]	2011	USA	Pediatrics	Yes	No	No	Modified-Delphi	Study selected indicators for neonatal intensive care units. Process resulted in 9 of 28 indicators aligned with IOM dimensions of quality using clear assessment criteria and indicator definitions. Expert panel did not include an administrator.

Reiter[38]	2011	Germany	Hospital System	Yes	No	No	QUALIFY Instrument	Paper describes selecting hospital quality indicators deemed suitable for hospital disclosure. Working groups of clinicians and representatives selected 31 of 55 indicators for disclosure.
Sauvegrain[39]	2019	France	Maternity	Yes	No	No	Delphi Survey	Paper describes process to select indicators for obstetrical care. Scientific committee and expert panel selected 13 indicators from a list of 28 that were derived from current database and literature review. Noted training ahead of process was not done but should be in future. Stated indicator targets should be discussed as an accompany process. Noted panel participants will have biases.
Schnitker[40]	2015	Australia	Emergency	Yes	No	No	Modified-Delphi	Study selected process quality indicators (PQIs) to monitor Emergency Department patients with cognitive impairment. Approach included building a list of PQIs based on a literature review. Process resulted in in 11 PQIs being selected from original list of 22. Process field tested indicators for data quality ahead of final selection. Noted a panel of local experts have biases and recommend involving outside experts.
Schull[16]	2011	Canada	Emergency	Yes	No	No	Modified-Delphi	Study selected national measures for Emergency Departments. Process resulted in selection of 48 of 170 candidate indicators. Categorized indicators by clinical domain. Noted when a panel is system-based it can underrepresent smaller and rural hospitals.

Science[41]	2019	Canada	Infection Prevention and Control	Yes	No	No	Modified-Delphi	Study identified metrics for Antimicrobial Stewardship programs. Process was governed by a steering committee and expert panel. Process resulted in the selection of 4 metrics. Noted that bias in panels can be mitigated by neutral facilitator.
Soohoo[42]	2010	USA	Surgery	Yes	No	Yes	Modified-Delphi	Study selected indicators for total joint replacement patients. Panel of orthopedic surgeons selected 68 indicators from an original list of 101. Field tested indicators for data quality and to inform the setting of targets.
Stang[43]	2013	Canada	Pediatrics	Yes	No	Yes	Modified-Delphi	Study identified indicators for high acuity pediatric conditions. An interdisciplinary advisory group selected 62 indicators from a list of 97. Noted that field testing of final indicators can inform potential benchmarks and targets.
Stegbauer[44]	2017	Germany	Mental Health	Yes	No	No	Modified-Delphi	Study selected indicators for schizophrenia. Expert panel narrowed 847 indicators to a list of 27 using 2 main criteria: relevance and schizophrenia. indicator had to be defined in terms of matching an outcome (goal) and be tied to a treatment (process). Patients were on panel.
Thern[45]	2014	Germany	Infection Prevention and Control	Yes	No	No	Modified-Delphi	Study selected 42 indicators from a list of 99. Process included surveying experts ahead of the development of an indicator list, a literature search, ranking of indicators using a Likert scale and an in-person conference.

								Stated that final list of indicators should be validated for data quality.
Tsiamis[46]	2018	Australia	Cancer	Yes	No	No	Modified-Delphi	Physician panel selected indicators to monitor radiotherapy for men with prostate cancer. Process included literature review and categorizing QIs along the continuum of care. 17 out of an original list of 114 QIs were selected. Noted physician only panel could have bias. Noted most QIs selected were process metrics.
van der Wees[47]	2019	Netherlands	Patient Safety	Yes	No	No	User Based Design	Paper proposed a framework to select Patient Reported Outcomes Measures. Framework developed using a design approach based on user needs and was guided by a project team of experts and end-user representatives.
Van Grootven[48]	2018	USA	Geriatrics	Yes	No	No	Delphi	Study selected indicators to evaluate in-hospital geriatric programs. 31 of 44 indicators were chosen using Likert scale against 2 criteria: appropriateness and feasibility. Panelists had at least 2 years of experience in geriatric medicine. Panel demographics balanced age and gender to ensure equity.
van Heurn[49]	2015	Netherlands	Surgery	Yes	No	Yes	Modified-Delphi	Panel of surgeons selected 24 neonatal surgical indicators an original list of 220. Paper emphasized importance of validation data and having external experts review final list for link to best practice. Study stated indicators need validation to inform targets.

Wood[50]	2013	Canada	Cancer	Yes	No	Yes	Modified-Delphi	Study selected indicators in Renal Cell Carcinoma. Panel selected 23 indicators from an original list of 34 that were generated from a literature search and panel input. Categorization of indicators followed continuum of care. Noted physician only panel should include other professions. Noted indicator data should be tested to inform targets.

Table 4: Scoping Review Grey-Literature Summary

Article Info				Indicator Type Addressed			Consensus Method Used	Article Summary
First Author	**Year**	**Jurisdiction**	**Field of Study**	**Clinical Quality**	**Business Based**	**Target Setting**		
Health Quality Ontario[51]	2016	Canada	Hospital	Yes	No	No	Modified-Delphi	Agency aimed to reduce number of patient safety indicators. 11 indicators selected from original inventory of 180. Structured process included clear aim, guiding principles, literature search, voting using a Likert scale, and involved representation from clinical experts, sector representatives and patients.
CIHI[13]	2015	Canada	System	Yes	No	No	Conference followed by Working Groups	Agency prioritized a national set of indicators. Document explains process of conference, criteria and post conference work that led to a manageable list. Broad representation but no patient or front-line manager. Had clear indicator assessment criteria. Conclusion noted requirement to validate indicators for data quality.
Ontario Hospital Association[52]	2019	Canada	Hospital	Yes	No	No	Modified-Delphi	Process aimed to reduce amount of measurement. Criteria used included public accountability, system monitoring, local monitoring and indicator retirement. Over 500 indicators reduced to 156 with 144 indicators retired. Expert panel did not include patients or frontline staff but noted they were required in future. Noted targets needed but did not address directly.
Health Quality and Safety Commission	2012	New Zealand	System	Yes	No	No	Modified-Delphi	Paper summarizes process used to select 17 indicators for public reporting and quality improvement. Process included a steering committee, advisory group, and a

New Zealand[53]								use of defined criteria. Panel included managers and patients.
The King's Fund[54]	2010	UK	System	Yes	No	Yes	Not Applicable	Paper provides guidance on measuring acute care quality. Key topics include defining measurement; identifying audiences and purposes of indicators; impact indicators and benchmarks have on staff; and steps to select indicators. Paper emphasizes indicators and targets will motivate or unintendedly harm users. As such, processes need to ensure data is tailored to right audience.
National Institute for Health and Care Excellence[55]	2019	UK	System	Yes	No	No	Modified-Delphi	Document describes how national system indicators were selected and how indicators are to be used. Document shares the principles and aims of indicator selection, committee structures, testing of indicators, and consultation with stakeholders. Validation included qualitative feedback from end-users. Process involved managers and public. Emphasizes regular review required for acceptability.
The Health Foundation [56]	2019	UK	System	Yes	No	No	Qualitative Interviews	Multiple-case study interviewed unit-level staff on how best to reduce indicators to manageable number to enable improvement. Categorized indicators into Donabedian framework and Patient Reported Outcome and Experience Measures. Assessment criteria included indicators being easily understood, relevant to area, and actionable.
Hospital Association	2016	USA	Hospital	Yes	No	Yes	Not Applicable	Discussion paper proposes indicator selection process. Processes should aim to have indicators match clinical reality and

of New York State[57]								allow improvement; include assessment criteria; use ranking methodologies; and validate indicators for data quality. Report suggests indicator assessment criteria should include fit with priorities; performance history; relevance; actionability; and financial impact.
National Quality Forum[14]	2019	USA	System	Yes	No	No	Modified-Delphi Process	Guide explains governance model, process and criteria used to select national indicators. Process included interdisciplinary membership, feedback from stakeholders ahead of and during process and clear assessment criteria. Indicators categorized using Donabedian framework of structure, process, and outcomes.
National Quality Forum[58]	2020	USA	System	Yes	Yes	No	Not Applicable	Paper discusses work of committee that examined definitions, best practices, data issues and impact of measurement. Paper offers a four-step process to assess and select indicators and noted costs and efficiency indicators should be considered. Paper stated processes should include education on how to use indicators.
Institute of Medicine[59]	2015	USA	System	Yes	No	Yes	Modified-Delphi Process	Paper proposes 15 indicators that measure health outcomes while reducing burden of measurement on clinicians and enhancing transparency and comparability. Report provides an overview of process followed, including criteria set used. Calls on system to test indicators for both statistical and face validity.

Aim:

The first theme addresses the rationale an indicator and target selection process is conducted. Subthemes that arose to form this theme included describing an aim statement (100% of peer-reviewed and 100% of grey-literature documents); offering a set of principles to guide the work (30.3% of peer-reviewed and 72.7% of grey-literature documents); and identifying the system or organizational unit in which the work is based (100% of peer-reviewed and 100% of grey-literature documents).

Peer-reviewed literature focused on specific organizational units measuring discrete clinical processes or outcomes, whereas grey-literature focused on system level indicators that address quality and patient safety. As a result, peer-reviewed papers' aim statements are more narrowly defined than those found in the grey-literature. Values such as openness, transparency, and accountability were frequently cited as being part of a set of guiding principles.[26,30,31,38,53,55] Papers that described selection processes within clinical areas stressed that indicators should match the care continuum, so they are representative of the patient journey and clinical practice.[23,42,46]

All documents noted the system or organizational unit the process was designed to inform.[13,14,16,19-59] Indicator selection processes must consider the intended use of the indicator given indicators can be used for a variety of reasons, including accountability, process improvement, and public reporting.[32,36,47,42,55,56]

Governance:

Governance oversight of indicator and target selection processes is the second theme. Subthemes included identifying structures that provide an oversight function (97.0% of peer-

reviewed and 100% of grey-literature documents), and the identification and recruitment of process participants (93.9% of peer-reviewed and 72.7% of grey-literature documents).

Documents shared two models of governance. The first model is a single-body governance structure where the process is managed and conducted by one steering committee or expert panel.[20-22, 24, 27, 31-35, 37,39-57] The second model is a multi-body structure that has a steering committee responsible for managing the process and offering recommendations, but also includes sub-committees or expert panels that assist with literature reviews, data collection, and assessments.[13,14,16,19,23,25-26,29,30,38,51-53,58,59]

Most documents identified who participated in indicator and target selection processes. Several peer-reviewed papers revealed studies that involved only physicians,[20,27,29,33,42,46,49,50] while other studies incorporated broader representation from areas such as nursing, allied health, research, quality, and administration.[13,14,16,19-24,26,28,31,32-35,37-41,43-45,48, 43-55,56,58] Some indicator selection processes involved patients and family members, noting that their contribution ensured indicators connected with the consumer of services.[14,19,21, 25,38-40,44,47,51,53,55,58,59] Studies using only physicians and nurses cited their clinical backgrounds as a strength but acknowledged the need to expand participation to mitigate medical biases.[19,29,33,46,48,50] Studies that had expert panels with broader memberships believed that broader participation enabled a more inclusive view of the care process.[13,16,19,21,25,40,42,51,52,54,55,59] One study required panelists to have at least 2 years of clinical experience, and a balance of gender representation to ensure experience and equity perspectives are considered in the selection of indicators.[48]

Preparation:

Five sub-themes emerged to create the third theme: preparation. These sub-themes consisted of seeking early input from end-users on their indicator needs (21.2% peer-reviewed and 36.4% grey literature documents); reviewing literature and evidence-based guidelines (87.8% peer-reviewed and 36.4% of grey-literature documents); compiling an indicator inventory and definition list (100% of peer-reviewed and 100% of grey-literature documents); placing indicators into categorical themes (84.8% of peer-reviewed and 81.8% of grey-literature documents); and, developing participant orientation and training materials (33.3% of peer-reviewed and 36.4% of grey-literature documents).

All documents described an indicator selection process that involved consulting data libraries, peer-reviewed literature, and clinical guidelines to create an inventory of potential indicators. Documents stated that a final list of indicators built from comprehensive sources improves their relevancy to end-users while enabling future comparability and benchmarking.[13,14,16,19-59]

Documents that sought end-user input upfront on indicator knowledge and user requirements [13,20,21,32,42,45,47,50,52,55,56] and issued orientation materials[13,14,20,21,26,32,37,38,40,44,46,50,54,58] reported increased participant engagement and improved understanding of the process among participants.

Process Methodologies:

The fourth theme speaks to the methodologies used to assess and recommend indicators and targets. This theme emerged from documents that described consensus building methods (97.0% of peer-reviewed and 90.9% of grey-literature documents); facilitation (24.2% of peer-

reviewed and 89.7% of grey-literature documents); indicator assessment criteria (100% of peer-previewed and 90.9% of grey-literature documents); and rating methods by which indicators were assessed (90.9% of peer-reviewed and 54.5% of grey-literature documents).

Studies that utilize consensus building processes, such as a modified-Delphi approach, involved issuing surveys to seek input on the number of indicators to be considered, followed by an in-person or online web conference to finalize the selection. [12,16,20-22,24-29,31,33-35,37,40-46,49-53,55,59] These consensus-building processes increase validity with participants[12,16,20-22,24-29,31,33-35,37,40-46,49-53,55,59] Several papers reported that processes facilitated by a neutral expert minimized steering committee or expert panel bias.[16,20,30,35,38,41,49] Common indicator assessment criteria include relevance, scientific soundness, feasibility, and usability, as per the Appraisal of Indicators through Research and Evaluation (AIRE) tool.[13,14,19,19-60] Analytically, studies generally ranked indicators using Likert scales from 1-7 or 1-9.[20,21,25, 26, 29,30,31,33-35,37,40,42-46,48,50] Two studies allowed participants to provide qualitative feedback on indicators between modified-Delphi rounds.[34, 48]

Validation:

The final theme, validation, emerged in two forms: quantitatively testing for data quality (39.4% of peer-reviewed and 63.6% of grey-literature documents) and qualitative feedback from end-users on face validity (21.2% of peer-reviewed and 63.6% of grey-literature documents). Processes that statistically tested indicators for data quality emphasized the increased scientific soundness of the indicators[14,16,19,23,25,28,30,33,36,39,41,43,47,49,54-56,58,59] and resulted in better informed target setting.[43] Processes that validated a final list of indicators with end-users reported

improved relevance and usability by users, especially in cases where the expert panels did not include front-line directors, managers, or patients.[13,14,21,23,28,30,36,37,44,54-56,58,59]

Target Setting

No document summarized a process that directly addressed the setting of indicator targets or benchmarks. Literature that made suggestions in this area emphasized that targets and benchmarks need to be better defined and understood by end-users.[23,31,36,42,43,49,50,54-57] Benchmarks have limitations as they are generally based on a subset of performance units versus an agreed upon best practice. Benchmarks are not necessarily the required target given a unit's indicator performance may already have exceeded the benchmark. Thus, an indicator target may be intended to simply maintain performance.[23,31,36,42,43,49,50,54,56] Similarly, given that performance on an indicator may be behind the benchmark, incremental improvement towards the benchmark may be a more appropriate target.[54,57] Targets may also distort practice choices or not reflect the care needed at the patient level given targets generally measure macro-outcomes at the population level versus operational realities. As such targets must be set carefully by testing for scientific soundness and relevance to end-users.[23,31,36,42,43,49,50,54]

Discussion

This scoping review identified 44 documents that addressed the research question, "How and by whom are health care performance indicators and targets selected in Commonwealth Fund countries?" The review demonstrates that structured indicator selection processes are generally governed by steering committees or expert panels, are guided by clear aim statements, involve literature searches on potential indicators, use consensus seeking methods, categorize

indicators as process, outcome, or structure metrics, and align indicators to categories such as strategic themes or clinical care processes. Not all documents describe preparation and validation stages. Only a few studies engaged end-users up front about how they use indicators or validated the relevance of the chosen indicators with stakeholders after indicators were selected. Similarly, only a few studies tested selected indicators for data quality. No paper directly addressed targets, but some advocated for testing data to ensure benchmarking could occur.

Most papers focused on clinical access and quality indicators and did not address medical education, system-level, or business-related indicators in areas such as finance, human resources, and supply chain. As such, governors of indicator selection processes should be mindful that health care managers, administrative leaders, and other clinical actors have many more indicators to manage that only those related to quality and patient safety.

Indicator selection processes varied in who participated, in particular, those included on expert panels. Findings seem to indicate that, given the multidisciplinary nature of health care delivery and the need to ensure indicators match the information needs of end-users, indicator selection processes should be inclusive and equitable.[7,48] No study directly addressed how to set performance targets. Moreover, given that indicators are used as an instrument to help advance performance, findings suggest that those responsible for indicator selection and target setting should ensure end-users understand and provide input on the targets they are accountable for achieving.

While all documents described steps of an indicator selection process, no process included each component identified in the thematic analysis. Incomplete indicator selection processes risk over-measurement, the lack of prioritizing strategic and operational goals, lack of support by end-users, and paralyzed decision-making ability.[2-4,7,11] These gaps present an

opportunity to build a standardized framework that can assist organizations in developing a comprehensive indicator and target selection process.

The 5-P Indicator Selection Process Framework

The themes extracted from each of the papers lead to the development of a standardized process framework. The 5-P Indicator Selection Process Framework consists of five domains and 17 elements. The framework's first domain, "Purpose", sets out the reasons why an indicator selection and target setting process is undertaken. By stating the process aim, the principles used to guide the process, and the organization level in which the indicators will be used, organizations can facilitate a shared understanding of the rationale they are trying to achieve. The second domain, "Polity", identifies the governance structures that manage the selection process, how the process will be resourced, and who will participate. The third domain, "Prepare", addresses how to plan for selection. Elements include asking potential users about their experience with indicators, researching literature and best practices, developing a defined inventory of potential indicators, categorizing indicators into strategic themes, and delivering training or orientation materials and programs. The fourth domain, "Procedure", describes the steps used to assess indicators and targets and gain consensus. Elements include consensus building methods, facilitation, assessment criteria, analytical assessment of potential indicators, and target-setting. The final domain of the framework is "Prove". This domain describes the validation processes used to test any final set of indicators for data quality and relevance with end-users. Table 5 summarizes each domain and element.

Table 5: The 5-P Indicator Selection Process Framework

Domain	Elements	Element Description
Purpose	Clarify Aim	Articulate the rationale for conducting an indicator and target selection exercise. By stating the process aim, whether it is to align indicators to an operational process, a strategic plan, a regulatory requirement, or public reporting, the work can be scoped properly.
	Develop Guiding Principles	Establish principles to ensure participants understand the values by which the process is being conducted. Principles may include openness, transparency, scientific soundness, relevance, accountability, scope, and span of control.
	Identify Level of Use	Identify the organizational unit that will use the indicators to ensure relevancy to end-users. As an example, indicators used by a board to monitor quality outcomes may be different than indicators selected by a clinical unit focused on process improvement.
Polity	Build Governance Structures	Identify a structure that will manage indicator and target selection to ensure it is completed. These structures may include a steering committee, a project management team, a data quality advisory group, and an expert panel that will assess potential indicators and targets.
	Recruit Participants	Select and recruit expert panel members. Panels should be diverse and multi-disciplinary to ensure equity and a broad view of how indicators and targets will be used. Composition of panels should consider the process aim and level of use when selecting participants.
Prepare	Seek End-User Input	Seek input from end-users to understand their experiences with the potential indicators under consideration and solicit ideas on the draft criteria they may recommend in evaluating indicators.
	Research Evidence-Based Literature	Identify the range of indicators used in their area or that are required by regulation. A search of literature and evidence-based guidelines, and government mandated indicators will help organizations identify a comprehensive set of indicators to assess.
	Build an Inventory of Potential Indicators	Compile a comprehensive list of indicators with definitions and data sources, so participants understand each indicator to be evaluated. If the process addresses target selection, the nature of the target (e.g., past performance, benchmark, best practice) should be explained.

	Categorize Potential Indicators into Strategic Themes	Categorize indicators into themes aligned with the organization's strategy, quadrants of the balanced scorecard, or the Donabedian framework of outcomes, process, and structure. By creating categories, process participants and end-users will better understand the linkage an indicator has with the identified purpose.
	Orient and Train Participants	Provide participants with orientation materials on the process aim, definition and purpose of each indicator, potential targets, and methods they will use to recommend indicators and targets.
Procedure	Utilize a Consensus Building Method	Identify and use a recognized consensus building method such as the Delphi, modified-Delphi, or Normative Group Technique. This is particularly important when indicators are being identified to measure a new strategy compared to a quality improvement project.
	Identify a Facilitator	Select an independent facilitator so as to not bias the process. The facilitator should be a third-party, or a neutral party from an organization's performance measurement department.
	Indicator Selection Criteria	Set criteria by which the assessment of indicators will be based. Common criteria include those prescribed by the Appraisal of Indicators through Research and Evaluation (AIRE) tool such as relevance, scientific soundness, feasibility, and validity. Criteria may change based on the aim statement and level of use described in the "Purpose" domain.
	Analytically Assess Indicators	Identify a Likert assessment scale participants will use to evaluate indicators against criteria, and how assessments will be completed, either via survey, in person, or both.
	Set Indicator Targets	Assign a target for each indicator. Considerations may include maintaining performance if the current indicators result is ahead of a benchmark, attempting to reach a benchmark if performance is behind ideal performance, or making progress towards the benchmark should it be deemed unattainable within the period in which the indicator is being measured.
Prove	Assess Data Quality	Validate the final list of indicators by testing data quality. Processes may wish to defer the setting of specific indicator targets until after this phase to ensure targets are based on valid data trends.

	Validate with End-Users	Seek feedback from end-users on the relevance the final set of indicators and targets have to their environment and performance requirements, and whether the identified target motivates the end-user to implement improvement actions.

Whereas previously published constructs such as the Appraisal of Indicators through Research and Evaluation (AIRE) Instrument[60] and the Quality Indicator Critical Appraisal (QICA) tool[8] suggest criteria to guide which individual indicators should be considered, the 5-P Indicator Selection Process Framework offers a standardized process that governs and guides the overall process. Organizations that are mature in their performance measurement capabilities may use the framework to assess their current process and identify targeted opportunities for improvement. Less mature organizations and organizations undergoing transformations that may influence the number or type of indicators they measure should consider adopting the framework in whole. By adopting the framework, organizations will have a clear purpose for selecting indicators; adopt governance models that enhance equitable participation from multiple stakeholder groups, including patients; select indicators based on evidence-based criteria; and ensure indicators match end-users needs by validating any final set of indicators.

Limitations

The scoping review focused on clinical services generally found within acute care hospital settings. Future research should include articles on primary care and post-acute care to validate or extend the proposed framework. Only one individual screened and reviewed the papers in this review. To mitigate potential biases, the reviewer regularly debriefed with other members of the research team on inclusion and exclusion decisions. The 5-P Indicator Selection

Process Framework is the result of a scoping review and has not been validated in real-world settings. Future research may involve validating the framework by assessing it in practice.

Conclusion

This paper began by describing the proliferation of measurement in health care and risks associated with inconsistent indicator section processes. The overabundance of indicators has paralyzed decision making, and eroded trust between those who ask for indicators and those who are expected to use them to make change. Many policy institutes and academics have called for a more appropriate, lower number of indicators. Indicator selection or reduction processes cannot occur by happenstance. The adoption or elimination of indicators should be guided by the 5-P Indicator Selection Process Framework to ensure a systematic, evidence-based, and inclusive approach that engages measurement experts and those who use indicators to monitor and improve performance in both selection and validation.

The 5-P Indicator Selection Process Framework provides a practical, standardized structure that health care agencies, hospitals, and clinical disciplines can use to guide the selection of performance indicators and targets. The 5-P Indicator Selection Process Framework may also act as an implementation framework by which researchers evaluate how health care agencies select indicators and targets.

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Appendix A: Literature Search Data Bases and Search Terms

Literature Search Databases:

PUBMED: https://pubmed.ncbi.nlm.nih.gov/

Web of Science: https://clarivate.com/webofsciencegroup/solutions/web-of-science/

Search Terms:

(Healthcare OR Health Care OR Hospital) AND (Key Performance Indicator Selection Process OR Quality Indicator Selection Process OR Metric Selection Process) AND (Canada OR United States OR United Kingdom OR Sweden OR Switzerland OR The Netherlands OR Norway OR Germany OR France OR Australia OR New Zealand) AND (Emergency OR Surgery OR Maternity OR Critical Care OR Intensive Care OR Cancer OR Cardio or Medicine OR Infection OR Pediatrics OR Mental Health OR Psychiatry OR Hospital OR Patient Safety)

Appendix B: Grey Literature Search – Health Policy Institute Websites

Table 6: Grey Literature Search – Health Policy Institutes Websites

Country	Institutes	Website
Australia	Australian Commission on Healthcare Quality and Safety	https://www.safetyandquality.gov.au/
	Australian Healthcare and Hospitals Association	https://ahha.asn.au/publication
Canada	Canadian Patient Safety Institute	www.patientsafetyinstitute.ca
	Canadian Institute for Health Information	www.cihi.ca
	Ontario Hospital Association	www.oha.com
France	Haute Autorite de Sante	https://www.has-sante.fr
Germany	The independent Institute for Quality and Efficiency in Health Care	https://www.iqwig.de/en/home.2724.html
Netherlands	Danish Society for Patient Safety	https://patientsikkerhed.dk/english/
New Zealand	Health Quality & Safety Commission New Zealand	https://www.hqsc.govt.nz/
Norway	Norwegian Institute of Public Health	https://www.fhi.no/en/qk/healthservice-quality/
Sweden	The Swedish Institute for Health Economic	https://ihe.se/
Switzerland	Federal Office of Public Health on the quality and safety of healthcare in Switzerland	https://www.bag.admin.ch/bag/en/home.html
United Kingdom	The King's Fund	https://www.kingsfund.org.uk/
	Health Foundation	https://www.health.org.uk/
	Nuffield Trust	https://www.nuffieldtrust.org.uk/
	National Institute for Health and Clinical Excellence (NICE)	https://www.nice.org.uk/
	NHS	https://www.nhs.uk/
United States	Institute for Healthcare Improvement	http://www.ihi.org/
	Agency for Healthcare Research and Quality	https://www.ahrq.gov/
	National Quality Forum	http://www.qualityforum.org
	American Hospital Association	https://www.aha.org/
	National Academy of Medicine (Institute of Medicine)	https://nam.edu/
	Commonwealth Fund	https://www.commonwealthfund.org/
	Hospital Association of NY State (HANYS)	https://www.hanys.org

Chapter 3: What processes do hospitals use to select performance indicators and do they align with best practices? A multiple-case study of four hospitals in Ontario, Canada.

Abstract

Objective: Health policy institutes recommend reducing the number of indicators monitored by hospitals to better focus on those indicators most relevant to local contexts. To reduce the number of indicators, one must first understand how indicator selection processes are undertaken. This study classifies hospital indicator selection processes and analyzes how they align with best practices outlined in the 5-P Indicator Selection Process Framework.

Methods: This qualitative, multiple-case study examined indicator selection processes used by four acute care hospitals in Ontario, Canada. Data was collected through semi-structured interviews and document analysis. A thematic analysis compared processes to the 5-P Indicator Selection Process Framework.

Results: Three types of hospital indicator selection processes were identified. Hospitals deploy most elements found within the 5-P Indicator Selection Process Framework including setting clear aims, having governance structures, considering indicators required by health agencies, and categorizing indicators into strategic themes. Framework elements largely absent include adopting evidence-based selection criteria, considering finance and human resources indicators as well as clinical quality and patient safety indicators, considering if indicators measure structure, process or outcomes, adopting clearer approaches to target setting, and engaging a broader set of end-users in the selection process.

Conclusion: Current hospital indicator selection processes only partially mirror the domains and elements within the 5-P Indicator Selection Process Framework. Not engaging end-users such as clinical unit managers in the process of selecting indicators may risk hospitals to choosing too many indicators that are not reflective of front-line operations or valued by those end-users accountable for improving unit level performance.

Introduction

Over the past 20 years, governments and health care agencies around the globe have mandated the monitoring of hundreds of key performance indicators by health care organizations such as hospitals.[1-7] The overabundance of indicators in health care has negative consequences. Due to the arbitrary top-down mandate of collecting indicators by government and funding bodies, data does not necessarily reflect local contexts.[1,8-10-12] The large volume of measures has paralyzed decision making.[1,10] The use and public reporting of indicators without local input creates distrust between providers, health care organizations and political bodies.[3,4,7] The building of the information technology and data infrastructure required to support measurement has amplified the amount of data available and increased the financial cost of data collection to health care organizations.[1,3,5,7]

In recent years, health policy institutes have called for a balanced approach to measurement by advocating that strategy and end-user value inform the selection of indicators.[1-7] The Institute of Medicine (IOM), National Quality Forum (NQF), Hospital Association of New York State (HANYS), Canadian Institute for Health Information (CIHI), Ontario Hospital Association (OHA), and Health Quality and Safety Commission of New Zealand, have all recommended reducing the number of quality, patient safety and patient experience indicators monitored by health care organizations.[13-18] However, to reduce the number of indicators, one must first understand the processes that health care organizations currently use to select indicators.

The 5-P Indicator Selection Process Framework offers health care organizations such as hospitals an evidence-based, practical structure to design indicator selection processes.[19] Illustrated in Table 1, the 5-P Indicator Selection Process Framework stemmed from a scoping

review of international indicator selection processes and consists of five domains (Purpose, Polity, Preparation, Procedure and Prove) and contains 17 elements.[19] The framework has not previously been applied in empirical research. This study represents the first real world assessment of hospital indicator selection processes using the 5-P Indicator Selection Process Framework.

Table 1: The 5-P Indicator Selection Process Framework

Domain	Elements	Element Description
Purpose	Clarify Aim	Articulate the rationale for conducting an indicator and target selection exercise. By stating the process aim, whether it is to align indicators to an operational process, a strategic plan, a regulatory requirement, or public reporting, the work can be scoped properly.
	Develop Guiding Principles	Establish principles to ensure participants understand the values by which the process is being conducted. Principles may include openness, transparency, scientific soundness, relevance, accountability, scope, and span of control.
	Identify Level of Use	Identify the organizational unit that will use the indicators to ensure relevancy to end-users. As an example, indicators used by a Board to monitor quality outcomes may be different than indicators selected by a clinical unit focused on process improvement.
Polity	Build Governance Structures	Identify a structure that will manage indicator and target selection to ensure it is completed. These structures may include a steering committee, a project management team, a data quality advisory group, and an expert panel that will assess potential indicators and targets.
	Recruit Participants	Select and recruit expert panel members. Panels should be diverse and multi-disciplinary to ensure equity and a broad view of how indicators and targets will be used. Composition of

		panels should consider the process aim and level of use when selecting participants.
Prepare	Seek End-User Input	Seek input from end-users to understand their experiences with the potential indicators under consideration and solicit ideas on the draft criteria they may recommend in evaluating indicators.
	Research Evidence-Based Literature	Identify the range of indicators used in their area or that are required by regulation. A search of literature and evidence-based guidelines, and government mandated indicators will help organizations identify a comprehensive set of indicators to assess.
	Build an Inventory of Potential Indicators	Compile a comprehensive list of indicators with definitions and data sources, so participants understand each indicator to be evaluated. If the process addresses target selection, the nature of the target (e.g., past performance, benchmark, best practice) should be explained.
	Categorize Potential Indicators into Strategic Themes	Categorize indicators into themes aligned with the organization's strategy, quadrants of the balanced scorecard, or the Donabedian framework of outcomes, process, and structure. By creating categories, process participants and end-users will better understand the linkage an indicator has with the identified purpose.
	Orient and Train Participants	Provide participants with orientation materials on the process aim, definition and purpose of each indicator, potential targets, and methods they will use to recommend indicators and targets.
Procedure	Utilize a Consensus Building Method	Identify and use a recognized consensus building method such as the Delphi, modified Delphi, or Normative Group Technique. This is particularly important when indicators are being identified to measure a new strategy compared to a quality improvement project.

	Identify a Facilitator	Select an independent facilitator so as to not bias the process. The facilitator should be a third-party, or a neutral party from an organization's performance measurement department.
	Indicator Selection Criteria	Set criteria by which the assessment of indicators will be based. Common criteria include those prescribed by the Appraisal of Indicators through Research and Evaluation (AIRE) tool such as relevance, scientific soundness, feasibility, and validity. Criteria may change based on the aim statement and level of use described in the "Purpose" domain.
	Analytically Assess Indicators	Identify a Likert assessment scale participants will use to evaluate indicators against criteria, and how assessments will be completed, either via survey, in person, or both.
	Set Indicator Targets	Assign a target for each indicator. Considerations may include maintaining performance if the current indicators result is ahead of a benchmark, attempting to reach a benchmark if performance is behind ideal performance, or making progress towards the benchmark should it be deemed unattainable within the period in which the indicator is being measured.
Prove	Assess Data Quality	Validate the final list of indicators by testing data quality. Processes may wish to defer the setting of specific indicator targets until after this phase to ensure targets are based on valid data trends.
	Validate with End-Users	Seek feedback from end-users on the relevance the final set of indicators and targets have to their environment and performance requirements, and whether the identified target motivates the end-user to implement improvement actions.

Study Purpose

The following qualitative, multiple-case study investigates the research question: "What processes do acute care hospitals in Ontario, Canada use to select performance indicators and how do they align with the 5-P Indicator Selection Process Framework?".

Methodology

This study deployed an exploratory approach based on a multiple-case qualitative study design and included two data collection methods: semi-structured informant interviews and document analysis.[20,21]

Population Sample and Recruitment

Purposeful sampling was used to select cases based on hospital type. Four large community, multi-site acute care hospitals offering services in emergency medicine, medicine, surgery, obstetrics, mental health, and surgery and operating at least 400 inpatient beds were included in the study. These hospitals also reported annual revenues of greater than $400M.[22] These parameters ensured the hospitals were of a certain size, comparable in their service offerings and administrative capacity, and subject to similar reporting requirements internally to their organization, and externally to government and other health information institutes.

Permission for the hospital to participate was solicited through written communication with each hospital's President and Chief Executive Officer. McMaster University's and all four hospitals' Research Ethics Boards (REB) approved the project. Senior management leaders responsible for the collection and reporting of these indicators within each hospital were interviewed. Senior management leaders interviewed held titles such as Vice-President or

Director and were responsible for clinical services, strategy and performance, finance, decision support and business analytics, or human resources portfolios. Interview data collected from senior management leaders was aggregated into thematic findings to ensure informant contributions were anonymous, protected from social risks, and reflected a common hospital perspective rather than relying on a single participant to represent the hospital.

Data Collection

A study invitation, consent form, copy of the 5-P Indicator Selection Process Framework, and interview protocol were emailed to respondents in advance of scheduled interviews. Interviews were conducted between June 2021 and August 2021, audio recorded using digital meeting software, transcribed, and completed in approximately 45-60 minutes. The interview protocol asked respondents to consider their hospital's most recent indicator selection and target setting process and compare it to each of the 5-P Indicator Selection Process Framework's domains. Participants were also asked to reflect on the role front-line clinical unit managers played in indicator selection and what type of indicators motivated managers to improve performance. A copy of the interview protocol is in Appendix A.

Following semi-structured interviews, document analysis was conducted. Hospital indicator scorecards, data reports, presentations, and briefing notes were obtained through each hospital's research offices. Documents were analyzed against the 5-P Indicator Selection Process Framework and triangulated with participants' descriptions of their indicator selection processes.[21] A table outlining the documents reviewed from each hospital is in Appendix B.

Data Analysis

Data analysis mapped each hospital's process to the 5-P Indicator Selection Process Framework. Interviews and documents were coded first by deductive, then inductive coding.[20] Deductive codes were developed based on the 5-P Indicator Selection Process Framework. These deductive codes enabled a comparison of broad themes that participants shared in their interviews to the framework's five domains. For example, deductive codes included "Purpose" and "Procedure". Inductive coding enabled a closer analysis of the relevance of the framework's 17 elements to the practices that participants described. For example, inductive codes developed from interviews included "Quality and Safety" and "Funding". After all interviews were coded, a comparison of the codes was performed to develop a single triangulated description of each hospital's approach. Deductive and inductive codes are listed in Appendix C.

Member checking was completed to ensure data collected via interviews was validated by respondents.[20] Each respondent who participated received an aggregated summary of their organization's data and was asked to verify its accuracy. All summaries were accepted.

Results: Case Findings

Across the four cases, 13 senior management leaders were interviewed with three respondents from Case A, Case B, and Case D, and four respondents from Case C. Three types of indicator selection processes were identified and are described in Table 2.

Table 2: Ontario Hospital Indicator Selection Process Types

No.	Process	Description
1	Informal, Undocumented, Senior Management Led, Annual Renewal of Indicators	• Annual process to select indicators that will measure yearly goals and objectives. • Governed by the senior management team, they receive recommendations from corporate data support departments such as business analytics, finance, and quality. • Senior management report indicator results to their board, but the board is not involved in indicator selection. Clinical directors and physician leaders are aware of the indicators being recommended but are not engaged in the process of indicator selection. • The process is not documented.
2	Formal, Documented, Board and Senior Management Led, Annual Renewal of Indicators	• Annual process to select indicators that will measure yearly goals and objectives. • Process is governed by the board and senior management team without clinical director and physician leader participation. • Process is documented and outlines clear aim statement; selection criteria; and target setting rationales.
3	Formal, Documented, Board, Senior Management and Program Leadership Led, Selection of Indicators following a Strategic Plan	• A formal, structured, and time-limited process aimed at selecting indicators that measure a new strategic plan. • Process is governed by the board and senior management team and involves clinical director and physician leader participation in the selection of indicators and targets. • Process is documented and outlines aim, guiding principles, indicator selection criteria and target setting rationales.

The following section describes the processes each hospital used to select indicators followed by an inter-hospital comparison. Table 3 details how each hospital's process mapped to the five domains and 17 elements of the 5-P Indicator Selection Process Framework.

Case A – Process 1

Case A's senior management team annually reviews indicators and targets that are reported to their board at the beginning of its fiscal year. The annual process that this study explored was conducted in 2020. Case A did not document the methods it used to select indicators and targets. Case A leaders described improving quality, accountability, and patient safety, and meeting provincial funding requirements as the aims of its indicator selection process. Case A's senior management team's process was supported by the decision support, finance, and quality departments, which considered indicators mandated or suggested by national health policy or government funding bodies. Senior management team discussions did not involve any formal consensus methodology. Any disagreements on indicator selection were arbitrated by the President and CEO. While clinical directors and physician leaders were advised of draft indicators and targets through a regularly scheduled committee meeting, and the board's balanced scorecard was shared with the patient and family advisory council, Case A did not involve either group in the selection of indicators. The senior management team set annual targets based on reaching the top 25th percentile of performance in their peer group and asked programs to incrementally reach that target monthly.

In summary, Case A's indicator selection process can be described as informal and only aligned to a few domains of the 5-P Indicator Selection Process Framework. However, a unique aspect of Case A's performance measurement approach was a weekly in-person meeting of all

clinical managers, directors, and the senior management team. Managers are required to attend the weekly meeting to report on their program's performance but were not directly involved in indicator selection. While the performance meeting process enabled ongoing review of indicator results, it may not necessarily establish face validity given managers did not provide input on the indicators selected. Case A-Executive 2 noted this was an area of potential opportunity, sharing,

> We've successfully hardwired a weekly meeting that brings managers, directors, and executives together to go over data results, but those metrics are generally picked by the senior management team. Moving forward we do need to seek feedback from clinical units to see if they would change anything.

Deficiencies within Case A's process compared to the 5-P Indicator Selection Process Framework include the absence of: guiding principles; board and end-user participation; the use of a consensus building methodology; documentation of an up-to-date inventory of indicators with definitions, data sources and target justifications; training and orienting those responsible for indicator selection on measurement; using evidence-based indicator selection criteria; and the inclusion of end-users such as managers and patients in indicator validation.

Case B – Process 3

Following the release of its new strategic plan in 2019, Case B developed and documented an organization-wide performance measurement framework and completed a formal, structured, and time-limited process to select indicators that would measure its strategic plan. The aim of Case B's process included selecting indicators that would measure business performance, enable peer comparison, and that would comply with public reporting guidelines.

An additional aim of the process was to ensure organizational alignment. As Case B-Executive 2 stated, "We used our process to also get directors, physicians and executives to use the same nomenclature, so we knew how to work together."

Facilitated by the strategy department, a working group of data-based department directors including decision support, finance, health records, quality, human resources, and patient flow, were responsible for identifying an initial inventory of indicators based on indicators from peer scorecards, and indicators mandated by government agencies. Using a set of criteria that included whether an indicator measures a process, outcomes or structure, the hospital's clinical directors and physician leaders reviewed initial options before recommending a list of indicators to the senior management team and board who jointly governed the process. Data training on performance measurement and orientation on the process was provided to all participants. The final set of indicators were shared with end-users such as clinical unit managers but only for information and not to seek qualitative validation.

In summary, Case B used a formal, structured approach that selected indicators and targets that aligned moderately well to the 5-P Indicator Selection Process Framework. Unique aspects of Case B's process included having guiding principles aimed at ensuring clinical and management leaders were using the same language and nomenclature going forward; that the process was governed by the board; that data automation was a required criteria for indicator selection; and, that they purposively balanced the number of process, outcome and structural indicators included in the final indicator set. Deficiencies within Case B's process compared to the 5-P Indicator Selection Process Framework included the lack of: engagement of front-line, clinical unit managers in the indicator selection process, consensus building methods, and

validation of any final set of indicators either qualitatively with end-users or quantitatively for data quality.

Case C – Process 3

Case C conducted a formal, structured, and time-limited indicator selection process following the release of its new strategic plan in 2019. The aim of Case C's process was to support clinical best practices, measure business performance, and improve accountability. As Case C-Executive 1 stated,

> We've really put an emphasis on picking indicators that make our leaders accountable for our entire business performance. That means focusing on quality and patient experience metrics, but it also means paying attention to finance and human resource metrics to ensure we are efficient.

Case C's senior management team was responsible for recommending a final list of indicators and targets to their board. The senior management team empowered clinical directors and physician leaders with recommending a draft list. Categorized into the quadrants of their balance scorecard, initial indicators were generated from peer scorecards and those recommended by government, and national and provincial health agencies. While a formal consensus methodology was not used, the working group did receive formal orientation and training on the process. The final list, as approved by the board, was not validated nor formally shared across the organization. Instead, Case C's directors and physician leaders were expected to communicate the results of the process within their program areas.

In summary, Case C conducted an indicator selection process that aligned with most of the 5-P Indicator Selection Process Framework. A unique aspect of Case C's indicator selection process was that one of its guiding principles was to make the process of indicator selection simple and focused. The organization used this principle to emphasize the need to select a manageable and meaningful number of indicators. Case C had their process facilitated by an external consultant. Case C-Executive 2 noted, "We needed an outside expert to challenge previous approaches and biases to measurement." Case C had a clear rationale of reaching the top 25th percentile performance for the targets they set for each indicator including those indicators that measure financial and human resource performance. Deficiencies within Case C's process as compared to the 5-P Indicator Selection Process Framework included the lack of: engagement of front-line, clinical unit managers in the indicator selection process, use of a consensus building methodology, consideration of whether an indicator is a process, structure our outcome indicator; and validation of any final set of indicators qualitatively with end-users or quantitatively for data quality.

Case D – Process 2

Case D annually reviews indicators and targets at the beginning of a fiscal year for the purposes of board governance and corporate management. The annual process that this study explored was conducted in early 2020. Case D documented the process. The aim of Case D's process was to improve quality and measure performance against its strategic directions. Case D's process was governed by its board who approved indicators recommended by the senior management team. Case D's guiding principles included ensuring the process is open and transparent, and that the process supported its clinical and management leaders in achieving

common goals and objectives. An initial inventory list of current performance indicators and any alternatives are presented to an internal hospital committee of clinical directors and physician leaders. Categorized into the quadrants of their balance scorecard, Case D's indicator selection criteria included data quality, data availability, strategic alignment, ability to benchmark, and whether the indicator can help improve quality at the unit level. Case D was examining these criteria. As Case D-Executive 3 emphasized,

> We've made indicator selection too simple by accepting administrative outcome data. Hospitals and patient conditions are very complex. If I had to reselect the indicators we monitor, I would focus on process indicators clinicians value like how many specimens are lost, or number of cancers misdiagnosed, or outcome indicators that address unnecessary deaths and then use risk adjustments so clinicians can make direct practice changes.

In summary, Case D's annual indicator renewal process matches some elements of the 5-P Indicator Selection Process Framework. Unique aspects of Case D's process included the documentation of indicator selection criteria, indicator definitions, and target rationales. If a selected indicator is local in nature and has not been validated by a government or national health agency, Case D quantitatively validates those indicators for data quality. Deficiencies within Case D's process compared to the 5-P Indicator Selection Process Framework included a lack of: end-user participation in the selection process; a consensus building methodology; training and orienting those responsible for indicator selection on measurement; and, validating any final set of indicators qualitatively with end-users such as clinical unit managers, patients, and families.

Table 3: Case Findings compared to the 5-P Indicator Selection Process Framework

Framework Domain / Element	**Case A**	**Case B**	**Case C**	**Case D**
Indicator Selection Process	Process 1	Process 3	Process 3	Process 2
Purpose				
Clarify Aim	• To improve quality, accountability, patient safety, and to match provincial funding requirements.	• To measure business performance, align organization, enable peer comparison, and meet reporting requirements.	• To support adoption of clinical best practices, help run the business more efficiently, and improve accountability.	• To select indicators that will improve quality and measuring success against its strategic directions.
Develop Guiding Principles	• Does not have a set of guiding principles.	• Communicating objectives, assisting timely decisions, leadership engagement, and accountability.	• Simplicity (selecting a manageable number of indicators), valuing accuracy over precision, and data availability.	• Openness, transparency, alignment, and leadership engagement.
Identify Level of Use	• Selects indicators for Board, and hospital-wide operations.	• Selects indicators for Board, and hospital-wide operations.	• Selects indicators for Board, and hospital-wide operations.	• Selects indicators for Board, and hospital-wide operations.
Polity				
Build Governance Structures	• Senior management is responsible for indicator and target setting and reports to the board.	• Board sponsored process with senior management recommending indicators and targets.	• Board sponsored process with senior management recommending indicators and targets.	• Board sponsored process with senior management recommending indicators and targets.
Recruit Participants	• Informally consult Clinical directors and physician leaders. • Unit managers, patients and family do not participate in the process.	• Process includes senior leaders, clinical directors, and physician leader participation. • Unit managers, patients and family do not participate in the process.	• Process includes senior leaders, clinical directors, and physician leader participation. • Unit managers, patients and family do not participate in the process.	• Annual process includes senior leaders, clinical directors, and physician leader participation. • Unit managers, patients and family do not participate in the process.

Prepare				
Seek End-User Input	• Seeks informal input from clinical directors but not managers, patients, or frontline clinicians.	• Informally consults on clinical indicators but not finance and HR indicators.	• Does not formally consult end-users ahead of any indicator or target setting process.	• Seeks informal input from clinical directors but not managers, patients, or frontline clinicians.
Research Evidence-Based Literature	• Does not research indicator literature but considers indicators measured by peer hospitals and government agencies or national health institutes.	• Does not research indicator literature but considers indicators measured by peer hospitals and government agencies or national health institutes.	• Does not research indicator literature but considers indicators measured by peer hospitals and government agencies or national health institutes.	• Does not research indicator literature but considers indicators measured by peer hospitals and government agencies or national health institutes.
Build an Inventory of Potential indicators	• Produces definitions and target rationales for board's quality improvement plan.	• Produces indicator definitions and data sources. • Does not include target rationales.	• Produces indicator definitions, data sources and targets. • Does not include target rationales.	• Produces indicator definitions, data sources, and target justifications when selecting indicators.
Categorize Potential indicators into Strategic Themes	• Categorizes indicators into themes that match their strategic plan. • Does not consider if an indicator is a process or outcome indicator.	• Categorizes indicators into the quadrants of their balanced scorecard. • Considers if an indicator is a process or outcome indicator.	• Categorizes indicators into the quadrants of their balanced scorecard • Does not consider if an indicator is a process or outcome indicator.	• Categorizes indicators into the quadrants of their balanced scorecard. • Does not consider if an indicator is a process or outcome indicator.
Orient and Train Participants	• Does not offer formal training or orientation materials on how to select indicators and targets.	• Held training sessions when selecting indicators for new strategic plan.	• Training materials used for selecting indicators for new strategic plan.	• Does not offer formal training or orientation materials on how to select indicators and targets.
Procedure				
Utilize a Consensus Building Method	• Does not use a formal consensus methodology.	• Does not use a formal consensus methodology.	• Does not use a formal consensus methodology.	• Does not use a formal consensus methodology.
Identify a Facilitator	• Process facilitated internally by decision support department.	• Process facilitated internally by strategy department.	• External facilitator used following new strategic plan.	• Process facilitated internally by strategy, business analytics and quality departments.

Establish Indicator Selection Criteria	• Data quality, timeliness, funding and public reporting requirements, and clinical relevance.	• Data automation, quality, timeliness, usability, funding requirements, and clinical relevance.	• Data quality, data availability, gap in performance, and clinical relevance.	• Data quality and availability, strategic alignment, benchmarking, and quality improvement.
Analytically Assess indicators	• Do not vote on an indicator list. • Indicators selected by informal agreement.	• Do not vote on an indicator list. • Indicators selected by informal agreement.	• Do not vote on an indicator list. • Indicators selected by informal agreement.	• Do not vote on an indicator list. • Indicators selected by informal agreement.
Set indicator Targets	• Selects targets by first meeting provincial benchmarks. • No target setting philosophy on finance or HR indicators.	• Selects targets by benchmarking against peer performance then incrementally reaching top 25th percentile. • Finance and HR indicator targets align to fiscal plan.	• If performance is below 50th percentile, target set to 50th percentile. If performance is above 50th percentile, target set to top 25th percentile. If above top 25th percentile, target to maintain performance. • Finance and HR indicator targets align to fiscal plan.	• Target setting considers own performance, peer performance, and government benchmarks. • Selects targets for quality indicators at top 25th percentile. • No target setting philosophy on finance and HR indicators.
Prove				
Assess Data Quality	• Does not validate any indicators for data quality given many indicators are tested by provincial and national agencies.	• Does not validate any indicators for data quality given many indicators are tested by provincial and national agencies.	• Does not validate any final list of indicators for data quality given their selection criteria includes data quality.	• Does not validate government or agency mandated indicators but does validate locally driven indicators.
Validate with End-Users	• No direct validation. • Final indicators shared through hospital committees, website, and public data Boards.	• No direct validation. • Final indicators shared with directors and physician leaders who share indicators across organization.	• No direct validation. • Final indicators shared with directors and physician leaders who share indicators across organization.	• No direct validation. • Final indicators shared on public reporting Boards.

The alignment of individual hospital indicator selection processes with the 5-P Indicator Selection Process Framework are illustrated in Table 4.

Table 4: Case Alignment with 5-P Indicator Selection Process Framework Summary

Domain	Elements	Case A	Case B	Case C	Case D
Purpose	Clarify Aim	A	A	A	A
	Develop Guiding Principles	NA	A	A	PA
	Identify Level of Use	A	A	A	A
Polity	Build Governance Structures	PA	A	A	PA
	Recruit Participants	NA	PA	PA	PA
Prepare	Seek End-User Input	NA	PA	PA	PA
	Research Evidence-Based Literature	A	A	A	A
	Build an Inventory of Potential Indicators	PA	A	A	A
	Categorize Potential Indicators into Strategic Themes	A	A	A	A
	Orient and Train Participants	NA	A	A	NA
Process	Utilize a Consensus Building Method	NA	NA	NA	NA
	Identify a Facilitator	A	A	A	A
	Establish Indicator Selection Criteria	PA	A	A	A
	Analytically Assess Indicators	NA	NA	NA	NA
	Set Indicator Targets	PA	A	A	A
Prove	Assess Data Quality	NA	NA	NA	PA
	Validate with End-Users	PA	NA	NA	NA

A = Alignment, PA = Partial Alignment, NA = No Alignment.

Results: Multi-Case Analysis

The following analysis describes the common alignment and deficiencies between the processes used by the four cases compared to the 5-P Indicator Selection Process Framework.

Purpose

The indicator selection processes observed for this study were for indicators to be used at the board governance or hospital-wide operations level. All hospitals articulated the aim of their indicator selection processes with Cases B, C and D explicitly publishing aims in a document. In general, hospitals' aim statements included selecting indicators that measured business

performance, supported quality improvement efforts, and met public reporting and funding requirements. Case A did not identify guiding principles related to their indicator selection process, whereas Case B could articulate principles, but these principles were not documented. Cases C and D documented their guiding principles. Case D's guiding principles could be interpreted as indicator selection criteria. Openness, transparency, aiding decision making, alignment, and accountability were the most prevalent guiding principles across all cases.

Polity

All hospitals' senior management teams were responsible for leading their indicator selection processes. Cases B, C and D required board approval of any final indicator list, while Case A did not report having to do so. Participants in hospital indicator selection processes generally included senior management leaders, clinical directors, and physician leaders. Absent from all hospitals' processes was the inclusion of end-users such as clinical unit managers, patients, and family members as participants who directly helped select indicators.

Prepare

No hospital consulted end-users such as clinical unit managers, patients, or family members on their experience with indicators ahead of any indicator selection process. Hospitals relied on informal discussions with clinical directors and physician leaders on how indicators are used within their organization.

Indicators mandated or suggested by government funding and health policy institutes, and indicators used by peer hospitals informed the lists of potential indicators these four hospitals considered. Potential indicators are mainly derived from administrative data sets versus those

from clinical information systems. In Ontario, Canada these indicators are generally mandated by the Ministry of Health, Ontario Health, Canadian Patient Safety Institute, and the Canadian Institute for Health Information and are often required to obtain funding or meet other accountability objectives.

All cases reported having an inventory list of indicators that included definitions and data sources. While all interviewees articulated a rationale for the proposed targets, only Case D documented their rationale in their indicator inventory list. All hospitals noted that the maintenance of these lists for either a formal selection process (process 3: Cases B and C), or an annual renewal process (processes 1 and 2: Cases A and D), was inconsistent and an area for improvement. At the time of the interviews, Cases B and C were implementing new electronic health records and clinical information systems and reported optimism that these tools might improve the type of indicators they could consider and the maintenance of data dictionaries.

Given their processes followed a new strategic plan, Cases B and C provided participants in their processes a formal orientation on the concepts of performance measurement and indicator selection but admitted orientation and training on measurement was not part of any annual indicator selection process. Cases A and D did not provide orientation or training materials to those who participated in their annual indicator renewal process. No hospital offered annual training on performance measurement for end-users, such as clinical unit managers, who are accountable for making process improvement changes at the point of service delivery.

Procedure

No case used a formal consensus building methodology such as a Delphi or modified-Delphi process that required voting by participants. Indicators are informally agreed to through

meeting presentations and generally accepted recommendations. All cases suggested that the absence of a formal consensus building method was influenced by their organizational culture. As Case B-Executive 1 stated,

> We would never put a list of indicators in front of our clinical directors and physician leaders to formally vote on. Given we need to work together every day, it is just not in our culture. If there is a disagreement on what indicator or target to pick that would be the responsibility of senior executives to decide.

Cases A, B and D assigned internal representatives from their strategy, decision support, business analytics, or quality performance departments to facilitate their indicator selection processes. Case C was the only hospital whose process was facilitated by an external consultant.

The criteria used to select indicators did not vary significantly across cases. All hospitals considered an indicator if it is required to obtain funding. Data quality, data availability, data comparability, and importance (indicator results showed a gap in performance) were common criteria. Case D had plans to consider indicators that could be risk adjusted to enhance physician engagement in measurement. Case B considered whether an indicator was a process, structure, or outcome indicator.

In setting targets, hospitals relied on benchmarks published by government and health policy agencies. Case A explained that they used government benchmarks to set targets. Cases B and C articulated target setting philosophies based on an indicator's performance against their peer's top 25th percentile score. As an example, if Case C's performance is below 50th percentile, their target is set to 50th percentile. If Case C's performance is above 50th percentile, their target is set to top 25th percentile. If Case C's performance is above the top 25th percentile, their target

is to maintain performance. Case D used guiding principles to inform their target setting. In setting targets, Case D analyzed each indicator's year over year performance, compared that performance to peer performance, and then considered government benchmarks. Target setting philosophies were articulated for clinical quality, patient safety and patient experience indicators. Cases B and C stated financial targets matched objectives outlined in their annual budget plan. No case provided information on how they set targets for human resource indicators.

Prove

All four case hospitals did not validate indicators for data quality. Given hospitals generally selected indicators mandated by a government agency, all cases assumed indicators had been previously validated for data quality. Hospitals did not seek input from end-users, such as front-line clinical unit managers or patients and families, on the face validity of any final indicator list. Selected indicators and targets were shared with end-users for information purposes only. As Case B-Executive 3 explained,

> We present our indicators to our patient and family council. But it is more of a report to them than active engagement given that we don't receive much feedback.

Perceived Front-Line, Clinical Unit Manager Participation and Motivations

Given indicators are designed to measure elements of performance, hospital senior management leaders were asked about the role front-line, clinical unit managers played in indicator selection, what type of indicators might motivate managers to make change, and the confidence they had in managers to use indicators to improve performance.

All four hospitals enabled clinical unit managers to select some metrics for the unit they were responsible for, but as noted in Table 3, no hospital included clinical unit managers on working groups charged with selecting hospital-wide indicators. Nor did any of the hospitals systematically validate hospital-wide indicators with clinical unit managers as end-users. In general, senior management leaders had a low level of confidence in clinical unit managers' understanding of and ability to use indicators to improve performance. Case A had the greatest confidence in clinical unit managers, noting that their weekly performance meeting that required managers to report on performance created expectations for managers to know their business. However, as Case A-Executive 1 noted,

> I don't think that if you asked a frontline manager about how we got to a target, they would have a clue how we calculated the target or the outcome. That's an area of improvement for us.

Cases B and C expressed low confidence in managers' ability to understand how to use indicators, mentioning manager span of control and workload often forced managers to focus on transactional based tasks versus improving performance. Case D reported increased confidence in managers who had longer years of service and managed clinical units that were subject to high patient volumes and increased regulatory reporting requirements. Given their low confidence in clinical unit managers ability to use indicators effectively, senior management leaders across all cases were probed on why they had not involved clinical unit managers in indicator selection processes. Senior management leaders said they preferred to consult clinical directors who used to be clinical unit managers, had more experience with indicators and measurement, and were accountable for the outcomes for multiple units.

Discussion

This study set out to research the question, "What processes do acute care hospitals in Ontario, Canada use to select performance indicators and how do they align with the 5-P Indicator Selection Process Framework?" In doing so, this study identified three types of indicator selection processes deployed across four large community acute care hospitals in Ontario, Canada (see Table 2). Table 4 provided a comparative analysis between the processes used by four cases and how they aligned with the five domains and 17 elements of the 5-P Indicator Selection Process Framework.

Cases B and C, who both completed indicator selection processes following the launch of their strategic plans, aligned generally well to the framework, whereas Cases A and D, who completed indicator selection processes as part of their annual planning, had greater variation compared to the framework. None of the processes used by the cases mirrored the framework completely. Major findings across all four cases are categorized into three themes: the structure and mechanics of indicator selection processes, the engagement of key stakeholders in indicator selection, and documentation. This section will also discuss the potential impact the COVID-19 pandemic may have on future indicator selection processes.

Structure and Mechanics of Indicator Selection Processes

The following section discusses the gaps the case hospitals had in their process structure and how their processes were conducted. These gaps are associated with the following elements found within the 5-P Indicator Selection Process Framework: Clarify Aim; Identify a Facilitator; Indicator Selection Criteria; Set Indicator Targets; and Assess Data.

Hospitals often confused the setting of a process' aim and the use of guiding principles. There is a difference in the aim and use of an indicator versus the process of selecting the indicators. For example, the aim of a process may be to select a reasonable number of indicators that will measure business performance or quality, whereas the principles guiding the process of decision making may be openness, transparency, and accountability. Setting clear aims and guiding principles allows participants to understand the desired goals a process is aiming to achieve and the actions to which they are expected to contribute.[24]

Hospitals generally relied on internal personnel to facilitate the process. Internal facilitation may bias processes whereas external facilitators have an ability to play both a problem solving and supportive role that might otherwise be difficult when only internal parties are engaged.[25] External facilitation is valued when a process is focused on an interactive problem or distinct activity.[25] Given indicator and target selection processes are often linked to measuring strategic goals and establishing accountabilities, hospitals may wish to use external third-party facilitation for their indicator selection processes.

In deciding which indicators to select, hospitals focused on access, quality, patient safety and patient experience indicators. Given these indicators generally measure each hospital's core service offering, the focus on those types of indicators is understandable. However, hospitals are not only social and medical service delivery agencies, but business units and employers who have a large economic impact. As such, hospitals should consider business-based indicators that measure finance and human resources performance as part of their indicator selection processes.

Only Case B suggested its process considered if the indicators it chose were structural, process or outcome-based in nature, or if they had selected the right balance between all three. The Donabedian framework suggests that health care quality is best measured using three types

of indicators: structural, process and outcome.[26] As such, hospitals would be wise to consider the type of indicator they are selecting and what balance of indicator types they need.

A 2022 study found that accountability agreements and public reporting generally drive Ontario hospital indicator selection.[27] This study confirms that finding. All four cases stated that requirements for government funding, accountability objectives and public reporting were criteria they strongly considered. Hospitals may find themselves caught between the need to monitor indicators that measure their local business imperative, while also carrying several other indicators that are mandated by government and may no longer be relevant to local operations.[3,4,6,7] To help improve indicator selection criteria, hospitals and their funding agencies would be wise to align their criteria to an instrument such as AIRE or QICA to simplify the process, create a standard criteria set that can be widely understood, and gain greater engagement in measurement.[28,29]

Despite Case C's thoughtful target setting philosophy for indicators that measure access, quality, safety and patient experience, hospitals in this study admitted that their target setting approaches needed further attention. Cases attributed this need to their reliance on government directed metrics, overuse of peer benchmarks, and an inability to match improvement activities to numerical gains. Approaches to target setting might be further enhanced through greater use of forecasting, and engaging end-users to understand how planned improvement activities may contribute to the achievement of target calculations.

Hospitals stated that their financial and human resource indicator targets were derived from objectives outlined in their annual budgets and financial statements. No hospital however could explain the criteria by which these targets were set or share an example of a target's justification. The challenge with this approach is that finance and human resources indicators

such as current ratio, days payable, days receivable, percentage of margin, cost per weighted patient case, percentage of sick time and overtime, spans of control, vacancy turnaround time, and turnover ratio may not be reflected in base financial statements. Yet, some of these indicators may be better placed to inform unit-level decision making than only those that can be calculated based from financial statements.

Hospitals did not validate their final list of indicators for data quality. Hospitals reasoned that they did not need to complete this type of validation given that most of the indicators they monitor are mandated by external funding agencies, and it is therefore assumed these indicators were previously validated. This may be a false assumption. While the technical formula of an indicator may have been validated by an external agency, the data that is generated from the different local hospital information systems may be of different quality than the data by which an indicator was tested by the external agency. Hospitals may wish to validate data quality regularly to ensure data accuracy, especially if agencies mandate different indicators than were used in the past.

Engagement of Key Stakeholders in Indicator Selection

Compared to the best practices offered by the 5-P Indicator Selection Process Framework, who is involved in hospital indicator selection processes, and to what extent, is the most glaring deficiency of the processes identified in this study. These gaps are associated with the following elements found within the 5-P Indicator Selection Process Framework: Recruit Participants; Seek End-User Input; Orient and Train Participants; Validate with End Users; and Utilize a Consensus Building Method.

Processes used by most hospitals in this study reported to the board and final indicator sets were shared with end-users such as front-line clinical unit managers and patients, but their involvement seemed perfunctory. In the data shared by the cases, boards seemed to only approve a final recommended list versus having some or all its members participate in indicator selection discussions. Cases also did not seek input ahead of, directly involve, or seek qualitative validation from clinical unit managers in the selection of hospital-wide indicators. While cases did train and orientate participants if a process was conducted following a strategic plan (process 3), hospitals did not train and orient process participants or end-users on annual indicator selection processes (processes 1 and 2). All four cases reported having little to moderate confidence in clinical unit managers' ability to effectively use indicators to improve performance.

These are important reflection points for hospitals. Involving the board in indicator selection is known to result in improved financial, quality, and patient safety outcomes.[30-32] Indicator selection processes that have broader participation are more likely than others to have a more inclusive view of front-line operations.[19] Understanding the goals of a process, while educating and training participants on the process, make processes more efficient and effective.[24] Managers who are involved in understanding why an initiative is being undertaken are more likely to positively contribute to the aims and objectives of the initaitive.[33-35] Excluding and not adequately training individuals who are accountable for making improvements at the point of service delivery in indicator selection can lead to selecting indicators that do not match operational realities, and risk paralyzed decision making and overmeasurement.[7,9,11,12]

Hospitals in this study stated that the multiple operational and time demands placed on their leaders, and their organization's desire to maintain a culture of collaboration prohibited

them from using consensus building methodologies like the Delphi technique. Delphi techniques have four features: anonymity, iteration with controlled feedback, statistical group response and expert input.[36] Delphi techniques are designed to provide open and transparent information, enable fairness, neutralize bias, and provide an evidence-based process to selection and agreement.[36] All four hospitals expressed a desire to build collaborative cultures for improving performance. Delphi techniques should be seen as helpful, not a hindrance, in this regard.

Documentation

This study was based on semi-structured interviews and documentation analysis. In addition to the gaps identified above, the study found that documentation across all four cases was inconsistent. Documentation generally took the form of briefing notes and presentations. Documentation did not take the form of a formal policy or procedure. To ensure indicator selection processes are defined and understood, hospitals should document their approach to indicator selection in the form of policies and procedures to codify their process and overcome the gaps discussed. Procedure development should consider the domains and elements of the 5-P Indicator Selection Framework.

The COVID-19 Pandemic's Impact on Future Indicator Selection Processes

An unexpected finding of this study was the potential impact the COVID-19 pandemic might have on future indicator selection processes. Hospitals described how the pandemic resulted in the pausing of any new or annual renewal of indicator selection given the need to focus on the public health crisis. Consequently, the pandemic provided leaders responsible for

performance measurement an opportunity to reflect on the criteria that may inform future indicator selection. As Case D-Executive 4 stated,

> COVID taught us that after years of trying to get the organization to make data-driven decisions that often fell on deaf ears, the organization was thirsty for data about this new disease. This demand for data was likely a result of operating in a new unknown environment and the need to base operational decisions on emerging data compared to traditional lagging indicators. But COVID also taught us that we likely had been providing the wrong data before the pandemic. COVID forced us to prioritize our efforts and stopped us from chasing too many indicators. It led us to provide more leading process-based indicators that clinical units found useful in planning their day versus lagging outcome data that government wanted.

Senior management leaders across all four cases shared similar sentiments, mentioning that some clinical practice, supply chain, and human resource indicators, once thought not important to regular monitoring, had surfaced as priorities. Examples of priority indicators that emerged during the pandemic included disease-specific daily case counts, patients under investigation, number and timing of isolation room cleanings required, days left of personal protective equipment (PPE), and vaccination status of employees and patients. As a Case D-Executive 2 observed,

> By looking at a new set of indicators during an unknown time, we were able to operationalize new solutions that included how to isolate patients in older

buildings that do not have many single patient rooms or how to provide virtual care to our outpatients.

All four cases acknowledged that the pandemic highlighted the lack of quality human resources data hospitals maintain. For instance, at a time of staffing shortages, hospitals could not easily identify how many staff were cross trained in certain disciplines who may have been eligible for reassignment to other clinical units. Hospitals shared that future indicator selection criteria should include more process indicators that are relevant to workplace capacity and staff safety.

Limitations

This study has three limitations. First, this qualitative multiple-case study involved four large community acute care hospitals in Ontario, Canada. The focus on community-based, acute care hospitals may limit the generalizability of findings to other hospital types. Second, the study was completed during the COVID-19 pandemic. The timing of study interviews may have impacted participant recall ability given some hospitals may have stopped reviewing and selecting indicators and targets during this time. Third, this study researched senior management perceptions of indicator and target selection processes and not those who participated in any of the described processes. Future research may wish to examine this area.

Conclusion

This study identified three indicator selection process used by Ontario hospitals to select performance indicators and targets. None of these processes completely aligned to all domains

and elements within the 5-P Indicator Selection Process Framework. There is no standard process used by hospitals on who should be involved in the indicator selection process, and how to govern and validate the selection of indicators and targets.

Structural and functional gaps hospital processes had compared to the elements of the 5-P Indicator Selection Process Framework included the lack of clear guiding principles, use of formal consensus building methodologies, consideration of evidence-based criteria sets, consideration of finance and human resources indicators, having a balance between structural, process and outcome indicators, and quantitively validating any final proposed indicator list. The most common gap hospitals have, compared to the framework, is related to which key stakeholders they engaged in their process. Given they are ultimately accountable for implementing process changes designed to improve patient outcomes, processes should directly engage boards, clinical unit managers, and patients in the mechanics and validation of indicator and target selection.

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Appendix A: Interview Protocol

Introduction:

I am Mike Heenan, a PhD student at McMaster University conducting my thesis / dissertation research. As noted in the materials shared, I am researching how organizations select their Performance Indicators (KPIs) and associated targets, and how those processes may impact manager's motivation to improve performance.

While executives may perceive that clinical directors are more experienced and accountable for the outcomes for multiple units, directors, unlike managers, do not directly supervise the front-line staff that ultimately will implement practice changes to improve care. Executives' preferences may be missing an opportunity to involve these potential change champions at the unit level. As part of this research, I am interviewing three-four people in your organization on the processes you use as a hospital after which I will interview 8-10 managers on how they are involved in those process and how it may motivate them. You will have received a consent form from me earlier and so I will begin by confirming your consent. Please note all information you provide will be anonymized and neither you nor your organization will be identified in any publication.

Consent:

- Do you agree to the interview being audio recorded? Audio recording will ensure the information you provide is accurate and can be summarized easily. The recording will be deleted after data is summarized.
- Do you agree to be contacted for follow up to clarify your responses?
- Would you like to receive a copy of the study results? What email address should I use?
- Do you agree to allow you data to be used for future research?

5-P KPI Selection Framework (to be Described and Shared electronically)

In addition to the consent form, you were issued a copy of the 5-P KPI Selection Framework and a draft of these questions. This framework was developed following a scoping review of international literature and summarizes the main processes used by health organizations in selecting KPIs and targets. This is the framework I will reference throughout our conversation, and you'll see the questions I ask will follow each of the domains in the framework.

5-P KPI Selection Framework (to be Described and Shared electronically)

Domain	Elements
Purpose	Clarify Aim Develop Guiding Principles Identify Level of Use

Polity	Build Governance Structures Recruit Participants
Prepare	Seek End-User Input Research Evidence-Based Literature Build an Inventory of Potential KPIs Categorize Potential KPIs into Strategic Themes Orient and Train Participants
Procedure	Utilize a Consensus Building Method Identify a Facilitator KPI Selection Criteria Analytical Assess KPIs Set KPI Targets
Prove	Assess Data Quality Validate with End-Users

Part 1: Respondent Information (may not be required in interview and can be collected ahead of time)

1. Can you please provide me with your position title(s), how long you've been in that position and why you took the role?

2. What KPIs are you responsible for collecting and reporting on within the organization?

Part 2: PURPOSE and POLITY

3. In setting its KPIs, can you describe the aims and guiding principles [name of organization] uses to develop a list and eventually decide on the KPIs?

4. Who participates in the identification, assessment, and eventual use of the KPIs and targets at the senior team, and clinical unit levels?

Part 3: PREPARE

5. In setting up a list of KPIs and targets to be discussed, does the organization seek input from the users (board members, executives, and managers) on their past experience with KPIs ahead of the process? If so, how?

6. In the process of identifying an appropriate number and type of KPIs, what literature, best practice guidelines or provincial or national agencies do you look to for potential KPIs? Why do you select these agencies?

7. In offering a draft set of KPIs to those who will use them, do the eventual end-users receive a definition for each KPI, the data source where it may be collected, and a potential justification for any proposed target?

8. In presenting KPIs, does the organization place them in categories that match the strategic plan or other frameworks such as the balanced scorecard?

9. In considering KPIs, does the organization consider which ones are process, outcome or structural KPIs? Do you consider how many you might have of each type?

10. In preparing to identify and select KPIs, is there any education, training or orientation offered to leaders on measurement in general or the process you follow to select KPIs?

Part 4: PROCEDURE and PROVE

11. What process do you use to get consensus on the final list of KPIs? How formal is that process (e.g., Delphi /modified-Delphi)?

12. Who facilitates that process (KPI identification and selection)?

13. Can you describe a time when there may have been a disagreement on which KPIs should be chosen? How was it resolved?

14. What criteria are used to select the final list of the KPIs to be used? (e.g., relevance, importance, usability, scientific soundness)

15. Does your organization use a formal or informal method to select the final list of KPIs? (e.g., voting or ranking using a Likert scale?).

16. What criteria does the organization use to set targets? Does it only aim for benchmarks or does it use incremental or "top-box" approaches?

17. Once a set of KPIs are selected, does the organization share the list more broadly within organization to ensure they are relevant? If so, how? If not, why not?

Part 5: MANAGER MOTIVATION

18. Can you describe how managers are involved and contribute to the process of KPI selection?

19. As a corporate leader, describe how confident you are in front-line managers' understanding of measurement, the use of KPIs and how targets are set?

20. In thinking about a high performing manager in this area, what factors do you think motivates the manager to act on a KPI and/or target?

21. What supports does the organization put in place to aid managers in focusing and acting on the KPIs?

Part 6: WRAP UP

22. Given our conversation, is there anything you'd like to add or expand upon?

Appendix B: Case Documents

Table 4: Document Log

Hospital	Documents Analyzed
Case A	Weekly Data Report Balanced Scorecard
Case B	Performance Measurement Framework Balanced Scorecard Advisory Group Process
Case C	Balanced Scorecard: Principles, Proposed Dimensions and Metrics Balanced Scorecard: KPI Definitions and Target Methodologies
Case D	Quality Improvement Plan: KPI Selection Board Committee Briefing Note and Balanced Scorecard

Appendix C: Deductive and Inductive Codes

Tables 5 and 6 summarize the deductive and inductive codes used throughout the data analysis phase of this research. The deductive codes match the 5-P Indicator Selection Process Framework that informed the basis of the study. Inductive codes resulted from data provided by informants related to manager's motivations and motivational theory. Case study codes were used to anonymize the hospitals and individual respondents. Codes were shared and validated by the researcher's PhD. Supervisory Committee.

Table 5: Deductive Codes

Deductive Codes	**Domain**	**Inductive Codes**	**Description**
PUR-1	Clarify Aims	PUR1a	Quality Improvement / Clinical Best Practice / Patient Safety
		PUR1b	Funding Requirement
		PUR1c	Business Performance / Strategy Measurement
		PUR1d	Peer Comparison
		PUR1e	Public Reporting
PUR-2	Develop Guiding Principles	PUR2a	Accountability
		PUR2b	Leadership Engagement / Alignment
		PUR2c	Openness and Transparency
		PUR2d	Support Evidence-based Decisions
PUR-3	Identify Level of Use	PUR3a	Board
		PUR3b	Senior Leadership / Corporate Wide
		PUR3c	Unit-Level
POL-1	Build Governance Structures	POL1a	Board
		POL1b	SLT
		POL1c	Support – Decision Support / Business Analytics
		POL1d	Support – Strategy Office / Quality Department
POL-2	Recruit Participants	POL2a	Senior Leadership Team
		POL2b	Clinical Directors
		POL2c	Physician Leaders / Clinical Chiefs

		POL2d	Corporate / Administrative Directors
		POL2e	Patients and Family Members
PRE-1	Seek End-User Input	PRE1a	No
		PRE1b	Yes – Clinical Directors
		PRE1c	Yes – Physician Leaders / Clinical Chiefs
		PRE1d	Yes – Corporate Data Areas
PRE-2	Research Evidence-Based Literature	PRE2a	Peer Reviewed Literature
		PRE2b	Provincial Agencies (MOH, OH, CCO)
		PRE2c	National Agencies (CIHI, CPSI)
		PRE2d	Peer Hospitals (incl. OHA)
PRE-3	Build an Inventory of Potential KPIs	PRE3a	No
		PRE3b	Yes – Definition
		PRE3c	Yes – Source
		PRE3d	Yes – Target Justification
		PRE3e	Yes – Paper
		PRE3f	Yes – Electronic
PRE-4	Categorize Potential KPIs into Strategic Themes	PRE4a	Strategic Plan Themes
		PRE4b	Balanced Scorecard Quadrants / Quadruple Aim
PRE-5	Orient and Train Participants	PRE5a	Yes – Formal
		PRE5b	Yes – Informal
		PRE5c	NO
PRO-1	Utilize a Consensus Building Method	PRO1a	Yes – Formal (Delphi, modified-Delphi)
		PRO2b	No – Informal Agreements
PRO-2	Identify a Facilitator	PRO2a	No
		PRO2b	Yes – External
		PRO2c	Yes – Internal (SLT)
		PRO2d	Yes – Internal (Support Department)
PRO-3	KPI Selection Criteria	PRO3a	Data Quality
		PRO3b	Timeliness of Data (Automation)
		PRO3c	Provincial Reporting / Funding Requirement
		PRO3d	Performance Gap
		PRO3e	Relevance

		PRO3f	Usability
PRO-4	Analytical Assess KPIs	PRO4a	Yes
		PRO4b	No
PRO-5	Set KPI Targets	PRO5a	Benchmarking
		PRO5b	Stretch / Top Box Approach
		PRO5c	Incremental – Towards Stretch / Top Box
		PRO5d	Incremental – Performance Percentile Approach
		PRO5e	Hard Target – Finance
		PRO5f	Hard Target – Patient Safety
PRV-1	Assess Data Quality	PRV1a	Yes
		PRV1b	No
PRV-2	Validate with End-Users	PRV2a	Yes
		PRV2b	No

Table 6: Inductive Codes

Code	**Description**
Covid1	Stopped Formal KPI Process
Covid2	Increase Data Demand
Covid3	New KPIs Emerged
Covid4	KPI Criteria (Process vs. Outcome)
Covid5	KPI Criteria (Operational Need)
Covid6	KPI Criteria (Forecasting)
Covid7	HR KPI Challenges
Covid8	KPI Prioritization
Covid9	Trust Data Leadership
Covid10	Rethink Operational Business (ED LOS, Isolation, Virtual)

Chapter 4: How clinical unit managers' roles in selecting hospital indicators impacts their motivation and self-efficacy to improve performance: A qualitative multiple-case study.

Abstract

Objective: Clinical unit managers' commitment and ability to implement innovations is linked to strategy realization, operational efficiency, cost control, and achievement of quality outcomes. Clinical unit managers are expected to use indicators to improve performance. This study researches the question: What role do acute care hospital clinical unit managers have in selecting indicators and targets, what are their perceptions of the process, and how might the process impact their motivation and self-efficacy to improve performance?

Methods: This is a qualitative, exploratory multiple-case study of four acute care hospitals in Ontario, Canada involving 22 clinical unit managers. Data was analyzed using deductive and inductive coding following semi-structured interviews.

Results: Three types of hospital-wide indicator selection processes were used by hospitals in this study, none of which engaged clinical unit managers in indicator selection. Managers reported being unaware of the criteria their hospitals used to select indicators, not being trained in measurement, having little control over the indicators they were accountable for, and were fearful of reporting on performance. Managers were motivated by process indicators focused on quality, clinical practice and patient experience compared to outcome or business-based indicators in finance or human resources. Managers gained self-efficacy in using indicators over time and by learning how to communicate the utility of indicators to front-line staff.

Conclusion: Clinical unit managers are not involved in, and by extension, are not motivated by hospital-wide indicator selection processes. Managers have low self-efficacy in using indicators to improve performance. To motivate and enhance clinical unit managers self-efficacy to improve performance, hospitals should engage managers in indicator and target selection, provide training in measurement, and consider process indicators that match their motivations to improve clinical practices that by extension contribute to better outcomes. To help their own career development, managers may want to pursue learning opportunities related to performance measurement.

Introduction

There has been growing recognition that health care organizations like hospitals collect, monitor, use and report on too many performance indicators.[1-7] In response there have been calls to reduce the number of indicators health care organization should monitor.[1-7] Before one can decide what and how many indicators health care organizations should carry, one must understand the processes used to select indicators and who participates in such processes.

A 2022 scoping review found that clinical discipline and health system indicator selection processes that include end-users such as front-line clinical unit managers and patients as participants have greater support for the goals the process aimed to achieve.[8] A 2022 qualitative multiple case study of four large community hospitals in Ontario, Canada identified three types of indicator selection processes, all of which did not engage end-users, such as clinical unit managers in selection processes.[9] This finding by the 2022 qualitative case study suggests that some hospital indicator selection processes do not align to published literature on clinical unit manager motivation and self-efficacy, or goal setting theory of motivation.

Clinical unit managers are employees who are both supervised by an organization's top managers and who themselves supervise front-line employees.[10] Clinical unit managers' commitment and ability to implement innovative change at the unit level has been linked to strategy realization, efficiency of operations, cost control, and overall achievement of quality outcomes.[10-12] If positively motivated and engaged, clinical unit managers can effectively support innovation and change.[13-15] Conversely, if managers are disengaged and not motivated, it can impede improvement in the units they oversee.[13-15] Managers' motivation and commitment increases when their senior managers support them with the infrastructure and resources necessary to implement change and improve performance.[14,16]

Research literature has published evidence suggesting that when organizations provide indicators and performance targets to support managers in achieving the goals set out for them, they are often not reflective of local clinical environments.[12,15,17-21] The development of indicators without end-user input can lead to the selection of too many indicators, can paralyze decision making, and, may lead to indicators being used inappropriately.[18-20,22,23]

Goal setting theory of motivation emphasizes the relationship between goals and performance.[24,25] The theory states that a manager's level of task performance is influenced by the stated goal's content, intensity, and duration; the manager's abilities; the manager's self-efficacy and confidence in their abilities; the professional goals of the manager; or a combination of all four of these attributes.[26] The theory contends that when one participates in goal setting and task assignment, it clarifies what is important and why, creates shared accountability for performance among managers and their teams, and, if paired with leadership support, can improve managerial motivation, self-efficacy and performance.[25,26]

Study Purpose

This study explores the intersections among the motivations of clinical unit managers, current indicator selection practices, and goal setting theory by conducting a multiple-case study on four Ontario hospital's indicator selection processes and researching the question, "What role do acute care hospital clinical unit managers in Ontario, Canada have in selecting indicators and targets, what are their perceptions of the process, and how might the process impact their motivation and self-efficacy to improve performance?"

Methodology

This multiple-case study deployed a qualitative exploratory approach, using semi-structured interviews which informed a thematic analysis.[27,28]

Population Sample and Recruitment

The population sample was purposeful. Two inclusion criteria were considered: the hospital setting in which managers performed their job; and the role and responsibilities the manager had within the hospital.

The cases chosen were the same four hospitals from the 2022 study that identified three types of hospital indicator selection processes.[26] Hospitals in the study included large community acute care hospitals that offered services in emergency medicine, medicine, surgery, obstetrics, mental health, and surgery; operated at least 400 inpatient beds; and reported annual revenues of greater than $400M.[9,29] These parameters ensured that the managers who participated in study interviews worked in similar environments.

To ensure managers were able to reflect on the same processes their senior leaders used to select indicators and targets, and that any findings could be contextualized against those processes, managers interviewed were from the same hospital cases used in the 2022 study.[26] The type of manager role selected was clinical unit managers, those employees who are both supervised by an organization's top managers and who themselves supervise front-line employees directly involved in patient care.[10] Given health care indicators are defined as measurable elements of practice performance that relate to clinical, population health, financial, or organizational performance,[30] managers closest to the point of patient care were included in the study. Sample participants were educated in a clinical discipline and managed either an

inpatient unit, outpatient unit, or a clinical support department. Inpatient units care for overnight stay patients. Outpatient units provide same day ambulatory or emergency care services. Clinical support departments offer services in diagnostic imaging, laboratory medicine, or pharmacy. Managers responsible for corporate service areas, such as finance, human resources, and information technology, were excluded.

Permission for clinical unit managers to participate was solicited through written communication with the hospital's President and Chief Executive Officer (CEO). Following President and CEO sponsorship, potential participants were identified by each hospital's research office. Participant names were not shared with the hospital's senior management team to protect participants from social risks. McMaster University's and all hospital's Research Ethics Boards (REB) approved the project.

Data Collection – Qualitative Semi-Structured Interviews

A study invitation, consent form, and interview protocol were emailed to participants ahead of interviews. Interviews were conducted between July 2021 and November 2021, audio recorded using digital meeting software, transcribed, and completed in approximately 30-60 minutes. The interview protocol was developed based on literature on nurse manager roles and motivation, the use of performance data by clinical unit managers, and international indicator selection processes.[8,15-17,31,32] The protocol consisted of four sections of open-ended questions. These sections included (i) Professional background, motivations, and goals (5 items); (ii) Engagement and knowledge of hospital indicator selection processes (6 items); (iii) Work environment, experience, and commitment to use indicators (11 items); and (iv) overall impressions of hospital indicator selection and use (1 item). Draft protocol questions were tested

with two nursing directors who had previous clinical unit managerial experience and were not associated with the four cases. Following testing, some questions were separated into two, reordered, and language was edited for clarity. The interview protocol is in Appendix A.

Across the four cases, 22 clinical unit managers were interviewed: five managers from Cases A, B and D, and seven managers from Case C. Of the 22 managers, 17 were nurses and five were allied health professionals. Allied health professionals are staff with backgrounds in areas such as pharmacy, laboratory medicine, respirology, kinesiology, social work, physiotherapy therapy, or occupational therapy. Fifteen of 22 managers had a post-graduate master's degree. Of the 15 managers who had a post-graduate degree; three had degrees in nursing, three in business, three in leadership, and four in health administration (see table 3 in Appendix B). Eleven of 17 nurses had previously been Clinical Practice Leaders (CPLs). CPLs are nurses who educate and train front-line nurses in clinical practice standards. Nine of 22 clinical unit managers had served as managers for three years or less; nine had between four and eight years of managerial experience; and four managers reported greater than nine years of managerial experience. Nine of the 22 clinical unit managers had career aspirations to progress upward in management by seeking a director level role. Twelve managers were responsible for an inpatient unit, seven managed an outpatient unit, and three managed a clinical support department. A summary of participant demographics is in Appendix B.

Data Analysis

Interviews and notes were coded and analyzed using deductive and inductive coding.[28] For example, some deductive codes were used to capture data related to participant background, such as "Professional Background - RN" while others were designed to capture pre-determined

protocol options answers such as “Job Impact – Easier and Effective” or “Job Impact – Stress and Ambiguity”. Inductive codes were identified as interviews progressed and were designed to capture open-ended answers that participants offered while answering interview questions. Inductive codes included items a such as “KPI Professional Goal – Staff Development” and “KPI Motivation – KPI Patient Focused”. Identified codes in each interview were analyzed and compared to provide an aggregate view of each hospital case. Deductive and inductive codes are listed in Appendix C.

Member checking was completed to ensure data collected was validated by respondents.[28] Member checking memos were sent to respondents and no edits were suggested.

Results:

Clinical unit managers involved in this study were employed by one of the four large community acute-care hospitals that participated in the 2022 study on hospital indicator selection processes.[9] The 2022 study identified three types of processes, as outlined in Table 1.[9]

Table 1: Ontario Hospital Indicator Selection Process Types[9]

No.	Process	Description
1	Informal, Undocumented, Senior Management Led, Annual Renewal of Indicators	• Annual process to select indicators that will measure yearly goals and objectives. • Governed by the senior management team, they receive recommendations from corporate data support departments such as business analytics, finance, and quality. • Senior management report indicator results to their board, but the board is not involved in indicator selection. Clinical directors and physician leaders are aware of the indicators

		being recommended but are not engaged in the process of indicator selection. • The process is not documented.
2	Formal, Documented, Board and Senior Management Led, Annual Renewal of Indicators	• Annual process to select indicators that will measure yearly goals and objectives. • Process is governed by the board and senior management team without clinical director and physician leader participation. • Process is documented and outlines clear aim statement; selection criteria; and target setting rationales.
3	Formal, Documented, Board, Senior Management and Program Leadership Led, Selection of Indicators following a Strategic Plan	• A formal, structured, and time-limited process aimed at selecting indicators that measure a new strategic plan. • Process is governed by the board and senior management team and involves clinical director and physician leader participation in the selection of indicators and targets. • Process is documented and outlines aim, guiding principles, indicator selection criteria and target setting rationales.

The following section describes the role clinical unit managers had in their hospital's indicator and target selection processes, their perception of their hospitals processes, and the impact those processes had on their motivation and self-efficacy to improve performance. Table 2 summarizes managers' responses from each case.

Case A – Process 1

Case A deployed indicator selection process #1 in 2020 (see table 1).[9] Case A did not involve clinical unit managers in hospital-wide indicator and target selection, either by understanding how managers use indicators or in involving them in the final indicator selection

decision.[9] Managers are mandated to attend a weekly performance meeting to report on how their area is performing against selected indicators and targets.[9] When asked about the hospital-wide indicator selection process, Case A managers could not describe the process or criteria senior management used to select indicators or targets. Whereas senior management leaders described data quality, timeliness, funding, public reporting, and clinical relevance as indicator selection criteria,[9] clinical unit managers hypothesized that senior management considered patient safety, government funding, and benchmarking as possible indicator selection criteria. Two clinical unit managers within Case A felt senior management often selected an indicator because government funding required it, without clearly explaining why government may want to monitor the indicator. Case A-Manager 4 stated,

> We ask why are we doing this? They tell us these strangers in government are telling us to do this all of a sudden, so we had to get over it. So, it's not about the numbers, more so the reasoning behind them.

None of the clinical unit managers reported knowing if their organization selected indicators based on whether the indicators were outcome, process, or structural in nature. Case A's senior management leaders did not consider whether indicators were outcome, process, or structural in nature.[9] All clinical unit managers stated they were motivated by and believed indicator selection processes should consider process indicators that measure clinical practice improvement, and patient safety and are valued by front-line staff. Only one of Case A's five clinical unit managers thought government funding was a criteria that should be considered. Comfortable with access, quality, patient safety and patient experience indicators, clinical unit

managers were unaware of how finance and human resource indicators were chosen, whether they were relevant to their unit's activity, and how to use them.

When asked to provide an example of an indicator that matched the motivations of why they became a manager, four clinical unit managers shared indicators that focused on the patient experience, while three shared indicators that measured clinical practice compliance. This was illustrated by Case A-Manager 5 who stated, "Indicators that cover things like suicide assessments, medication compliance, and are practice based is what frontline staff cares about, and that's what my nurses really want to focus on."

Clinical unit managers were asked whether they felt they had ownership over indicators and if indicators created stress or made their job easier. All five clinical managers reported that they felt indicators were handed to them and that they had little say in the type of indicators they were to monitor and improve. Three managers shared that using indicators created stress, while two managers believed it made their job easier. Despite the stress indicators bring them, four clinical unit managers felt indicators enabled them to focus on certain priorities and felt accountable for the results. This feeling of accountability was in large part due to Case A's weekly performance meeting that required them to report on indicator performance. Case A-Manager 2 stated, "I have been here three years and early on it was a lot of pressure, but over time I learned the culture here is about effective accountability."

Case A clinical unit managers did feel that senior management could improve how they communicated the importance of monitoring indicators. Managers observed that the hospital's weekly performance meeting focused too much on improving poor performance. Managers would prefer senior management highlight good results to further motivate and demonstrate appreciation of managers. Case A-Manager 4 shared that "Some senior leaders use indicators in

a punitive way. Other leaders use it to celebrate successes so that's what motivates me to make change."

In terms of understanding if job tenure might impact clinical unit manager self-efficacy in using indicators to improve performance, two clinical unit managers with job tenure greater than five years reported more confidence in using indicators than managers who were new to their roles. Neither long tenured or new managers received training on measurement or orientation on how indicators are selected. Three clinical unit managers with less than four years of experience expressed a need to learn about how the organization selected indicators and targets so they could confidently communicate their rationale to front-line staff. Case A-Manager 1 shared, "I find it difficult to communicate why we use indicators. It makes me nervous because if I message it wrong, it may not translate properly to front-line staff."

Case B – Process 3

Case B deployed indicator selection process #3 in 2019 (see table 1).[9] Case B did not engage clinical unit managers in hospital-wide indicator or target selection either by understanding how managers use indicators, or in involving them in the final indicator selection decision.[9] All clinical unit managers were aware their senior management team conducted an indicator and target selection process and why the process was completed, thereby validating that senior management had publicized the process and its aim across the organization. However, when asked about the hospital-wide indicator selection process, not one clinical unit manager could describe the details of the process the hospital used to select indicators, nor could they confirm any criteria senior management used to select indicators.

When asked what criteria they might use to select indicators, two clinical unit managers listed patient safety and three managers listed clinical practice. When asked what criteria they thought their senior management team used to select indicators, three clinical unit managers hypothesized that senior management considered government funding, while two mentioned benchmarking and one mentioned patient safety. Case B's senior management team identified data automation, data quality, timeliness, usability, funding requirements, and clinical relevance as criteria they used.[9] When choosing indicators, Case B's senior management considered if the indicators were outcome, process, or structural in nature[9], but managers were unaware of this.

Clinical unit managers understood why senior management may select indicators that are aligned to government funding but reported not being motivated by these reasons. Two clinical unit managers stated they were motivated by indicators that measure quality and compliance to standards, while three clinical unit managers reported being motivated by indicators that measure process improvement.

When asked to provide an example of an indicator that matched the motivations for why they became a manager, four clinical unit managers shared indicators that focused on patient experience and measured clinical practice compliance. This was illustrated by Case B-Manager 3 who stated,

> I really like access indicators that measure how many patients get discharged with home supports and how many of those patients get readmitted back through the Emergency Department. These indicators tell us if we followed best practice in preparing people to get safely home or to another setting. It also tells me how satisfied patients might be as they really want to go home and not come back.

One clinical unit manager said the organization had the right number of indicators, while three thought they had too many. Clinical unit managers did not blame their senior management team for having too many indicators. Case B-Manager 3 showed that they understood the pressures senior management faced, stating, “We have too many, but it’s how we are funded. The regulation is so top heavy, it creates a lot of overlap.” Only two clinical unit managers thought they had control over indicators assigned to them. Three clinical unit managers felt monitoring indicator performance was stressful, while three stated that focusing on indicators allowed them to prioritize their work.

In terms of having the skills to use indicators effectively, Case B managers had not received any training on indicator selection or performance measurement from their hospital. Three Case B clinical unit managers stated that they relied on training they received when completing their Master of Business Administration degrees. “My MBA background has helped me in this area”, stated Case B-Manager 4. Two clinical unit managers from Case B that did not have a master’s degree shared that they often relied on data support departments or their supervising director to help guide them. These two managers also reported that they did not fully understand finance and human resources indicators. “My confidence in the business indicators is low as I do not think they reflect what’s happening clinically on my unit”, shared Case B-Manager 3.

When asked what barriers they faced in using indicators more effectively, two clinical unit managers identified a lack of resources and the need for more timely data as barriers. Three clinical unit managers agreed that a major impediment was the lack of time they have available in their daily job. Case B-Manager 3 said,

> It really boils down to time. If I had the time to go through all of it with a fine-tooth comb, I could probably pick up things that are happening earlier versus waiting to the end of the quarter to see it.

Case C – Process 3

Case C deployed indicator selection process #3 in 2019 (see table 1).[9] Case C did not engage clinical unit managers in hospital-wide indicator or target selection either by understanding how managers use indicators or in involving them in the final indicator selection decision.[9] While clinical unit managers did not participate in the process, they were aware it occurred. All seven clinical unit managers reported that the aim of the process was to select indicators that would measure quality and patient experience. Six clinical unit managers said the process aimed to enhance accountability for overall business performance, validating that senior management publicized the aim of its process across the organization.[9]

Whereas senior management reported using indicator selection criteria that included data quality, data availability, gaps in performance, and clinical relevance,[9] six of the seven clinical unit managers could not describe any selection criteria the senior management team may have used. One clinical unit manager hypothesized that criteria used by senior management included government funding given how often senior management talked about targets being set externally. Case C-Manager 6 shared, “I have had leaders say to me the government is saying, well, this is what gets funding so that’s what we need to do.”

While all clinical unit managers believed their senior management team used indicators for government funding, they all reported not being motivated by those reasons. All seven clinical unit managers said they preferred indicators that are process-based with five listing

quality as motivating factors. Two clinical unit managers who had longer tenure than their colleagues said they sometimes used benchmarking as a motivation. As Case C-Manager 4 shared,

> I recognize that we all need to be evaluated and benchmarked the same way, especially if we are receiving government funding. But I also strongly believe that if you invest in the people who do the work and set the benchmark as the aim for them, people who do the work are going to do the work exceptionally well.

Case C Managers were split on whether the hospital monitored the right number of indicators with two saying that they had the right amount, two saying they had too many, and three desiring more. When asked if monitoring indicators created stress or made their job easier, five clinical unit managers reported monitoring and reporting on indicators was stressful, while two stated that it made their job easier. Case C-Manager 2 replied,

> It’s a combination of both. It gives me focus, but the problem with some of these measurements is it's all retroactive, so I'm getting the data one or two months later then I'm getting questioned as to why it's not hitting target when it was so long ago.

When asked to provide an example of an indicator that matched the motivations of why they became a manager, four clinical unit managers shared indicators that focused on patient experience and measured clinical practice compliance. Two managers shared that they prefer indicators that engage staff. Case C-Manager 7 manager shared an indicator that addressed all three of these reasons:

> I like process indicators like length of stay because it allows us to collaborate with the doctors and staff on patient safety issues like pressure ulcers, infection rates, and discharge practices. It is these issues that are driving length of stay and so framing an access indicator into a series of safety processes is really valuable.

When asked what barriers they faced in using indicators more effectively, four clinical unit managers said the lack of time and resources, while three stated the lack of training and need for more timely data. Two clinical unit managers stated they had a fear of reporting on indicators because they were not confident in how to use the data and did not want to embarrass themselves or their unit. Two clinical unit managers shared that a potential barrier to using indicators was their physician group who may not share the same goals as unit staff. Case C-Manager 1 said,

> The physicians do not report to me, but they drive the procedures we are doing so it is hard to balance the needs of staff and doctors when doctors might care about indicator number one and the staff and management are looking at indicator number two.

None of Case C's clinical unit managers reported receiving training on performance measurement and the use of indicators from the hospital. Five clinical unit managers with long tenure shared that their self-efficacy in using indicators increased with experience over time. A comment by a Case C-Manager 6 who was about to retire illustrated this:

> I think finally, I can say that just as I'm getting close to retirement, I may be comfortable, I know what indicators mean. I know how to communicate them to

> the staff in a manner that they would understand because a lot of them don't understand what the data means or how to interpret it.

Case D – Process 2

Case D deployed indicator selection process #2 in 2020 (see table 1).[9] Case D did not engage clinical unit managers in hospital-wide indicator or target selection either by understanding how their managers used indicators or by involving them in the final indicator selection decision.[26] Case D's clinical unit managers could not describe the process or criteria the hospital used to select indicators and targets. All five clinical unit managers hypothesized that senior management used indicators for evaluation of organizational performance or for government funding. When asked what criteria senior management would use to select indicators, clinical unit managers responded that quality, benchmarking, and government funding were likely criteria. These answers partially matched those of senior management who stated the criteria they considered included data quality, data availability, strategic alignment, ability to benchmark, and quality improvement.[9]

All five clinical unit managers stated they were motivated by indicators related to quality and were uninspired by indicators that were used for government funding or reporting. Two clinical unit managers stated criteria they would use to select indicators included considering if the indicator is process-based, measures quality improvement, and promotes adherence to professional practice guidelines and workload. The need for more process indicators was explained by Case D-Manager 4 who stated,

> We only really look at outcome data and that's not enough. Having process and practice data would allow me to drill down to see how things are operating so I can work with staff to improve it.

When asked to provide an example of an indicator that matched the motivations of why they became a manager, two clinical unit managers shared indicators that focused on patient experience; two mentioned indicators that measured clinical practice compliance; and two managers mentioned indicators designed to measure staff engagement. An example of an indicator that measured clinical practice compliance was shared by Case D-Manager 3 who testified,

> I like to focus on the number or rate of medication errors. It obviously is tied to patient safety, but the processes to fix it are multifactorial. We can ask if the error was related to dosing, administration of the drug, the labelling of the drug, or even if it was for the right patient.

When asked about whether they felt they had ownership over indicators and whether indicators created stress or made their job easier, a Case D clinical support manager felt their unit indicators were essentially handed to them, whereas the inpatient and outpatient managers thought they had greater control over the indicators they were responsible for. One clinical unit manager reported that the focus on indicators makes their job easier, whereas two stated it created job stress. All clinical unit managers agreed that monitoring indicators allows them to focus on key deliverables. Case D-Manager 2 shared, "Indicators create some stress, but I understand they are needed for the purpose of making us improve and align our teams." Two

clinical unit managers felt that the finance and human resource indicators they monitor were not reflective of their unit's activity.

In terms of identifying barriers to using indicators more effectively, two clinical unit managers noted the need for additional resources and more timely data, whereas three noted the lack of time. Case D-Manager 4 shared the need for a more modern data mining tool, "Our reporting burden is only increasing so to not have timely data with a good data tool just creates more workload."

When asked what skills and confidence they had in using indicators, Case D clinical unit managers reported that they had not received any formal indicator training and felt unprepared to use indicators when they accepted their job. "I have had zero training here. I think when I became a manager there was an assumption, I knew it. I went through the motions to figure it out", shared Case D-Manager 1. Four of the five clinical unit managers who had greater than five years of experience stated that their self-efficacy in using indicators increased over time and after they learned how to best communicate the use of indicators to their front-line staff.

Table 2: Clinical Unit Manager Responses per Case

Protocol Area	**Case A (n=5)**	**Case B (n=5)**	**Case C (n=7)**	**Case D (n=5)**
Process	Process 1	Process 3	Process 3	Process 2
Respondent Backgrounds	• 5 Registered Nurses. • 4 Inpatient Managers. • 1 Outpatient Manager.	• 4 Registered Nurses. • 1 Allied Health Professional. • 2 Inpatient Managers. • 2 Outpatient Managers. • 1 Clinical Support Manager.	• 7 Registered Nurses. • 4 Inpatient Managers. • 3 Outpatient Managers.	• 2 Registered Nurses. • 3 Allied Health Professionals. • 2 Inpatient Managers. • 2 Outpatient Managers. • 1 Clinical Support Manager.
Professional background, motivations, and goals				
Reasons for becoming Manager	• Personal growth (1). • Encouraged to take role (3). • Wanted to improve quality (2), improve staff working environment (3), improve professional practice (2).	• Pursue leadership (4). • Personal growth (3). • Encouraged to take role (1). • Wanted to improve quality and (3), and staff environment (3).	• Pursue leadership (4). • Encouraged to take role (3). • Wanted to advancing quality (4), practice (4), and improve staff working environment (2).	• Personal growth (3). • Contribute to hospital and sector leadership (4). • Wanted to improve quality (3), and advance teaching and practice (2).
Unit Goals	• Unit goals included quality (5), supporting staff (4), advancing practice (3), and growing program (1).	• Unit goals included quality (4), supporting staff (3), efficiency (2), and growing program (3).	• Unit goals included quality (5), supporting staff (5), efficiency (2), and Health Record adoption (2).	• Unit goals included quality (5), supporting staff (5) and practice adoption (3).
Professional Goals	• Become director (2). • Lead change (5). • Continue to learn role (3).	• Become director (1). • Lead change (4). • Continue to learn role (4).	• Become director (3). • Lead change (4). • Continue to learn role (3).	• Become director (2). • Advance best practices (3).
Engagement and knowledge of hospital indicator selection processes				
Indicator Rationale / Reasons	• Managers reported quality (2), accountability (2), evaluation (2), and government funding (2) as reasons hospital uses indicators.	• Managers reported quality (3), accountability (1), evaluation (2), resource planning (3), and priority setting (2) as reasons hospital uses indicators.	• Managers reported quality (7), accountability (3), patient experience (4), and evaluation (4) as reasons hospital uses indicators.	• Managers reported quality (3), accountability (5), evaluation (3), resource planning (2) and government funding (2) as reasons hospital uses indicators.

Process and Criteria	• Managers could not describe hospital process used to select indicators and targets (5). • Process criteria likely includes patient safety (4), government funding (2), and benchmarking (2).	• Managers could not describe hospital process used to select indicators and targets (5). • Process criteria likely includes benchmarking (2), government funding (3), and patient safety (1).	• Managers could not describe hospital process used to select indicators and targets (7). • Process criteria likely includes benchmarking (1) and government funding (1).	• Managers could not describe hospital process used to select indicators and targets (5). • Process criteria likely include quality (2), government funding (1), and benchmarking (1).
Manager Involvement	• Managers not involved in hospital-wide indicator selection process (5).	• Managers not involved hospital-wide indicator selection process (5).	• Managers not involved hospital-wide indicator selection process (7).	• Managers not involved in hospital-wide indicator selection process (5).
Manager Training and Support	• Managers do not receive indicator training (5). • Receive support from data departments (2). • Rely on directors to guide them (2). • Managers receive indicator sheets that describe definition and target justification (2-yes, 1-no, 2- inconsistent).	• Managers do not receive indicator training (5). • Receive support from data departments (1). • Rely on directors to guide them (2). • Managers receive indicator sheets that describe definition and target justification (1-yes, 1-no, 2-inconsistent).	• Managers do not receive indicator training (7). • Receive support from data departments (3). • Rely on directors to guide them (2). • Units monitoring provincially indicators get definitions and target justifications but for not local indicators (2).	• Managers do not receive indicator training (5). • Receive support from data departments (2). • Rely on directors to guide them (4). • Indicator definition and target justification sheet is not provided consistently (4).
Indicator Relevance	• Clinical indicators match unit activity (4). • Finance and HR indicators not reflective of unit activity (5).	• All indicators reflect unit activity (1). • Clinical indicators match unit activity (4). • Finance and HR indicators not reflective of unit activity (4).	• All indicators reflect unit activity (4). • Clinical indicators match unit activity (3). • Finance and HR indicators not reflective of unit activity (3).	• All indicators reflect their unit's activity (2). • Clinical indicators were relevant (2) • Finance and HR indicators not reflective of unit activity (2).
Work environment, experience, and commitment to use indicators				
Number of indicators, and Criteria for indicator selection	• Right number of indicators (2). • Not enough indicators (1).	• Right number of indicators (1). • Too many indicators (3)	• Right number of indicators (2). • Too many indicators (2) • Not enough indicators (3).	• Too many indicators (2). • Not enough indicators (1). • Criteria should include improving quality (2) and

	• Criteria should include clinical relevance (1), measure practice (3), improve patient safety (1), and funding (1).	• Criteria should include clinical relevance (1), measure practice (2) and improve patient safety (2).	• Criteria should include clinical relevance (3), improve quality (2), and data timeliness (2).	workload measurement (2).
Indicators that are Meaningful and Motivate	• Indicators that motivate focus on patient experience (4), measure clinical practice (3), and engage staff (1). • Indicators related to quality assurance (3), and internal improvement (4), are motivators. • Government funding indicators are not motivating (5).	• Indicators that motivate focus on patient experience (4), measure clinical practice (4), and engage staff (1). • Indicators related to quality assurance (2) and internal improvement (3) and benchmarking are motivators (2). • Government funding indicators are not motivating (5).	• Indicators that motivate focus on patient experience (4), measure clinical practice (4), and engage staff (2). • Indicators related to quality assurance (2) and internal improvement (3) and benchmarking are motivators (2). • Government funding indicators are not motivating (7).	• Indicators that motivate focus on patient experience (2), measure clinical practice (2), and engage staff (2). • Indicators related to quality assurance (3), and internal improvement (4), are motivators. • Government funding indicators are not motivating (5).
Ownership and Control	• Indicators are handed to them (4). • Feel they own the indicator set (3).	• Indicators are handed to them (1). • Feel they own the indicator set (2).	• Indicators are handed to them (4). • Have control on indicators they should focus on (2).	• Indicators are handed to them (1). • Have control on indicators they should focus on (4).
Job Impact and Barriers	• Indicators make job easier and effective (2). • Indicators create stress (3). • Indicators allow focus on key deliverables (5). • Barriers identified included need for data mining tools (2), fear of reporting results (4), need for resources (2), and communicating indicators to staff (3).	• Indicators make job easier and effective (1). • Indicators create stress (3). • Indicators allow focus on key deliverables (3). • Barriers identified included lack of time (3), large spans of control (2), resources (2), timely data (2), modern data mining tool (1), and communicating indicators to staff (1).	• Indicators make job easier and effective (3). • Indicators create stress (5). • Indicators allow focus on key deliverables (5). • Barriers identified included lack of time s (4), resources (4), need for training on measurement and quality improvement (3), timely data (3), physician engagement (2), and fear of reporting (2).	• Indicators make job easier and effective (1). • Indicators create stress (2). • Indicators allow focus on key deliverables (4). • Barriers identified included lack of time (3), the need for more timely data (2), resources (2), and modern data mining tool (3).

Effectiveness in Using Indicators	• Not sure how effective they were (1). • Learn how to use indicators over time (4). • Accepted using indicators as part of their job (2).	• Not sure how effective they were (1). • Learn how to use indicators over time (3). • Accepted using indicators as part of their job (1).	• Did not feel confident in using indicators (3). • Learn how to use indicators over time (2). • Effective after learning how to communicate indicators to staff (2).	• Effective by learning over time (4). • Effective after learning how to communicate indicators to staff (4).
Overall impressions of hospital indicator selection and use				
Strengths	• Senior management focus on quality (3). • Corporate alignment (3). • Process instilled accountability (2).	• Senior management support (3). • Corporate alignment (2). • Focus on quality (1).	• Senior management support (2). • Process instilled accountability (1). • Transparent process (1).	• Senior management support (2). • Corporate alignment (1).
Opportunities	• Measurement training (2). • Timely data tools (2). • Celebrate good results not just "red" indicators (1).	• Measurement training (1). • Timely data tools (2).	• Measurement training (1). • Timely data tools (2). • Celebrate good results not just "red" indicators (1). • Share unit results (3).	• Measurement training (1). • Input on hospital wide indicators (1). • Timely data tools (3). • Share unit results (1).
COVID-19: Considerations for Indicator Selection Going Forward				
COVID-19	• Refocused organization on staff and patient safety, infection control, staffing levels, and supply management. • Created single priority and lead to quicker decision-making. • Have not discussed recovery and how managers will be engaged.	• Refocused organization on staff and patient safety, infection control, staffing levels, and supply management. • Led to quicker decision-making. • Became more of a data driven organization.	• Refocused organization on staff safety, staffing levels, best practice, and supply management. • Invited greater manager input and quicker decision-making. • Created a single priority. • Stopped unit quality initiatives. • Have not discussed recovery and how managers will be engaged.	• Refocused organization on staff safety, staffing levels, and supply management. • Invited greater manager input and quicker decision-making. • Created single priority. • Stopped unit quality initiatives. • Have not discussed recovery and how managers will be engaged.

(n) = number of responses

Discussion

This multiple-case study explored the role clinical unit managers had in their hospital's indicator selection process, their perceptions of their hospital's process, and how the process might have impacted their motivation and self-efficacy to improve performance. Four matters arise from the data in this study. The first matter is the common motivations, goals and indicator preferences clinical unit managers have across the four cases. The second matter is the impact workload, experience and other barriers have on managers' self-efficacy on using indicators to improve performance. The third matter is the role clinical unit managers may want to play in, and the suggestions they have for, indicator selection processes. The fourth matter relates to how lessons learned during the COVID-19 pandemic might advance clinical unit managers inclusion in indicator selection and their motivation and self-efficacy to improve performance. The discussion will link these findings to literature and theory.

Manager's motivations, goals, and their preferred indicators

In the 2022 study on hospital indicator selection processes, none of the senior management teams shared how their chosen indicators related to the clinical unit manager's motivations.[9] Senior management teams in these cases also reported low confidence in managers ability to use indicators to improve performance.[9] To understand the processes and type of indicators that motivate clinical unit managers, one must first understand the reasons why front-line clinicians become managers. Most participants in this study shared that they never thought of becoming managers when completing their initial clinical education. Fourteen nurses and allied health professionals viewed becoming a manager as an opportunity to embed teaching and professional practice into their unit's culture. Nine of 22 clinical unit managers reported that

supporting staff was another reason they decided to take on a leadership role. An expression of this motivation was described by Case A-Manager 1 who shared, "I like helping people. I come from a family of teachers, which is probably why I was drawn to being a clinical instructor before becoming a manager."

These rationales for becoming a clinical unit manager translated into the goals they set for their unit. When asked what goals they had for their units, 17 of 22 managers stated supporting and developing their staff, while 20 of the 22 mentioned patient safety and quality improvement. This was demonstrated by Case A-Manager 5 who stated, "My goals are to build a staff environment that focuses on quality and practice standards, so nurses feel more connected to patients and love their work." These findings align with published literature on clinical manager motivations that states front-line clinicians like nurses initially move into management to help improve quality and the working conditions of their fellow staff.[16,33-35]

While senior management teams in the 2022 study described the aims of their indicator selection processes to include improving quality, they also stressed that indicator selection processes assisted them in measuring business performance, meeting reporting requirements, enabling peer benchmarking, and securing government funding.[9] Further, senior management in these cases described very detailed selection criteria such as data quality, data timeliness, strategic alignment, performance gaps, and clinical relevance.[9] When asked what the aims and potential criteria of indicator selection process should include, clinical unit managers' answers were more broad than the detailed answers senior management leaders answers gave. Clinical unit managers referenced themes such as quality, patient safety, clinical practice, and front-line staff engagement as criteria by which they would choose indicators. This case study illustrates the aims and criteria senior management used to select indicators do not necessarily match the

motivations of their front-line clinical unit managers. Senior management were much more detailed in their criteria descriptions and focused on both quality and business objectives compared to clinical unit managers who spoke in terms of broad themes related to quality, clinical practice, and staff engagement.

The impact of workload and job experience on Manager's self-efficacy on using indicators

Senior management leaders within the cases studied reported low confidence in clinical managers ability to use indicators to improve performance.[9] This study found that many clinical unit managers reported low self-efficacy in this area. Managers gave three main reasons for this: lack of training and knowledge on measurement, workload, and job experience.

All 22 clinical unit managers reported not receiving any training on measurement and the use of indicators from their hospital. Clinical unit managers expressed great discomfort in this area. As Case A-Manager 3 stated, "I have not received any training or education on measurement here. When I started in the role, it was kind of just sink or swim." Case B-Manager 3 agreed, sharing "My education is based on how to be a nurse, not how to decipher data and know what it means. So, some of this stuff is foreign to me and it's been trial by fire for me."

Most managers also stated that their self-efficacy in using indicators was negatively impacted by feeling fearful and embarrassed to participate in performance reporting, and an inability to effectively communicate the importance and use of data to their staff. Case D-Manager 1 shared,

> Sometimes you get these odd graphs and you're like, I don't understand what this means. I don't want to look dumb and say, I don't understand your graph. Can you please make it simple because I have to explain it.

Case B-Manager 5 reaffirmed this feeling, sharing,

> As a manager, it definitely stresses me. Communication is huge and how that information trickles down to the front-line is very important. Staff are not going to slow down for you if you don't communicate the reason why you're actually measuring something. So, if I don't know how this number helps us, we could have a big problem later on.

Managers consistently noted that while they understood that indicators allow focus, they felt stressed by them. This aligns with literature that found clinical unit managers often view indicators as a punitive tool.[10,17] Managers in this study believed that indicators should help reinforce positive behaviour and motivate managers to make change. Case C-Manager 3 suggested hospital leadership should celebrate positive results compared to always highlighting gaps or negative results.

> While senior management may want to focus on a lagging "red" result, they need to know staff are very fearful of repercussions and that they might get excited because we're doing something really well and want to continue that.

Clinical unit managers understood senior management teams have an accountability for the performance of financial and human resource indicators. Managers however consistently shared that they struggle to understand how these indicators are relevant to their unit's daily activities. Notably, the three clinical unit managers who had completed Master of Business Administration (MBA) degrees all reported using their graduate training to help them in this

area. The remaining 12 managers who had master's degrees in areas such as nursing, health leadership, and health administration, and the seven managers with only undergraduate training did not make this comment.

In addition to a lack of knowledge and training on performance measurement, many managers said they did not have enough time to learn and be engaged in indicator selection due to the highly transactional nature of their workload. All clinical unit managers shared that most of their time is consumed by tasks like staff scheduling, patient flow, and supporting doctors and families compared to performance improvement. Clinical unit managers uniformly identified the need for more time and timely data as barriers to focus on improving performance. One clinical unit manager shared that it was not unusual that by the time they received a data report it was unusable given they had moved on to another issue within their unit. Case D-Manager 5 noted,

> Some of the data I get is not very user friendly, so what I am hoping for in the next few years is the ability to pull my own reports. Right now, I rely on a data team to drill down on my questions and that takes time given the number of requests they get.

Job experience helped clinical unit managers in their understanding and self-efficacy in using indicators. All managers with management experience greater than four years reported greater self-efficacy in using indicators to improve performance than managers with less than four years. Managers reported that the amount of time they had on the job allowed them to learn how to use indicators through trial and error, and to receive support from hospital data leaders or their supervising director.

These findings align with literature that shares that a lack of role clarity and accountabilities can result in large workloads for clinical unit managers, and that part of the business skills clinical unit managers need to obtain is the understanding, interpretation, and use of performance data for evidence-based decision making.[10,11,32,33,36,] These findings confirm that clinical unit managers are often appointed to managerial roles without these business skills and they therefore need to learn them through trial and error.[31,33,36] Given each hospital in this multiple-case study is accountable for annual budgets more than $400M, hospitals need to engage clinical unit managers in understanding performance measurement and business-based indicators, to help support the long-term financial viability of their hospital.[12,14,17,37-39]

Nine of 22 clinical unit managers shared that they had future goals of progressing upward in management. Given this, these findings also suggest that clinical unit managers themselves may need to seek formal training in performance measurement to support their professional development. Finally, the findings also suggest that like MBA programs, other graduate programs in nursing, health leadership, and health administration may wish to add measurement training to their curriculum.

Role managers want to play and considerations to improve indicator selection processes

The 5-P Indicator Selection Process Framework provides a standardized structure that health care organizations, hospitals, and clinical disciplines can use to guide the selection of performance indicators and targets.[8] In assessing the four cases against the 5-P Indicator Selection Process Framework, not one included clinical unit managers in three key elements of the framework: seeking input from managers to understand their experiences with potential indicators; involving managers directly in the expert panels or committees charged with the

selection of indicators; and, seeking validation feedback from managers on the relevance any final set of indicators may have to their local environment.[9] As a result, all managers in this study suggested that having representation on hospital-wide indicator selection processes would help they and their fellow clinical unit managers better understand the alignment of their unit's activity to hospital goals. They also said that their participation would contribute to them having greater ownership of the indicators they were responsible for improving.

Clinical unit managers in this study reported that they felt indicators were handed to them, that they had too many indicators to monitor, and that they and little control over the indicators they were accountable for. Senior management leaders in the hospitals included in the 2022 multiple-case study reported having low confidence in clinical unit managers' ability to use indicators effectively.[26] These two phenomena are juxtaposed. Hospital senior management teams cannot reasonably doubt the capabilities of their clinical unit managers' ability to use indicators to improve performance if they are not engaging these leaders in the selection of, or educating them about, indicators and targets.

These findings align with literature on indicator selection. Measurement leaders must be mindful of the audience to whom the indicator is designed to help and that centrally mandated indicators can lead to low morale, loss of control and lack of trust amongst front-line managers.[8,18,20,40] These findings also align with goal setting theory of motivation that contends that when one participates in goal setting and task assignment, it clarifies what is important and why, creates shared accountability for performance among managers and their teams, and, if paired with leadership support, can improve managerial self-efficacy, motivation, and performance.[25,26] Findings also align with literature that states, if positively motivated and engaged, clinical unit managers can effectively support innovation and change.[13] As a result,

implementation of measurement systems consisting of indicators and targets should not be perceived by clinical unit managers as a check box item. Indicators and targets must be tied to a clear goal, communicate the expected benefit the indicator measures, be framed within a culture of continual learning and improvement, be reflective of the intrinsic ideal's clinical unit managers value, and should focus on processes they can directly change.[12,14,17,37-40]

The COVID-19 pandemic's potential impact on future indicator selection and manager motivation and self-efficacy

The fourth matter relates to lessons learned during the COVID-19 pandemic and how they illustrate the above noted point that engagement in and understanding indicator selection processes may advance clinical unit managers' motivation and self-efficacy in improving performance. Clinical unit managers uniformly shared that the pandemic created a single priority for their organizations; involved greater engagement in, and lead to, faster decision making; and led organizations to focus on process indicators related to professional practice and staff safety. As an example, a new indicator that clinical unit managers commonly reported being monitored more closely during the pandemic was the inventory levels of personal protective equipment (PPE) which was rarely monitored or reported previously.

One clinical unit manager reported that senior management leaders better understood their clinical areas given the greater engagement that occurred during a time of crisis compared to normal operations. Case A-Manager 4 described,

> COVID has changed everything. I've seen senior leader sentiment sort of evolve from when people are being told to do things versus asking us why we're doing them. Senior leaders have become clinically focused. We see them maybe a little

> bit better for who they are now because the data is not being shoved down our throats. We are being asked if certain data makes sense to us. My VP is just, yep, whatever you need, so I get that support, which makes a huge difference.

These findings match earlier discussion points in this paper and literature that managers want to be engaged in goal setting to better understand their accountabilities and to help select process indicators that measure quality, clinical practice, patient experience and staff engagement.

Limitations

This study has three limitations. First, the sample only included hospital clinical unit managers responsible for acute inpatient, outpatient, and clinical support departments. Other hospital managers are accountable for business units that may not deliver direct care services but also use indicators to improve performance. As such, study findings may not be generalizable to all hospital managers. Second, the study sample did not include physician leaders and is not reflective of medical leadership participation in indicator selection processes. Finally, participant interviews were completed during the COVID-19 pandemic in Ontario, Canada. As a result, the timing of interviews may have impacted participants' recall ability given some hospitals paused the process of selecting indicators during this time.

Conclusion

This qualitative multiple-case study researched the role clinical unit managers have in selecting indicators and targets in their hospital, their perceptions of the process, and what impact

the process might have on their motivation and self-efficacy in using indicators to improve performance. Clinical unit managers are not involved in, and by extension, are not motivated by hospital-wide indicator selection processes. Managers have low self-efficacy in using indicators to improve performance.

In the cases studied, clinical unit managers reported having no role in the selection of hospital-wide indicators or targets. Managers did not understand the criteria by which their senior management team selected indicators. While clinical unit managers understood that senior management must monitor outcome indicators tied to government funding, they are not motivated by this reason. Rather, clinical unit managers are motivated by process indicators that measure quality, patient safety, clinical practice, and staff experience. Managers perceived that process indicators were more in their direct control. Managers believed that the process changes they can implement with front-line staff eventually do improve the service delivery outcomes their senior management team desires. Clinical unit managers have low self-efficacy in using indicators due to a lack of knowledge about indicator selection, a lack of training in measurement, a fear of reporting, and other workload requirements. To motivate and support clinical unit managers self-efficacy to improve performance, hospitals should recognize that the outcomes they set out to achieve are attained by processes delivered at the unit level.

To mitigate risks related to overmeasurement, selecting irrelevant indicators, and paralyzed decision making, hospitals should consider including clinical unit managers in hospital-wide indicator selection processes; contextualize the criteria by which indicators are selected within the motivational frame that matters to clinical unit managers; and offer continued education and training to managers on indicator and target selection, and performance measurement.

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Appendix A: Interview Protocol

Introduction:

I am Mike Heenan, a PhD student at McMaster University conducting my thesis / dissertation research. As noted in the materials shared, I am researching how organizations select their Key Performance Indicators (KPIs) and associated targets, and how those processes may impact manager's motivation to improve performance.

As part of this research, I interviewed senior leaders in your organization on the processes you use as a hospital. I am now interviewing managers on how they are involved in those processes and how it may motivate them. Thank you for agreeing to participate. You will have received a consent form from me earlier and so I will begin by confirming your consent. Please note all information you provide will be anonymized and neither you nor your organization will be identified in any publication.

Consent:

- Do you agree to the interview being audio recorded? Audio recording will ensure the information you provide is accurate and can be summarized easily. The recording will be deleted after data is summarized.
- Do you agree to be contacted for follow up to clarify your responses?
- Would you like to receive a copy of the study results? What email address should I use?
- Do you agree to allow you data to be used for future research?

In addition to the consent form, you were issued a copy of the 5-P KPI Selection Framework and a draft of these questions. This framework was developed following a scoping review of international literature and summarizes the main processes used by health organizations in selecting KPIs and targets. This is the framework I will reference throughout our conversation, and you'll see the questions I ask will follow each of the domains in the framework.

Part 1: Professional Background, Motivations and Goals

1. Can you briefly describe your professional and educational background?
2. How long have you've been in your position?

3. What motivated you to become a manager?

4. What goals do you have as manager in terms of the unit you oversee?

5. What goals do you have personally for your career as a manager?

Part 2: Engagement and knowledge of hospital indicator selection processes

6. Can you describe the reasons why the hospital uses and reports on KPIs?

7. Can you describe the process and criteria by which hospital KPIs are chosen?

8. Describe how you as manager participate in the selection of hospital wide or unit-based KPIs and targets? Do you get a say on the KPI and target chosen?

9. When you receive a KPI report, does it share the definition of the KPI, indicate the KPIs data source and explain the rationale for the target? If so, is it helpful? If not, would one? Why?

10. Please share the training, education or orientation you receive from the hospital in the area measurement and the KPIs you are held accountable for?

11. On a scale of 1-5 with 5 being highest, can you describe the confidence you have that the KPIs your unit monitors are relevant to daily operations? Does it differ by KPI type (e.g. quality, patient safety, finance, HR)

Part 3: Work Environment, Experience and Commitment to use Indicators

12. Do you think you have the right amount, too much, or not enough KPIs that you are responsible for? If you were to increase or reduce the number, what criteria might you use?

13. When you look at the different KPIs you monitor which ones match the professional goals you set out in taking on a manager position?

14. Of all the KPIs you work with, can you describe one you used to make improvement? What is it about that KPI that makes it meaningful to you?

15. Do you feel you have ownership over the KPIs and target or do you feel they are essentially handed to you? Why? Or why not?

16. Do you have control over the KPIs you over see? Why do you feel that way? Do you have enough support from data-based departments to assist you in using KPIs?

17. If you are asked to report KPI performance to your supervisor or a committee of the organization, do you do you think they are using KPIs for quality assurance, internal improvement, external comparison (benchmarking) or external / government reporting? Which one motivates you most?

18. Do you think the focus on measurement and hitting targets in your organization makes your job easier and more effective? Or does it create more stress or ambiguity? Why or why not?

19. What barriers might you face as a manager in using KPIs and targets more effectively?

20. Describe how confident are you as a manager in using skills to use, report on, and meet the goals the KPIs and targets set out for your unit?

21. Describe how effective are you as a manager in using skills to use, report on, and meet the goals the KPIs and targets set out for your unit?

22. In discussing COVID impact on KPIs with hospital executives, one executive said he was pleased that after many years of trying to push data driven decisions, organizational leaders demanded new data in the face of COVID to make decisions. He however also noted that it taught corporate leaders they may have been giving the wrong data or did not have the right data. As an example, COVID brought more of a focus on process based KPIs related to PPE supply and processes such as screening & vaccinations versus traditional outcomes KPIs. It also however highlighted the lack of strong HR data within hospitals like understanding how many staff can be deployed to different areas and by when. Hearing this story, can you describe how COVID may have impacted the way you looked at the type and use of KPIs?

Part 4: Overall impressions of on performance measurement

23. Given our conversation, what do you think are the strengths of and the opportunities for improvement in the KPI selection and target setting process in your hospital?

Appendix B: Study Sample Demographics

Table 3: Participant Demographics

Hospital Case	Participant Code	Position Type	Prof. Background	Unit Type	Managerial Experience	Educational Experience	Graduate Study Area
A	A-M1	Manager	Registered Nurse	Inpatient	4 years	Graduate	Nursing
A	A-M2	Manager	Registered Nurse	Inpatient	4 years	Undergraduate	-
A	A-M3	Manager	Registered Nurse	Outpatient	5 years	Undergraduate	-
A	A-M4	Manager	Registered Nurse	Inpatient	8 years	Graduate	Nursing
A	A-M5	Manager	Registered Nurse	Inpatient	<1 year	Undergraduate	-
B	B-M1	Manager	Registered Nurse	Outpatient	1 year	Undergraduate	-
B	B-M2	Manager	Allied Health Professional	Clinical Support	<1 year	Graduate (x2)	Science & MBA
B	B-M3	Manager	Registered Nurse	Outpatient	3 years	Undergraduate	-
B	B-M4	Manager	Registered Nurse	Inpatient	1 year	Graduate	MBA
B	B-M5	Manager	Registered Nurse	Inpatient	8 years	Graduate	MBA
C	C-M1	Manager	Registered Nurse	Outpatient	11 years	Graduate	Health Admin
C	C-M2	Manager	Registered Nurse	Inpatient	4 years	Graduate	Health Admin
C	C-M3	Manager	Registered Nurse	Outpatient	11 years	Graduate	Nursing
C	C-M4	Manager	Registered Nurse	Inpatient	1 year	Graduate	Health Admin
C	C-M5	Manager	Registered Nurse	Inpatient	3 years	Graduate	Nursing
C	C-M6	Manager	Registered Nurse	Outpatient	15 years	Graduate	Not Identified
C	C-M7	Manager	Registered Nurse	Inpatient	2 years	Graduate	Leadership
D	D-M1	Manager	Registered Nurse	Inpatient	8 years	Graduate	Leadership
D	D-M2	Manager	Allied Health Professional	Inpatient	5 years	Undergraduate	-
D	D-M3	Manager	Allied Health Professional	Clinical Support	13 years	Graduate	Health Admin
D	D-M4	Manager	Allied Health Professional	Clinical Support	2 years	Undergraduate	-
D	D-M5	Manager	Registered Nurse	Outpatient	7 years	Graduate	Leadership

Appendix C: Study Deductive and Inductive Codes

Table 4: Deductive and Inductive Codes

Protocol Area / Code Name	Deductive Code	Inductive Code	Protocol Area / Code Name	Deductive Code	Inductive Code	Protocol Area / Code Name	Deductive Code	Inductive Code
Demo 1 - Background			**HW KPI 4 - Definition Sheets**			**WESM 6 - Mgr Motivations**		
Demo1a - RN	DC		HW4a -No	DC		WESM6a - QA	DC	
Demo1b - Allied Health	DC		HW4b - Yes	DC		WESM6b - Internal Improvement	DC	
Demo1c - Undergrad Degree	DC		HW4c - Prov Reports Only		IC	WESM6c - Benchmarking	DC	
Demo1d - Graduate Degree	DC		HW4d - EHR Hope		IC	WESM6d - Govt Reporting	DC	
Demo1e - Clinical Educator (CPL)		IC	HW4e - Inconsistent		IC	**WESM 7 - Job Impact**		
Demo 2 - Unit Type			HW4f - Would Help		IC	WESM7a - Easier Effective	DC	
Unit2a - Inpatient	DC		**HW KPI 5 - Training**			WESM7b - Stress Ambiquity	DC	
Unit2b - Outpatient	DC		HW5a - No	DC		WESM7c - Allows Focus	DC	
Unit2c - Clinical Support	DC		HW5b - Yes	DC		WESM7d - Need Training		IC
Demo 3 - Manager Tenure			HW5c - Analyst Support		IC	WESM7e - Resources Needed		IC
Demo3a - 3 or less		IC	HW5d - Director Help		IC	**WESM 8 - KPI Barriers**		
Demo3b - 4 to 8		IC	HW5e - Learn as Go		IC	WESM8a - Time		IC
Demo3c - 9 or more		IC	HW5f - Weekly Huddle Help		IC	WESM8b - Span of Control		IC
Demo 4 - Motivation			**HW KPI 6 - Unit Relevance**			WESM8c - Resources		IC
Demo4a - Leadership Goal		IC	HW6a - Yes (All KPIs)	DC		WESM8d - Physician Demands		IC
Demo4b - QI Redesign Service		IC	HW6b - Yes (Q, PE, PE KPIs)	DC		WESM8e - IT (BI Tool)		IC
Demo4c - Encouraged		IC	HW6c - No (Fin HR KPIs)	DC		WESM8f - DSS dont understand Clinical		IC
Demo4d - Teaching		IC	HW6d - No (Not Practice Based)	DC		WESM8g - Data Lags		IC
Demo4e - Support Staff		IC	**WESM 1 - KPI Number**			WESM8h - Fear of Results RYG		IC
Demo4f - Patient Experience		IC	WESM1a - Right Amount	DC		WESM8i - Training		IC
Demo4g - Personal Growth		IC	WESM1b - Too Many	DC		WESM8j - Competing Priorities		IC
Demo 5 - Goals (Unit)			WESM1c - Not Enough	DC		WESM8k - Targets False		IC
Demo5a - Staff		IC	WESM1d - Criteria		IC	WESM8l - Reporting Burden		IC
Demo5b - Patient QI		IC	WESM1e - Clinical Relevance		IC	WESM8m - KPI Purpose Communication		IC
Demo5c - Efficiency		IC	WESM1f - Timely Data		IC	**WESM 9 - Confidence Effective**		
Demo5d - Access		IC	WESM1g - Practice KPI		IC	WESM9a - Learn Over Time		IC
Demo5e - EHR		IC	WESM1g - Workload		IC	WESM9b - Mgr needs to Translate to Front Line		IC
Demo5f - Best Practice		IC	WESM1h - HR KPIs		IC	WESM9c - Not Confident		IC
Demo5g - build accountabiliy		IC	WESM1i - Priorities		IC	WESM9d - Part of Job Acceot it		IC
Demo5h - Patient Safety		IC	WESM1j - Pt Safety QI		IC	**Overview 1 - Strength**		
Demo5i - Grow Program		IC	WESM1k - Ministry		IC	Over1a - Open Transparent		IC
Demo 6 - Goals (Career)			WESM1l - Financial		IC	Over1b - Local Ownership		IC
Demo6a - Director (Yes)	DC		**WESM 2 - KPI Professional Goal**			OVER1c - Accountability		IC
Demo6b - Director (No)	DC		WESM2a - Staff Development		IC	Over1d - SLT Support		IC
Demo6c - Continue Learn		IC	WESM2b - Patient Experience		IC	Over1e - Corp Alignment		IC
Demo6d - Lead Change		IC	WESM2c - Patient Safety		IC	Over1f - QI Focus		IC
Demo6e - Advance Practice		IC	WESM2d - QI		IC	Over1g - Weekly Huddle		IC
Demo6f - Learn SLT Governance		IC	WESM2e - Best Practice		IC	**Overview 2 - Challenge**		
Demo6g - More Education		IC	WESM2f - Finance		IC	Over21 - KPI Education		IC
HW KPI 1 - Reasons			**WESM 3 - KPI Meaningful**			Over2a - KPIs should adddress access flow		IC
HW1a - QI		IC	WESM3a - KPI = Pt Focus		IC	Over2b - Timely Data		IC
HW1b - Accountability		IC	WESM3b - KPI = Best Practice Process		IC	Over2c - EHR BI Tool		IC
HW1c - Pt Experience		IC	WESM3c - KPI = Staff Priority		IC	Over2d - DSS Clinical Awaerness		IC
HW1d - Transparency		IC	WESM3d - Financial		IC	Over2e - Span of Control Time		IC
HW1e - Evaluation		IC	**WESM 4 - KPI Own Control**			Over2f - Celebrate Results		IC
HW1f - Ministry Directed		IC	WESM4a - Handed To	DC		Over2g - Transparency		IC
HW1g - Access		IC	WESM4b - Control	DC		Over2h - HW KPI Mgr Input		IC
HW1h - Resource Decisions		IC	WESM4c - Time		IC	Over2i - Communicate Why		IC
HW1i - Priority Setting		IC	WESM4d - Span of Control		IC	**COVID 1 - Impact**		
HW1j - Peer Compare		IC	WESM4e - Resources		IC	COVID1a - Staffing Focus		IC
HW KPI 2 - KPI Criteria			WESM4f -No Opinion		IC	COVID1b - Safety Focus		IC
H2b - QI		IC	WESM4g - BI Tool Needed		IC	COVID1c - Ignored Other Areas		IC
H2c - Benchmarlkng		IC	WESM4h - Data Dept Support		IC	COVID1d - Recovery Not Focused On		IC
H2d - Ministry Funding		IC	WESM4i - Need MD support		IC	COVID1e - Community Needs		IC
H2e - Pt Safety		IC	WESM4j - Weekly Huddles Help		IC	COVID1e - Stopped QI		IC
HW2f - Data availalbility		IC	WESM4k - Mnistry Driven		IC	COVID1f - Redesign Services (Virtual Care)		IC
HW2g - Access Flow		IC	**WESM 5 - Report Motivations**			COVID1g - Capacity		IC
HW KPI 3 - Role			WESM5a - QA	DC		COVID1h - Practice		IC
HW3a - HW No	DC		WESM5b - Internal Improvement	DC		COVID1i - Quick Decisions		IC
HW3b - HW Yes	DC		WESM5c - Benchmarking	DC		COVID1j - FL Manager Input		IC
HW3c - Unit Yes	DC		WESM5d - Govt Reporting	DC		COVID1k - Set Priorities		IC
HW3d - Targets No	DC					COVID1l - PPE vaccines		IC
HW3e - Targets Yes	DC					COVID1m - No Financial Worry		IC
HW3f - Weekly Huddle		IC				COVID1n - Data driven		IC

Chapter 5: Conclusion

While there have been recent calls to reduce the number of performance indicators the health care sector monitors,[1-6] we must recognize that the selection and potential reduction of indicators is only a means to an end, and not an end in itself. The goal in using indicators is to evaluate and improve performance. One must therefore examine not only how indicators are selected, but by whom, and whether indicator selection processes motivate clinical unit managers to improve performance. To that end, this dissertation's main research question was "How does the process of selecting indicators and their targets impact clinical unit managers' motivation and self-efficacy to improve overall performance?"

To address this question, this dissertation began by describing two phenomena and one theory: the call to reduce the number of indicators monitored by health care organizations; the negative impact an overabundance of indicators has on clinical unit managers ability to use indicators to improve performance; and goal setting theory of motivation.[14-16] The dissertation described the risks top-down, arbitrary, limited participant indicator selection processes have on over-measurement, misalignment of corporate and unit-goals, paralyzed decision making, and trust between levels of authority and those expected to lead performance improvement initiatives.[6,7-13,17-19] To that end, the dissertation aimed to fill three gaps within the current literature.

1. The lack of a structured, standard framework that governs indicator and target selection processes.

2. Understanding how indicator and target selection processes are conducted at the organizational level by health care organizations and how these organizations consider business-related indicators such as those monitor finance and human resources.

3. Understanding how indicator and target selection processes impact front-line clinical unit managers motivation and self-efficacy to improve performance.

In approaching these questions, this dissertation was designed like an inverted triangle (Figure 1).

Figure 1: Dissertation Study Cascade - Macro, Meso, Micro Perspectives of Indicator Selection Processes

Starting broadly, the dissertation completed a scoping review of international indicator and target selection processes within health care organizations; narrowed to the organization level within a single jurisdiction and researched the practices of four hospitals based on the scoping review's resulting framework; and, concluded by examining the roles clinical unit managers have in hospital-wide indicator selection processes and how those processes impacted their motivation and self-efficacy to improve performance.

Study One's scoping review focused on gap 1. The study completed an analysis of peer and grey literature and found that while there are common practices to select indicators and targets in health care, no single standardized indicator selection process framework existed.

Study One consolidated common practices from the peer and grey literature to develop the 5-P Indicator Selection Process Framework.[20]

One of Study One's limitations was that the 5-P Indicator Selection Process Framework had not been validated in real-world settings. This limitation became the basis for Study Two. Deploying a qualitative, exploratory multiple-case study approach, Study Two focused on gap 2 and compared the indicator selection processes of four large community acute care hospitals in Ontario, Canada. Study Two identified three processes used by Ontario hospitals to select performance indicators and targets, none of which completely aligned with the 5-P Indicator Selection Process Framework.[21] Study Two found that the most glaring gap hospitals have compared to the framework is in their exclusion of end-users such as clinical unit managers and patients in the participating in and validating indicator selection. This finding also contrasts with four hospital indicator selection processes that informed Study One's scoping review and the development of the 5-P Indicator Selection Process Framework.[20] Hospital-wide indicator selection processes conducted by Casey, Eliot, Martinez, and Reiter each involved front line managers or staff as participants.[20,22-25]

Study Three was a follow up study to Study Two and focused on addressing gap 3. Study Three investigated clinical unit managers role in hospital indicator selection processes, their perception of those processes, and the impact those processes had on their motivation and self-efficacy to improve performance.[26] Study Three found that clinical unit managers are not included in hospital-wide indicator selection processes and by extension are not motivated by them. While their hospital processes focused on selecting outcome indicators related to quality and business performance based on detailed criteria sets that included government funding, clinical unit managers are motivated by process indicators related to broader themes such as

quality, patient safety, clinical practice, and staff experience. Clinical unit managers are not motivated by outcome indicators that they feel are not in their full control. Study Three also found that due to a lack of skill development and lack of time, clinical unit managers have low self-efficacy in their ability to use indicators to improve performance.[26]

Contributions to the Literature

There are several contributions this dissertation makes to the literature. From Study One, whereas previously published constructs such as the Appraisal of Indicators through Research and Evaluation (AIRE) Instrument[27] and the Quality Indicator Critical Appraisal (QICA) tool[28] suggest criteria on how individual indicators should be considered, the 5-P Indicator Selection Process Framework offers an overall governance framework that enables organizations to mitigate against known risks related to over-measurement, misalignment of corporate and unit-goals, and paralyzed decision making.

Study Two was the first real-world application of the 5-P Indicator Selection Process Framework. Study Two identified three types of hospital indicator selection processes and concluded that hospital processes did not incorporate several elements found in the 5-P Indicator Selection Framework. Gaps in hospital indicator selection processes included the perfunctory involvement of the board and end-users such as clinical unit managers; the absence of formal consensus building methodologies and evidence-based criteria sets; and the lack of orientation and training for participants on measurement. If hospitals choose to adopt the 5-P Indicator Selection Process Framework,[21] they may be able to minimize risks related to over-measurement and misalignment of corporate and unit-goals, while also improving the decision-making and accountability capabilities of end-users such as the board of directors and clinical unit managers.

Study Two also revealed that hospital senior management teams had little confidence in clinical unit managers' ability to use indicators to improve performance.[21] Senior management leaders communicated that they preferred to work with clinical directors who are more responsible for the performance of multiple units, than clinical unit managers who oversee operations of a single unit. Study Three found clinical unit managers lack self-efficacy in their ability to improve performance using measurement.[26] Clinical unit managers noted a lack of training, time, and not being included in indicator selection as reasons for their low self-efficacy.[26] And therein lies a dilemma. While hospital senior management teams perceived that clinical directors are more experienced and accountable for the outcomes of multiple units; directors, unlike managers, do not directly supervise the front-line staff who implement practice changes that improve care. Senior management teams' preferences to only engage directors may be creating a missed opportunity to involve clinical unit managers who are the change champions at the point of service delivery.

All three studies contribute to the literature by identifying the need for indicator selection processes to consider indicators based on the Donabedian Framework. The Donabedian framework states that to adequately measure health care quality, one must consider a balance between structural, process and outcome measures.[29] Study Two noted that hospitals did not generally consider if they had a balanced number of structure, process, or outcome indicators. Study Three illustrated that clinical unit managers perceived that senior hospital management teams only focused on outcome indicators while they preferred process indicators. These findings in Studies Two and Three support the rationale for why the 5-P Indicator Selection Process Framework developed in Study One includes an element that prescribes the need to categorize indicators as either structure, process, or outcome indicators.

All three studies of this dissertation highlighted the lack of attention indicator selection processes have on business-based indicators. Whether it was the 44 documents that informed the scoping review or the four cases studies in Studies Two and Three, there was little attention paid to finance, human resource, and supply management indicators. Health care spending represents significant expenditures by governments, insurance companies, and individuals. In Canada, the United States and United Kingdom, health care expenditures represent 8.8%, 16.8% and 10.2% of GDP respectively.[30] The four cases studies in Studies Two and Three each have revenues exceeding $400 Million (CDN) per year.[26,31] Given the financial and resource allocation decisions indicators inform, health sector leaders must consider business-based indicators within indicator selection processes. To aid clinical unit managers in their ability to improve patient outcomes while also helping organizations be financially stable, opportunities for clinical unit managers to learn about these business concepts and indicators should be provided.

Studies Two and Three also contribute to the literature by examining the impact the COVID-19 pandemic had on goal setting, and the selection and use of indicators. Senior management leaders and clinical unit managers reported that there was greater attention on process versus outcome indicators, as well as indicators that focused on staff safety and supply management during the pandemic. Managers reported greater inclusion in decision making during the pandemic, unlike the hospital indicator selection processes described within studies Two and Three.

Alignment with Goal Setting Theory of Motivation

Goal setting theory of motivation submits that a manager's ability, motivation, and effort to improve task performance is positively influenced by participating in goal setting processes as

it enables managers understand what is important and to feel part of a broader team.[14-16] Collectively all three studies align with this theory and contribute to filling literature gap 3. Study One's scoping review reported that indicator selection processes that had broader participation from end-users such as managers reported greater support for the process's aim and the final proposed set of indicators.[20] Study Two and Three illustrated that none of the hospitals in the study sample included clinical unit managers in their processes.[21] Study Three reported that clinical unit managers are motivated by process indicators compared to the outcome indicators preferred by their senior management or government agencies.[26] In Study Three, managers also stated that they needed more involvement in indicator selection processes to understand why certain goals were being set, and that additional training would help them in improving performance.[26]

Implications for Management

The findings of this dissertation have several implications for management. If health care organizations such as hospitals were to adopt the 5-P Indicator Selection Process Framework, management leaders may face span of control and scope challenges compared to many of the single-focused expert clinical panel processes that were described in Study One's scoping review. Unlike clinical departments or expert panels that are tasked with recommending indicators for a select clinical discipline, hospitals must monitor indicators across several clinical departments, thereby having to consider substantially more indicators. As a result, the job of indicator selection for hospitals may be more difficult than single clinical departments.

This dissertation also found that clinical unit managers are more motivated by process indicators than outcome indicators. Clinical unit managers stated that process indicators are more

aligned with the motivations of why they chose to take on the role of a manager which included implementing best practices related to quality, patient safety and staff experience.[26] Managers must recognize however that hospitals are accountable to their communities, funding agencies and governments for outcomes, and as such they cannot ignore outcome measures. Senior management however should consider positioning the importance of process and outcome indicators within the motivational frame of clinical unit managers so both can meet their respective accountabilities.

This dissertation found that clinical unit managers have not received training that might enable them to use indicators effectively. As a result, clinical unit managers have low self-efficacy in their ability to improve performance using these instruments. This finding was especially true for newly tenured managers and those who may not have graduate training in business administration. Hospitals therefore may consider regularly orientating, training, and educating clinical unit managers on performance measurement and how to use indicators to drive improvement. Many clinical unit managers expressed a desire to pursue further leadership opportunities in hospital management. To help their own career development, clinical unit managers may wish to pursue learning opportunities related to performance measurement.

Future Research

Future research related to this dissertation could take several forms. From Study One, future studies could explore how organizations use the 5-P Indicator Selection Process Framework to inform their indicator and target selection processes.

From Study Two, given the size of hospital budgets and economic impacts health service organizations have, future research may explore how hospitals select finance and human resource indicators and targets. Like this dissertation, this research may initially take the form of

a scoping review followed by either quantitative or qualitative case studies on how hospital use these indicators to produce positive financial results. Research may also examine the actual type and balance of indicators selected by hospitals compared to the Donabedian Framework.

Study Three deployed a qualitative multiple case study approach using semi-structured interviews. Limitations of case study approaches include generalizability. As such, future research may use quantitative methods to analyze clinical unit manager motivation and self-efficacy across a broader set of hospitals to gain a greater sample size and enhance generalizability. Future research could examine if the proactive engagement of clinical unit managers in indicator selection leads to a change in selection criteria, increased motivation and self-efficacy, or greater performance scores. Future research might examine the roles physician leaders have in indicator selection processes and the impact on their motivation and self-efficacy to improve performance.

From Studies Two and Three, future research may examine how lessons learned from the pandemic changed the way hospitals select indicators. Research might be broadened to explore how significant unforeseen external events influence the selection of indicators and the involvement of front-line, clinical unit managers in decision-making during times of crisis.

In addition to aligning with goal setting of motivation, all three studies have connections to theories on participative decision-making (PDM) and planned behaviour. PDM theory hypothesizes that the degree of involvement one has in planning, generating alternatives and evaluating results is positively related to personal satisfaction and performance.[32] The theory of planned behaviour that predicts that behavioral achievement depends on both motivation (intention) and ability (behavioral control).[33] Future research may study indicator selection processes from these perspectives.

Summary

In addressing the main research question, "How does the process of selecting indicators and their targets impact clinical unit managers' motivation and self-efficacy to improve overall performance?", this dissertation found that clinical unit managers are not included in hospital-wide indicator selection, and by extension are not motivated by these processes.

In making this finding, this dissertation's three studies offer several contributions. Its contributions include the introduction of a new process framework that can be used within health care and other sectors; it highlighted that indicator selection processes have not considered business-based indicators despite the economics of health care; it uncovered that hospital senior management teams do not include end-users like clinical unit managers in their indicator selection processes; it identified that hospital senior management teams lack of confidence in clinical unit managers ability to use indicators; and it found that clinical unit managers are motivated by process indicators and that their self-efficacy in using indicators increases with tenure, and when offered training and more time to focus on performance measurement.

Finally, performance indicators and targets are only a means in health care. Indicators and targets are instruments to be used judiciously as any management tool should be. The end is the achievement of the high quality, safe patient care these tools set out to measure. These ends are not delivered by data systems, but by doctors, nurses, and allied health professionals working collaboratively with patients, families, and caregivers on what is best for their health. With this is mind, we return to the introduction of this dissertation that conveyed the story of Dr. Ernst Codman's failed attempt, and eventual success, at implementing a system of performance indicators at his hospital over 100 years ago. Given Dr. Codman was one of the first health care leaders to adopt indicators in health care, we certainly should admire and honour Dr. Codman.

However, the findings of this dissertation may lead one to wonder if Dr. Codman could have succeeded earlier in his quest to implement his performance measurement system had he proactively engaged those he was measuring in the process of indicator selection. Therefore, if there is anything this dissertation may impart, I hope it is that if we expect end-users such as clinical unit managers to be accountable for items such as, but not limited to adherence to clinical best practices, quality patient outcomes, staff satisfaction, and sustainable financial results, they should be engaged in the processes that select the indicators and targets by which they shall be evaluated.

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