Abstract

Background: Quality Improvement (QI) is a systematic approach to making changes that strengthen clinical practices, enhance professional and organisational development, and ultimately improve patient and population health outcomes. The Canadian healthcare system has encouraged QI by financing change and innovation initiatives and spreading ideas through knowledge translation and exchange. Nurses are key caregivers in the hospital setting and they can significantly influence the quality of healthcare. To build knowledge and engagement among front-line staff, a Leadership Program was developed in a Western Canadian hospital. This research aims to understand influential factors for the design and implementation of QI initiatives led by nurses using the Model of Improvement as the framework to guide improvement work.

Methods: This case study is a descriptive investigation. Two cases were selected through purposeful sampling, which sought critical cases that would provide rich and thick description of the initiatives. Data collection methods included 14 semi-structured interviews, three participatory observation activities, and source documents. Data analysis was performed through thematic analysis. Participants in this study included the nurse leaders and team members including QI consultants and unit managers, and other healthcare providers impacted by those initiatives.

Results: The results showed that the planning phase and the selection of appropriate interventions or tools was challenging for nurse leaders inexperienced in QI. Testing changes using the PDSA cycles was also not well understood by the majority of the participants. Factors such as the engagement of healthcare providers, increased complexity in cases with multi-professional and multi-unit involvement, and the lack of resources or incentives were perceived as barriers by the participants.

Conclusions: QI is difficult to achieve as it implies changing organisational culture and requires both resources and support from organisational leadership. Institutional commitment with the support of senior management in parallel with QI competency building of professionals is paramount to facilitate nurses’ QI role and leadership. Because QI initiatives demand a high investment in healthcare providers’ time and institutional resources, their careful planning, organisational support and the evaluation of outcomes are needed in the future.
Preface

Ethical approval to conduct this study was provided by the University of British Columbia Okanagan Behavioral Research Ethics Board. The Certificate Number of the Ethics Certificate was: H13-00950. The Interior Health Research Ethics Board also provided ethical approval for this study.
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List of Abbreviations

CFHI: Canadian Foundation for Healthcare Improvement
CFIR: Consolidated Framework for Implementation Research
CQI: Continuous Quality Improvement
HCP: Healthcare Providers
IHI: Institute for Healthcare Improvement
IOM: Institute of Medicine
PDCA: Plan-Do-Check-Act
PDSA: Plan-Do-Study-Act
QA: Quality Assurance
QI: Quality Improvement
QRA: Quality, Risk & Accreditation
SQUIRE: Standard for QI Reporting Excellence
TQM: Total Quality Management
WHO: World Health Organization
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Dedication

This dissertation is dedicated to my mother, Dr. Brigitte Cote, and my grandparents who believe in my ability to achieve my goals.
Chapter 1: Introduction

Problem Statement

In the last century, we have witnessed major improvements in the health of the population in terms of both longevity and quality of life. Public health interventions such as sanitation, infectious disease control and tobacco legislation have played a major role in these improvements. The World health Organisation (WHO) identifies numerous determinants of health, ranging from individual’s characteristics to physical, social, and economic environments (World Health Organization, 2015). The large social environment also comprises the health care services as an important determinant in terms of accessibility (primary care) and the quality of care dispensed (Berwick. xxxx) Primary care’s contribution to health and health care is now largely evidence-based and primary care has demonstrated its capacity to improve population health outcomes (Starfield, Shi, & Macinko, 2005). As for quality of care improvement initiatives, they may have some positive effect on health outcomes, but the effect is modest, and more research is needed to determine their impact (Schouten, Hulscher, van Everdingen, Huijsman, & Grol, 2008).

At the end of the 1990s, the publication of the To Err Is Human: Building a Safer Health System report had significant impact and triggered a nationwide movement in the United States to improve healthcare quality and patient safety (Kohn, Corrigan., & Donaldson, 2000). A similar study was undertaken in Canada to examine adverse events in hospitals. Baker et al. (2004) found that 7.5% of admitted patients—approximately 185,000 individuals—experienced adverse events. Although some adverse effects are unavoidable, other authors have estimated that 37% to 51% of such events happening in one year in hospital could be prevented (Davis et al., 2001; Leape et al., 1991; Neale, Woloshynowycz, & Vincent, 2001; Thomas et al., 2000; White et al., 2011). The high incidence of medical errors has been a major factor prompting calls for QI in healthcare (Baker et al., 2004; Kohn, 2000).

Schouten et al. (2008) describe quality improvement as an organised and multifaceted approach with five key features: 1) a specific topic to improve care or gaps between best practice and current practice, 2) engagement of clinical experts providing ideas and support for improvement, 3) multiprofessional teams who want to improve and share care, 4) clear and
measurable targets, collection data and testing changes on a small scale, and 5) a process involving structured activities with a timeline to advance improvement, exchanging ideas, and sharing experiences.

Improving quality can be difficult as it usually implies changing the culture of healthcare and shifting mindsets and behaviours (Kovner & Neuhauser, 2004; Shortell & Kaluzny, 2006; Weiner, Helfrich, & Hernandez, 2006). Failure to affect change seems to be more the rule than the exception as nearly two-thirds of change efforts fail (Burnes, 2004). Therefore, concerted efforts for change are required since improvement will typically not happen spontaneously (Health Council of Canada, 2013).

In the last twenty years, governments and institutions have trialled various strategies to change practices, build clinical leaderships, and create organisational environments to uncover the best way of improving care. Research funders, universities and academics have evaluated some of these initiatives. The most promising interventions in the last decade are inspired by the Model of Improvement (Institute for Healthcare Improvement, 2015). The Institute for Healthcare Improvement promotes the use of the Model of Improvement. The Model of Improvement is a complex intervention based on a series of interdependent steps and key principles that inform its application (Walshe & Freeman, 2002). This model relies mainly on the Plan-Do-Study-Act (PDSA) Cycles. The PDSA model promotes the establishment of a hypothesis for improvement (Plan), a study protocol with data collection (Do), analysis and interpretation of the results (Study), and the iteration of the next steps to be taken (Act).

To understand why some QI interventions might be more successful than others, it is important to understand how participants apply the Model of Improvement to design and implement their QI projects. This thesis will contribute to a wider understanding of how frontline nurses applied the Model of Improvement and what influential factors were encountered by healthcare providers (HCP) involved in the design and implementation of QI projects.

**Quality improvement in Canada and British Columbia**

Since the incorporation of the Canadian Council of Hospital Accreditation in 1958, most hospitals in Canada now participate in Accreditation Canada’s program. Quality improvement is embedded in the objectives of the accreditation process, alongside risk mitigation and patient safety (Accreditation Canada, 2015).
In 2003, the Canadian Patient Safety Institute was created to foster collaboration between governments, regulatory bodies and stakeholders and to develop effective patient safety strategies, frameworks, tools, and practices. However, progress has been slow and the knowledge gained has not spread throughout the care delivery system (Baker, Denis, Pomey, & Mactinosh-Murray, 2010). Hospitals devote considerable time, energy, and resources to solve safety and quality problems; yet, the response is not adequate for the large and growing quality problems affecting the Canadian healthcare system (Chassin, 2013).

In 2008, Health Canada committed funding to the Canadian Patient Safety Institute in the amount of $8 million annually over five years to provide leadership and build a culture of patient safety and QI in the healthcare system. The Canadian Foundation for Healthcare Improvement (CFHI; previously the Canadian Health Services Research Foundation) has been mandated to bring about measurable improvements in the healthcare system, through financing initiative changes and innovation, bringing together policy-makers and researchers, and spreading ideas through knowledge translation and exchange (http://www.cfhi-fcass.ca).

QI efforts were initially driven by “pockets of leadership” or “islands of innovations”, but there was no clear and coordinated approach (Health Council of Canada, 2013, p. 7). To align the efforts at all levels of healthcare governance system, the BC Ministry of Health outlined its plans and expectations for QI initiatives at the health system level. To do this, the BC Ministry of Health launched the Innovation and Change Agenda in 2010 with four main themes: 1) provide effective health promotion, prevention and self-management to improve the health and wellness of the BC population, 2) meet the majority of health needs with high quality primary and community-based healthcare and support services, 3) ensure high quality hospital care services are available when needed, and 4) improve innovation, productivity, and efficiency in the delivery of health services (British Columbia Ministry of Health, 2014). The Ministry of Health mandated the BC Patient Safety and Quality Council in 2011 to pursue those themes (http://bcpsqc.ca/about-the-council/our-story/).

**Quality improvement and Nursing practice**

As demand for quality outcomes in healthcare increases, all individuals and groups involved in the provision of healthcare should participate in efforts to improve quality (Cherry & Jacob, 2013). The role of nurses in QI is increasing as hospital participation in QI activities increases
(Institute of Medicine, 2001; The Joint Commission, 2012). Nurses are well positioned to participate on the front line of QI as they spend the most time at the patient’s bedside and are in the best position to affect the care the patient receives at the hospital (Draper, Felland, Liebhaber, & Melichar, 2008).

In 2013, a Leadership Program was developed in a mid-sized Western Canadian hospital. The Leadership Program objectives were to build knowledge, capacity, and engagement among front-line staff and managers, to improve outcomes of clinical care management, and to improve patient care. This one-year pilot project was based on the following premises: the front-line nurses are key to improving the system; the front-line nurses who are engaged in the audit, feedback and promotion of clinical practice improvement are more likely to own these change; and finally, when nurses own these changes and promote them, the changes are more likely to be sustainable. An internal document written by the Manager of QI that was provided to the Ministry of Health stated:

With vision and support from the site, the program is taking a one-year cohort of front-line nursing staff through QI training. As part of this training, participants will learn to plan, lead and implement their own QI projects on their units. The goal of this program is to partner with front-line leaders to build capacity for QI and patient safety at the point of care. (Leadership Program, 2013b)

The Leadership Program was to be supported by the hospital health administrators, the manager of the QI team, and the unit managers to help the front-line nurses in their development of QI projects within their units. Expressions of interest were issued in all units across the hospital to recruit front-line nurses to participate. The Program started in April 2013 and provided education to the nurses on the foundational principles of QI, measurement and clinical audit. These educational sessions included varied subjects, from an introduction to QI, project formulation, development of a project charter, PDSA methodology, barriers to and support for change, communication techniques, tools and techniques for action planning, to building QI capacity in hospital. While the nurses were participating in the monthly educational sessions, they were asked to design and implement a QI project within their units using the Model of Improvement. The QI initiatives studied in this research grew out of the Leadership Program.
Purpose

The purpose of this case study research is to understand the factors influencing the design and implementation of QI initiatives using the Model of Improvement within the Leadership Program. This study focused on the execution of two of these initiatives. As mentioned, the participating nurses were asked to design and implement QI projects in their units within the construct of the Model of Improvement.

The first step in this research was to describe how the nurses, and the team who helped them, applied the PDSA Cycles methodology. This study does not evaluate the QI projects per se, but rather seeks to understand the factors influencing design and implementation of QI initiatives. A number of HCP were impacted by these QI activities: from the nurses who developed the initiatives, to the QI consultants, team members and unit managers supporting the nurses and other HCP who could have been affected by the changes brought on by the activities. Table 3.1 in the methods chapter provides a complete list of the participants in this research study.

This study aimed to describe the experience of the HCP who were involved in some way or another in the QI projects. A case study research design was chosen as the best method to understand the factors impacting the design and implementation of QI projects using the Model of Improvement as a strategy to improve quality in healthcare.

In the Leadership Program, the nurse leaders were asked to build their team to help them design and implement the QI project. In the two cases of this study, the QI consultants and unit managers were included as team members. In the results and discussion sections, unit managers and QI consultants are referred as “team members with managerial responsibilities”.

Research Questions

This case study is a descriptive investigation of the design and implementation of QI projects developed within a Leadership Program. This study proposes to answer the following main research question:

What are the factors influencing the design and implementation of QI projects using the Model of Improvement within a Leadership Program?
To answer this research question, two sub-questions were considered in this study:

How did the nurse leaders and team members use the Model of Improvement and apply
the PDSA Cycles?
What facilitators and what barriers to designing and implementing QI projects did the
participants identify during their involvement in the QI project?

The next chapter, the literature review, provides a detailed description of QI approaches in
healthcare. The chapter introduces the Model of Improvement and the PDSA Cycles. A
discussion of the influential factors for effective implementation concludes this chapter. The
literature review is followed by the methodology chapter, in which the rationale and methods of
this case study are outlined. Results from semi-structured interviews, participant observations,
and source documents are presented in Chapter Four. Chapter Five presents the findings and
concludes the thesis.
Chapter 2: Literature Review

Quality Improvement

Quality in healthcare can be defined as “the degree to which health services for individuals and [the] population increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (Fleming & Koppelman, 1996). In Canada, there are specific measures of quality: the effectiveness of healthcare in improving outcomes, the capacity of systems to deliver appropriate services, the safety of delivering care, the degree to which healthcare is patient-centred, and finally, equity in healthcare outcomes and delivery (CIHR, 2012; GEMUENDEN & Lechler, 1997). Baker and Denis (2011) define QI as a systematic approach to making changes that result in improvement of clinical practices. The authors add that QI also includes enhancing the professional and organisational healthcare system factors to improve the patient and population health outcomes (Baker & Denis, 2011).

Many authors recognize the fundamental relationship between improvement and change. Berwick states, “not all change is improvement, but all improvement is change.” (Berwick, 1998, p. 619). Specifying and clearly identifying change is important since

“The rate and extent of improvement is directly related to the nature of the changes that are developed and implemented. It is through this focus on developing substantive change that the art of improvement is combined with the science of improvement.” (Langley, 2009, p. 6).

History and models

During the 20th century, healthcare was largely concerned with defining and measuring quality, and correcting any negative deviation from the defined standards of care. The classical approach, called Quality Assurance (QA), proposed by Donabedian, describes outcomes as a function of processes and structures. After using the QA approach for several years in the healthcare setting, Donabedian suggested there was more than processes and structures that fuelled the will to improve healthcare systems. Palmer and Adam (1993) also concluded that even if much was learned about quality measurement with the QA approach, the expected gains from it were not achieved. The failure of Quality Assurance led to another approach: Quality Improvement. According to Berwick (1998), the prevailing “Theory of Bad Apples” underlying the QA approach, led to unproductive defensiveness, and relied on inspection to improve
quality. While the QA approach is considered to detect a problem as it occurs, correct the special cases, find the people responsible, and have authority solving problems, the QI approach looks to prevent problems from happening, correct the common causes, involve all responsible people in finding a solution, and solve problems by employees at all levels (The Joint Commission, 2012). Berwick proposed the “Theory of Continuous Improvement” to understand and revise production processes to reduce waste and complexity (Berwick, 1989). QI methodologies were first developed in the manufacturing industry in the beginning of the 1900s, aiming to reduce variation and errors, improve quality of products and reduce costs (Nicolay et al., 2012). In healthcare, QI approaches were first supported by leading physicians such as Deming, Juran, Batalden, Berwick, and Blumenthal (Berwick, Godfrey, & Roessner, 1990; Blumenthal & Kilo, 1998; Deming, 1986; Juran & Godfrey, 1999). Numerous models were developed to implement QI in healthcare: the Kaizen method, the Toyota production system, the Lean approach, the Six Sigma, the Model of Improvement, Total Quality Management (TQM), and Continuous QI (CQI) (Nelsen & Daniels, 2007).

Many QI programs were undertaken in healthcare with the optimistic prediction that QI would solve central problems. The Institute of Medicine of the US National Academy of Sciences convened experts to a conference in 1997 to assess healthcare QI strategies and their impact (US National Academy of Sciences, 1997). Numerous articles and comments in the Milbank Quarterly were published following this national roundtable. Blumenthal, for example, published a report card on CQI based on interviews with QI experts to learn from the first decade of CQI application to healthcare (Blumenthal & Kilo, 1998). The report highlighted the value of educating staff on applying the scientific method to improve performance, and the potential benefits of adopting these principles for organisational learning. However, the report concluded that the QI movement “has not had the impact that many advocates and observers hoped for” (Blumenthal & Kilo, 1998, p. 55).

In 2004, when Grimshaw and colleagues reviewed the literature on QI interventions in healthcare, they concluded that the implementation of QI has had partial and mixed effects (Grimshaw et al., 2004). The authors mentioned that the main shortfalls of QI were the lack of a systematic approach to choosing an intervention and the inadequate design of interventions. The authors recommended further research to review the models and obtain a better understanding of how to improve quality in healthcare.
To answer Grimshaw’s concerns, Grol, Bosch, Hulscher, Eccles, and Wensing (2007) reviewed the theoretical assumptions about the interaction of factors that affect QI interventions to understand the effectiveness of QI. The authors proposed a more systematic approach to the planning and evaluation of improvement changes, based on models developed by scholars such as Rogers (1995), Greenhalgh and colleagues (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004), McCormack and colleagues (McCormack et al., 2002), and Baker et al. (Baker, Hearnshaw, & Robertson, 1999). The authors divided the literature into two distinct categories of theory - process and impact theories – because they vary widely in terms of their foci and perspectives (Rossi, Freeman, & Lipsey, 1999).

Process theories can be used to explain the actual implementation of change. The “Stage-of-Change Theory” developed by Rogers looks at how stages differ depending on the stakeholders’ awareness of and motivation to perform specific behaviours. On the other hand, impact theories describe causes and effects to determine which specific factors will facilitate a desired change. Grol et al. (2007) included individuals (cognitive, educational and motivational theories), social context (communication, learning, teamwork, leadership theories), organisational context (innovative organization, quality management, integrated care, organisational culture), and political and economic context (reimbursement, contracting) as examples of impact theories. One conclusion of their review is that it is important to use specific theories of change when designing interventions in healthcare.

**QI and Nursing**

As QI demand increases due to issues of access, costs, quality, safety, and accountability in healthcare, the pressure on nurses to accept changing duties and responsibilities is increasing (Cherry & Jacob, 2013). In addition to the issues listed above, nurses can face challenges with regards to an aging population, nursing shortage, generational differences in an aging workforce, conflict in the workplace, expanding technology, stress and overwork, violence in the workplace, and dissatisfaction with the quality of their own nursing care (Cherry & Jacob, 2013; Draper et al., 2008).

Nurses are key caregivers in hospitals and therefore can significantly influence the quality of healthcare (Draper et al., 2008). According to Cherry and Jacob (2013), nurses should also act as role models to guide improvement initiatives by following specific rules established by the
Institute of Medicine (IOM) in the Quality Chasm Report (Institute of Medicine, 2001). When directing improvement initiatives, the IOM states that nurses should aim to provide patient healthcare based on the best available scientific knowledge, promote a culture of safety by reducing risks and ensuring greater attention to systems that help prevent errors, and engage in collaboration to exchange information appropriately (Institute of Medicine, 2001).

An organisational culture supported by strong leadership sets the stage for QI activities (Institute of Medicine, 2010). By strong leadership, the IOM means that those involved in healthcare, nurses, physicians, patients, and others, should work as full partners in a context of mutual respect and collaboration (Institute of Medicine, 2010). Physicians, nurses, executives and members of the healthcare should work together, break down the walls of hierarchal silos and be accountable for improving quality as well as decreasing medical errors.

Culture is defined as a system of shared beliefs, values, customs, and behaviours that is passed on through learning, and is fundamental to making advances in QI. For Baker et al. (1999), “building healthcare systems that do not harm” is a crucial value to be shared and an aim in patient care delivery. For Cherry and Jacob (2013), nurses should lead this cultural change and become role models.

Specific challenges to nurses’ involvement in QI initiatives include adequate nursing staff when resources are scarce, the need to engage nurses at all levels, growing demands to participate in more QI activities which are sometimes viewed as duplicative, dealing with the heavy administrative burden that hinders nurses from having a more substantive role in QI, and lack of nursing education programs that prepare nurses with the skills and competency needed to participate in QI activities (Draper et al., 2008).

The next section pertains to the Model of Improvement, which was fundamental to the Leadership Programs studied.

The Model of improvement

Langley (1996) proposes the Model of Improvement framework (see figure 2.1 at the end of this chapter) as an approach to promote effectiveness and efficiency during change. The Model of Improvement is widely accepted in the healthcare improvement field, is used by the Institute of Healthcare Improvement (IHI), and has been employed by hundreds of healthcare organizations (http://www.ihi.org). The framework has two parts: the first looks at three
fundamental questions, which can be addressed in any order: (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? and (3) What changes can we make that will result in improvements? The second part of the model is to use the PDSA cycle iteratively in rapid cycles to explore an improvement change, test the change in the real world setting, and then evaluate the change. This systematic approach guides the test of change to determine whether an improvement has been made or not. The author emphasizes the fundamental components of a system of improvement which are: forming teams, setting aims, establishing measures, selecting changes, testing changes, implementing changes, and spreading changes.

**Forming teams**

The importance of teamwork to the success of new interventions is well documented in the literature (Hoegl & Gemuenden, 2001). Different approaches to implementing new interventions in either project management (Fleming & Koppelman, 1996; Gemuenden & Lechler, 1997), time management (Eisenhardt & Tabrizi, 1995), or quality management and continuous improvement (Griffin & Hauser, 1992; Mohrman, Cohen, & Mohrman, 1995) suggest that teamwork is a critical success factor when undertaking changes in an organization. Langley (2009) adds that it is essential to have the right people involved in the process of improvement. Greenhalgh et al. (2004) propose building teams that will identify and implement actions towards improving systems. Various roles - members, leaders, improvement advisors, subject matter experts, and sponsors – and their responsibilities are suggested in Langley’s improvement guide (Langley, 2009).

**Setting aims**

By answering one of the three fundamental questions, “What are we trying to accomplish?” the team sets specific aims. Establishing goals during the planning phase of an intervention offers several advantages: it provides a common frame of reference (Pinto, Pinto, & Prescott, 1993), helps structure tasks and facilitate orientation of team members (Pinto et al., 1993), and creates boundaries so the team does not need to redefine the intervention’s aim (Bowen, Clark, Holloway, & Wheelwright, 1994). The main objectives can come from various sources such as staff or customer complaints or concerns about quality of service. Aims should be time-specific, measurable, with a defined population that will be affected. Teams should first agree about the aim of working together. To make the main objectives clear and transparent, Langley (2009)
strongly suggests having a written statement of the aim, which is sometimes referred to as a charter. The project charter can include the general description of the project, the expected outcomes, and performance measures and goals.

**Establishing measures**

The impact of changes can be observed and judged by specific criteria such as speed, ease, reduced cost, security, etc. To answer the question “*How will we know that a change is an improvement?*” it is critical to support change with data to guide action for improvement. This question lays the foundation for the learning process that takes place in the improvement process. Valuable opportunities to learn and accelerate improvement could be lost if measurement is not established at the beginning of the process to determine whether there is improvement or not (Langley, 2009). In a complex environment such as the healthcare system, quantitative or qualitative data are necessary since observations alone will not suffice as a source of learning. Observations have some weakness because the mind filters observations – we perceive what we want or what we expect – and our present observations can be affected by past observations.

Solberg, Mosser, and McDonald (1997) contrast the key aspects of the type of measurement according to three approaches: research, improvement, and accountability. The aim of research should be to seek new knowledge by developing fixed hypotheses. The sample size should be as large as possible and statistical tests of significance should be used to determine pre and post intervention results. The use of accountability measures requires greater validity and reliability when collecting data. A standardized and detailed collection ensures that comparisons are fair and guide decisions based on quality. In the improvement approach, measure can be used for external or internal quality improvement programs or projects. External quality improvement measurements are collected by external agencies such as national health departments or professional organizations. Data are collected to verify their accuracy and report on quality performance results among providers and allow for comparison. External QI data collection is similar than quality measures for accountability. Data collected internally aim to improve the efficiency and/or effectiveness of a process or system where small sequential samples requiring “just enough” data to learn and complete another cycle. The hypotheses will be flexible and may even change as the study evolves.
Selecting changes

By answering the question “What changes can we make that will result in improvements?” the changes to be made to a system can be selected. As not all change leads to improvement, selecting meaningful changes in the area of work is critical (Berwick, 1998; Langley, 2009). In a complex system this question can be answered at two distinct levels: (1) at the broader level of the system (i.e., match capacity to demand), and (2) at the level of more detailed changes to be made (i.e., reallocation of specific resources). Detailed information should be gathered as to who will be impacted by the change and how it will alter the work or activities. Because there are interdependencies within a complex system, it is important to have a good understanding of the processes and the system of work to gain insights into making improvements: a change in one area will likely have an effect on another. Langley defines process as “a set of causes and conditions that repeatedly come together in a series of steps to transfer inputs into outcomes” (2009, p.36) and system as “interdependent group of items, people, or processes with a common purpose.” When selecting a change, it is fundamental that interdependencies within systems must be taken into account because where in one area a change results in an improvement, for other the change might hurt them.

Testing change

For Langley (2009), making a change just for the sake of change without seeing real improvement was not how the author viewed change. Langley proposed using PDSA cycles to turn ideas into action and learning by testing changes. He suggests that to jump directly into the implementation phase “without first testing the change idea in some way leads to making things worse.” (Langley, 2009, pp. 17-18). Testing changes permits the process of building knowledge. It also involves having a rational prediction of what would happen if the change were put in place. An important principle when testing a change is to start on a small scale and build knowledge sequentially. Testing on a small scale minimizes the level of risk, and allows people to gain some knowledge of the initiative. Langley (2009) clarifies that small scale does not imply small changes; rather, the test should be tried with one person or one component of change over a short period of time.

Implementing changes

Following the testing phase of a cycle, a change could be implemented, abandoned, modified, expanded or tested under different conditions. There are important differences between the
testing and implementation phases. Whereas testing is performed to learn whether a change will result in an improvement, the implementation phase involves making the change part of the day-to-day routine. Changes are not permanent in the testing phase, and therefore supporting processes are not maintained beyond the testing period (Langley, 2009). When a change is ready to be implemented more generally and becomes part of routine operations, the supporting structures (such as training, job description, and standardized procedures) need to be put in place to increase the chances that the results will be achieved and sustained. Another difference between the testing and implementation phases is that more people will be affected during the implementation phase, and therefore, in the author’s view, it is essential to plan for the impact the new activity will have on the workers.

**Spreading changes**

After testing and implementing successful changes in a specific area, organizations may decide to go further by distributing them to other locations. This expansion can make use of the skills and methods developed in the two previous phases; meanwhile, complexity and difficulty may increase as multiple locations are impacted by the implemented change. Langley (2009) proposes a framework for spreading change based on Roger’s definition of diffusion which is “a process by which new ideas are communicated over time through a social system” (Rogers, 1995). Strong leadership who are connecting work to strategic initiative and aligning incentives with the work, good exchange of tested and implemented ideas, good communication, measurement, and working plans are important areas that should be addressed for an effective spread of change. Leadership is the responsibility of the executive sponsor who needs to allocate appropriate resources and spread improvement work across the organization. Measurement and feedback activities as well as knowledge management systems should be monitored during the spreading phase.
The PDSA approach

The PDSA cycles are an iterative method for testing change in rapid cycles, consisting of a four-step problem-solving process. The approach involves developing a plan to test change (Plan), implementing the new processes on a small scale (Do), measuring the new processes and observing any differences between results and desirable outcomes (Study), and identifying modifications that should be made and acting on this learning (Act). Improving healthcare in its daily practice requires making changes in the process of care (Berwick, 1998). Many researchers suggest using the Plan-Do-Study-Act cycles as a powerful tool for efficient trial-and-learning of such changes (Helfrich, Weiner, McKinney, & Minasian, 2007; Langley, 2009; Ovretveit, 2011; Walley & Gowland, 2004; Walshe & Freeman, 2002).

The background of PDSA cycles

It is difficult to trace the history and evolution of this methodology, and to assign it a birth year and inventor. In 1939, Shewhart applied the scientific model of improvement to the
industrial mass production process represented by a straight line with three linear steps: specification – production – inspection. Deming then modified the “Shewhart Model” in the 60’s, and presented the modification in a seminar in Japan on statistical quality control for managers and engineers. Deming’s model emphasized the importance of constant interaction between design, production, sales and research – these four steps were represented by a circle to show the circular iteration of the process. Following the introduction of this model in Japan, many Japanese executives recast the “Deming wheel” as an improvement and management tool, which became the PDCA (plan-do-check-act) cycles. Deming then redefined the PDCA cycles in 1986 as the Plan–Do–Study–Act (PDSA) cycle. For Deming, the PDCA was inaccurate because the “check” and “study” processes were different: “check” refers to a quality assurance to deal with problems as they appear, whereas “study” emphasises building new knowledge through an iterative process.

Key features

A systematic review of the use of the PDSA method to improve quality in healthcare has recently been published (Taylor et al., 2013). The review concluded that despite the wide use and acceptance of the PDSA method, there is a lack of understanding of its key principles, and reporting of the PDSA method varies widely in the literature (Taylor et al., 2013). The Standard for QI Reporting Excellence (SQUIRE) were developed to provide guidelines for authors when describing formal studies of QI efforts (Ogrinc et al., 2008). However, the SQUIRE guidelines do not tell the users how to use the PDSA approach effectively and what key principles to apply to increase the rate of success of QI projects. To address this concern, Taylor et al. (2013) propose a theoretical framework for assessing the application of the PDSA method based on five key features of this method: the iterative cycles, the prediction-based test of change, the small-scale testing, the use of data over time, and documentation to support local learning. In this systematic review the authors identified 73 articles and applied these peer-reviewed publications to the proposed framework. The identified studies reported on the application of the PDSA cycles or other similar terms such as the ‘PDCA’, ‘Deming cycle’, ‘Deming circle’, ‘Deming wheel’ or ‘Shewhart Cycle’ in healthcare (Taylor et al., 2013). The theoretical framework was constructed in accordance with the recommendations for using the PDSA approach in the literature, and used the key features of the plan-do-study-act cycle method. The framework was validated through discussion amongst authors and with QI facilitators, as well as local research.
meetings. The review looked at how studies reported their applications of the PDSA cycles and did not focus on the success or failure of the interventions. One of the limitations of this review, as suggested by its authors, is the potential for publication bias, which might impact its results, since unsuccessful interventions might have been less likely to be published.

The key features of the plan-do-study-act cycle method – use of iterative cycles, prediction-based testing of change, initial small scale testing, use of data over time and documenting each stage – have been compartmentalized into observable variables for evaluation (Taylor et al., 2013). The plan-do-study-act QI cycle promotes an iterative approach to test an intervention, modify, extend or adopt (or even abandon) it in subsequent cycles based on knowledge gained from the previous cycle. This feature thus helps the user gain more knowledge from the experience and learn from one cycle, which informs those that follow. To achieve this iterative approach, multiple PDSA cycles must take place. One can analyse if iterative cycles took place in a project by asking questions such as: did iterative cycles occur, or were multiple cycles linked to one another by having an action informing the planning phase of the next cycle?

Iterative learning can be achieved by testing a change and assessing its impact on an outcome of interest. This requires that a prediction-based test of the outcome be established early in planning stage of a cycle. The intervention should be conducted, tested and examined by comparing the results from the predictions established in the planning phase. Every planned change must be tested and an explicit prediction articulated to compare the results. Questions such as “was the change tested?” or “was an explicit prediction articulated?” should be asked to study the prediction-based test of change. The PDSA method also gives the user the opportunity to trial the intervention at a small scale. Initial small scale testing gives the users more freedom to act and learn from the knowledge acquired in the PDSA cycles; as the user’s confidence grows, the PDSA can build in scale. Scale can be assessed by sample size (the number of changes that were tested in each cycle), complexity (the sequential cycles increased with respect to scale of testing), or duration (the length of PDSA application). To minimize risk and facilitate rapid change and learning, the change needs to be adapted according to feedback.

In complex settings, which inevitably involve working in a system with a lot of variation, the measurement of the data over time is another critical feature of the PDSA approach. This feature is necessary to understand the impact of the change on the outcome of interest and to be increase mindfulness of the other factors that might influence the processes or outcomes (Taylor et al.,
The data over time can be examined with respect to whether data collection was regular or isolated, whether statistics were used to test the effects of changes, and what type of data were collected to inform cycles (using qualitative, quantitative, or mixed methods). Finally, Taylor and colleagues recognize the importance of the local lessons learned from the PDSA and therefore, the last key feature is to document each stage of the cycles. To do so, researchers should see if the application of the PDSA method was detailed in a report and if each stage of the PDSA cycles was documented.

Twenty percent of the articles studied in the review by Taylor and colleagues conducted iterative cycles of change. Furthermore, only 15% of such studies used initial small-scale testing. The lack of testing and learning from each cycle may have had the result that the benefits of using the PDSA cycles were not achievable. Moreover, Taylor et al. suggest that large-scale cycles can present important risks in terms of investment and resources. Regular data collection over time was only reported in seven of the reviewed studies, which indicates a lack of understanding of the importance of measuring the changes and limits the ability to interpret the results. Finally, only two of the 73 articles demonstrated full compliance with the five key principles of the PDSA cycles. For the review’s authors, this reflects a lack of standardization of the PDSA cycles and the need to have greater rigour in the application and reporting of this pragmatic scientific method.

Factors influencing the implementation of QI initiatives

The implementation science literature proposes numerous theories and models, which describe factors promoting or hindering effective implementation. Implementation is a social process, and the context in which it takes place is important. Pioneers such as Rogers (1995), Damanpour (1991), Granados et al. (1997), Meyers, Sivakumar, and Nakata (1999) studied the determinants of diffusion, dissemination and implementation of innovations. Greenhalgh et al. (2004) integrate these key studies in a systematic literature review on the diffusion of service innovations. More recently, Damschroder et al. (2009) propose a model – the Consolidated Framework for Implementation Research (CFIR) – that includes the factors mentioned in the Greenhalgh model, but that also focuses on constructs specific to implementation and subsequent routinization. These different factors cannot be considered independently since they interact together in a complex way and can all influence the implementation process. The next section presents and describes the components within the five
domains stated in the CFIR model: the intervention characteristics, the outer setting, the inner setting, the characteristics of the individuals, and the process of implementation (Damschroder et al., 2009).

**Intervention characteristics**

It is important to understand the characteristics of the intervention at its start; also, without the adaptation and active engagement of stakeholders, the individuals impacted by the intervention might (will?) resist its adoption (Damschroder et al., 2009). Individuals adopt innovations at different rates; some interventions might never be adopted whereas others might not be sustainable over a long period (Greenhalgh et al., 2004; Rogers, 1995). Rogers (1995) supports that the adoption rate of new interventions varies depending on the key attributes of the intervention. The intervention source, evidence strength and quality, relative advantage, adaptability, trialability, complexity, design, quality and packaging and cost are specific characteristics of the intervention in the CFIR (Damschroder et al., 2009).

The intervention source – whether external or developed internally – may change the stakeholders’ perceptions of the new intervention (Van de Ven, Polley, Garud, & Venkataraman, 1999). A new intervention developed internally may be seen as more adequate and a problem solver, compared to an externally developed intervention. This can impact the legitimacy of the source, which may in turn influence the implementation of the intervention. When key stakeholders have little input in an implementation decision and leaders higher in a hierarchy mandate a change, implementation can be less effective (Helfrich, Weiner, et al., 2007; Klein et al., 2001).

The stakeholders’ perception of the quality and validity of evidence supporting the positive results of the intervention can impact its adoption (Rycroft-Malone et al., 2002; Stetler, 2001). While the evidence strength and quality seem to be important factors, they may not be predominant in an individual’s decisions about whether to adopt the new intervention. The more sources of evidence such as publications, peer review literature and guidelines support the strength and quality of the intervention, the more likely it will be adopted. Having these characteristics helps to engage the users as they bring more credibility to the process.
For Rogers (1995), the relative advantage is the most significant and consistent attribute for determining the innovation’s adoption. He defined this attribute as “the extent to which an innovation is perceived as being better than the idea its supersedes” (Rogers, 1995, p. 212). Without a clear and unambiguous advantage of the new initiative, the end users will not easily adopt it. An initiative, to be successful, needs to be recognized and acknowledged as effective or efficient by all stakeholders (Greenhalgh et al., 2004). Meanwhile, the Leadership Program (2013a) emphasizes that relative advantage is an ambiguous concept for organisational innovations. Having a relative advantage alone does not mean that the intervention will be adopted because professionals might not be well informed or convinced of the scientific evidence regarding the innovation (Grol et al., 2007). Even if the intervention is supported by evidence-based practice, there may be discrepancies between the different stakeholders’ perceptions and how they interpret the innovation, which may result in negotiations between them (Denis, Hebert, Langley, Lozeau, & Trottier, 2002). The process that often leads to power struggles between the professional groups may even increase or decrease the level of perceived relative advantage of the innovation (Ferlie, Gabbay, Fitzgerald, Locock, & Dopson, 2001).

The degree of the intervention’s adaptability to meet local needs can alter its adoption by users. Denis et al. (2002) suggest the notion of mutual adaptation when they talk about complex innovations having “hard core” and “soft periphery” elements. The soft peripheries are the adaptable organisational structures and systems required for the implementation of the new initiative, which contrast with the core essential and indispensable elements of the initiative itself. To identify the core versus the peripheral components, Carroll et al. (2007) suggest performing a component analysis, by assessing the effects of the interventions on outcomes and then observing which elements have the most impact. As an intervention can more easily be modified to adapt to local setting, this can favour adoption (Gustafson et al., 2003; Leeman, Baernholdt, & Sandelowski, 2007; Rogers, 1995).

Rogers defines trialability as “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 1995, p. 243). Trialability allows the users to build on their experience and provides more time to reflect on and test the initiative. In Grilli and Lomas (1994) systematic review, the authors identified that innovations tested on a small scale had a higher adoption and assimilation level than those with low trialability. Many authors suggest the
PDSA scientific method as a good option to support small change in health organisations. (Berwick, 1998; Leeman et al., 2007; Plsek, 2003).

If key players perceive the degree of complexity of the intervention as low, the new initiative has a greater chance of being adopted. Complexity can be perceived by participants in terms of pervasiveness, scope, impact, or duration of an intervention (Greenhalgh et al., 2004). Rogers (1995) and Plsek (2003) suggest breaking down the intervention into manageable parts so users can adopt them incrementally. Having fewer barriers to overcome can impact positively on successful adoption by users (Rogers, 1995). For example, having more targeted organisational units (such as teams, departments or the number of types of healthcare providers, patients or managers) will increase the complexity of the intervention (Kochevar & Yano, 2006). This increase in complexity can alter the progress of the work and the end results of a new intervention (Grol et al., 2007).

The evidence shows that another important element – how the design, quality and packaging of the intervention is perceived by the users - can impact the degree of adoption of a new intervention (Kochevar & Yano, 2006). A compelling presentation of the reasons why the intervention is important can be offered to the potential targeted group. If the users perceive the explanation as being well presented and assembled, they may be more inclined to adopt the new project.

**Outer setting**

The outer setting such as economic, political, and social context in which the initiative is being implemented can have either a positive or negative influence on the success of implementation. Fitzgerald, Ferlie, Wood, and Hawkins (2002) point out that contextual factors in the outer (macro) level often interplay with the inner (micro) level. Research findings suggest that strategic decisions to support diffusion of innovations were based on national policy priorities (Fitzgerald et al., 2002). This is supported by Rogers (1995) in the mandate for adoption concept which he defines as “a higher level of social organization like a government, community, or a commercial company [that] can exert its influence on the behavior of individual members of the system.” (p.222).

If the initiative targets a specific patient population or their unmet needs being prioritized by the organization, this will facilitate adoption. The extent to which an organization is linked to
other institutions (cosmopolitanism) or is in a competitive context (peer pressure) regarding implementing the initiative will affect its adoption (Pettigrew, Ferlie, & McKee, 1992). These external forces are critical for implementation success.

External procedures that include policies, regulations, external mandates, recommendations and guidelines, pay-for-performance, and collaborative and benchmark reporting can affect the success or failure of an intervention’s implementation (Institute of Medicine, 2001).

**Inner setting**

There are few studies that look at the process by which complex innovations impact the structures or practices of teamwork (Baldridge & Burnham, 1975; Kimberly & Evanisko, 1981). More research has been done on the individual as the unit of adoption, and in which the diffusion of change is done through simple imitation (Rogers, 1995). Many authors have said that the inner setting of an organization has an influence on the process of implementation, and is composed of structural, political, and cultural features through which a new initiative takes place (Damschroder et al., 2009; Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007; Mendel, Meredith, Schoenbaum, Sherbourne, & Wells, 2008; Pettigrew et al., 1992; Stetler, 2001). Structural characteristics, networks and communication, organisational culture, implementation climate and readiness of implementation are all interrelated and crucial for the implementation phase of complex innovations in organizations (Damschroder et al., 2009).

Structural characteristics that include social architecture, and characteristics such as age, maturity and size of organization have shown mixed results because of their interaction with other features of organizations (Frambach & Schilliwaert, 2002). An organization that has resources beyond the minimal requirements to maintain its operations, and which can provide extra resources for new projects, has been shown to be positively associated with innovation (Damanpour, 1991). Edmondson, Bohmer, and Pisano (2001) found that organisations with stable teams over the long term, with low turnover, and internal communication are more likely to assimilate the innovation.

Damschroder et al. (2009) define social networks and communications as the nature and quality of the social networks between individuals and formal and informal communications within organizations. The complex connections between individuals, units, departments and services of an organization have an impact on the spread of a new initiative. The type of
network structures, formal or informal, and the quality of communication in social networks can influence the adoption of a project (Greenhalgh et al., 2004). One of the components of social networks is the internal bonding of the individuals within their organization (Helfrich, Weiner, et al., 2007). For Plsek and Wilson (2001), individual attributes might be less important than relationships between individuals in the implementation of change theory. Building these relationships can contribute positively to the implementation of change in an organization (Edmondson et al., 2001; Safran, Miller, & Beckman, 2006). Informal and formal communication varies within departments and units in an organization, as each group has a different type of social network.

Ostroff, Kinicki, and Tamkins (2003) define the organisational culture as the fundamental values, basic assumptions of a given organization, and beliefs held in common by the members of an organisation. Theorists suggest that organisational culture can have a significant impact on leveraging new knowledge and implementing innovation (Helfrich, Weiner, et al., 2007; Ostroff et al., 2003). Culture is considered an intangible element within healthcare organizations that can be an important force for change and can influence implementation effectiveness (Helfrich, Li, Mohr, Meterko, & Sales, 2007; Laschinger, Wong, & Ritchie, 2007).

Implementation climate comprises the members’ perceptions to an intervention, of how it will be rewarded, supported, and expected within their organization (Klein, Conn, & Sorra, 2001). Klein et al. (2001) emphasize that the climate for implementation does not refer to the members’ job satisfaction or how they are satisfied with the innovation. Elements impacting the implementation climate in the CFIR framework are a sense of tension requiring workplace change, compatibility, relative priority, organisational incentives and rewards, goals and feedback, and the learning climate (Damschroder et al., 2009). These elements are described below.

Tension for change is one element of a system implementation climate, which refers to the potential users’ perception of their current work situation. When potential adopters perceive their current work situation as intolerable and tense, it is more likely they will welcome change if it will improve their work (Gustafson et al., 2003; Simpson & Dansereau, 2007). Externally developed intervention can be proposed in response to a need for change at the macro level, while local developers of new initiatives can be suggested because of a tension for change within a care unit.
Compatibility is the degree of tangible fit in terms of existing values, past experiences, and needs perceived by users. When the values and meaning attached to a new intervention are aligned with the individuals’ own norms, values and perceived risks and needs, it helps the individuals to adopt the new idea (Grol et al., 2007). For Greenhalgh et al. (2004), the degree of alignment between values and beliefs, and how the intervention fits with these (as well as the communication by upper management), have a strong influence on the adoption of new interventions.

Relative priority is part of implementation climate construct in the CFRI. The more the individual shares the priority to implement the initiative within an organization, the more effective the implementation is likely to be (Feldstein & Glasgow, 2008; Klein et al., 2001; Klein & Sorra, 1996). Klein et al. (2001) suggest that when the adopters perceive the implementation as a key organization priority, which is promoted, supported, and that supportive behaviour is rewarded, the implementation climate will be strong. When other interventions have been recently implemented and adopters feel overwhelmed with changes in the workplace, they might assign a low priority with the new initiative (Greenhalgh et al., 2004; Gustafson et al., 2003).

Organisational incentives and rewards such as financial compensation or other performance-based evaluations are important incentives to reinforce behaviour to attain results (Gustafson et al., 2003; Rycroft-Malone et al., 2002).

Kochevar and Yano (2006), and (Simpson & Dansereau, 2007) stress the importance of clearly stating goals, which are aligned with feedback given to staff during the implementation of a new initiative. Having the goal of the intervention clearly communicated, acted upon, measured, monitored, and reported back to the staff are key features of successful implementation (Armstrong & Laschinger, 2006).

Elements that arise from the learning climate are important during the implementation process. Targeted staff should feel supported, valued, and encouraged to try new methods. The organization should be ready to provide incentives to staff and remove barriers, to create a positive climate for implementation (Klein et al., 2001). This also presupposes that all individuals involved have time and space to reflect on the new initiative, as well as sufficient time to evaluate it (Klein et al., 2001; Klein & Sorra, 1996).
An organization’s readiness of implementation refers to the tangible indicator of the organization commitment to implement the intervention (Damschroder et al., 2009). The authors of the CFIR include specific constructs in an organization’s readiness for implementation: leadership engagement, available resources, and access to information and knowledge (Damschroder et al., 2009).

Leadership engagement is the commitment, involvement and accountability of leaders and managers to influencing the success of implementation (Armstrong & Laschinger, 2006; Meyer & Goes, 1988). Being supportive, in terms of commitment (Helfrich, Weiner, et al., 2007), persuading stakeholders to adopt the new intervention (Leeman et al., 2007), empowering clinicians to implement innovations (Ferlie & Shortell, 2001) and allowing time – which often impacts productivity (Klein et al., 2001) – are ways for leaders to help during an implementation. For Van de Ven et al. (1999), leadership is essential to facilitate the innovation implementation process as “without the intervention of leadership, structures and systems focus the attention of organisational members to routine, not innovative activities” (Van de Ven et al., 1999, p. 598).

Available resources need to be dedicated to implementation, such as financial resources, training, education, physical space and time (Gustafson et al., 2003; Rogers, 1995). Management needs to be supportive, and implementation policy and procedures need to be directed towards making financial resources available to implement new interventions (Klein et al., 2001). For Grol et al. (2007), providing education, training and access to information about the intervention are important to change stakeholders from disengaged to fully committed users. Having easy access to comprehensible information as well as knowledge about the intervention and how to include it in day-to-day work tasks are important elements for adopting an intervention (Greenhalgh et al., 2004; Wallin, Estabrooks, Midodzi, & Cummings, 2006).

**Individual characteristics**

When implementing a new intervention, another key element to consider is the individuals involved in or impacted by it. Numerous authors have proposed models for understanding or changing individual behaviours - Bandura, Rogers, Prochaska, Green, and Greenhalgh (Damschroder et al., 2009). Individuals make choices, and influence others, which can have predictable or unpredictable consequences on the degree of adoption (Damschroder et al., 2009).
Greenhalgh, Robert, Bate, Macfarlane, and Kyriakidou (2005) comment on the importance of the individual’s role:

People are not passive recipients of innovations. Rather...they seek innovations, experiment with them, evaluate them, find (or fail to find) meaning in them, develop feelings (positive or negative) about them, challenge them, worry about them, complain about them, ‘work around’ them, gain experience with them, modify them to fit particular tasks, and try to improve or redesign them—often through dialogue with other users. (Greenhalgh et al., 2005, p. 8)

The knowledge and the degree of belief towards a new initiative are key implementation factors (Damschroder et al., 2009). The user’s ability to understand the facts, and principles related to the intervention are important attributes when assessing the quality of implementation.

Self-efficacy is the degree to which the participants believe in their own capacity to accomplish the task and attain the outcomes of a particular intervention (Bandura, 1977). An innovation is more likely to be adopted if users believe in their skills to execute the tasks (Ferlie et al., 2001; Meyer & Goes, 1988).

The individual stages of the adoption are the phase an individual is in when he or she learn new skills and sustained use of the innovation (Grol et al., 2007). These stages will depend on the underlying model. Rogers (1995) describes a model of the adoption process according to a five-stage decision-making progression: knowledge, persuasion, decision, implementation and confirmation. The author specifies that in any stage, individuals might reject a new initiative at any time during or after the adoption process. In the knowledge phase, individuals are being exposed to a new initiative, but are lacking some important information about it. They might not be interested in learning more about it. The persuasion phase exposes the individuals to the innovation and increases their interest in seeking more details. In the decision phase - the more difficult stage according to Rogers (1995) – individuals weigh the benefits and disadvantage of using the innovation and decide whether to adopt or reject it. Individuals use the innovation in the implementation phase and their degree of adoption will vary depending on the situation. Users may look for more information and evaluate how the innovation is useful in their work. In the last stage, individuals make final decisions whether or not they will continue to use the innovation.
The individual perception of the organization and the degree of commitment to it can influence how users will engage in the implementation process (Greenberg, 1990; Prochaska & Velicer, 1997). Smith, Organ, and Near (1983) describe these behaviours as ‘organisational citizenship’, where individuals associate themselves with the organization, talk positively about it, and are ready to take risks for it. Emotional and physical distress can negatively influence the implementation process as the potential adopters are not willing to put their energy into initiating and adopting the new initiative (Cropanzano, Rupp, & Byrne, 2003). Glisson et al. (2008) propose a model to evaluate the social context of an organization, which includes the psychological climate, and work attitudes. For these authors, the ‘psychological climate’ relates to the perceived psychological influence of the workers over their work environment, while attitudes relating to their work depend on job satisfaction and organisational commitment.

Damschroder et al. (2009) also include a last construct in individual characteristics: the other personal attributes which contains traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, innovativeness, tenure, and learning style. The authors deplore the fact that these traits have received little attention from implementation researchers.

**Process of implementation**

The final domain included in the CFIR, and the most difficult to define, measure or evaluate in implementation research, is the process (Damschroder et al., 2009). Even if the CFIR does not support any model in particular, it includes the most common features of most of the implementation models: planning, stakeholders’ engagement, execution, reflection and evaluation of the implementation. These features also represent the four components of the PDSA model: Plan, Do (execute), Study (reflect and evaluate), and Act (adjust the initial plan following review). The next section briefly presents the four components of the process domain in the CFIR.

The planning phase is one of the four fundamental phases of the PDSA cycles for implementing change. Greenhalgh et al. (2004) say one needs to be proactive; they support a “make it happen,” scientific and planned approach, rather than having a “letting go” approach. Damschroder et al. (2009) say that the need to better understand the role of planning and the nature of the quality of planning to influence implementation should be reviewed. Methods such
as marketing, education, role modelling, and training should be used to strategically plan the engagement of appropriate professionals and keep them involved in the implementation.

Greenhalgh et al. (2004) stress the importance of involving all stakeholders early in the process to increase the chance of success of the implementation. The engagement of stakeholders in meaningful problem solving is a critical element for transforming patient care (Lukas et al., 2007, p. 56). The CFIR includes several roles of different types of leaders and influencers (opinion leaders, formally-appointed internal implementation leaders, champions, and external change agents). Damschroder and colleagues clarify that each role cannot function in isolation, as the relationship between these professionals is the most important factor, after the personal characteristics of these individuals (Damschroder et al., 2009).

The next step is the execution of the implementation plans and tasks. Several tactics for executing the plan can be put into place to increase the likelihood of success: allow teams to try out a task, run simulations to learn about the intervention before ‘going live’, use pilot tests to allow users to build confidence (Edmondson et al., 2001), break the intervention into manageable tasks (Damanpour, 1991), and allow the team time to feel they learned the new skills required by the intervention (Helfrich, Weiner, et al., 2007).

The final construct of the process domain is reflecting on and evaluating the progress and quality of the implementation (Damschroder et al., 2009). This is done through regular individual and team debriefings about how the intervention is going, and the experience of the stakeholders (Edmondson et al., 2001; Simpson & Dansereau, 2007).

**Summary**

This literature review provided evidence on the difficulty of achieving QI in healthcare. The Model of Improvement is a recognized framework and can be a powerful tool for accelerating improvement. Testing change using the PDSA Cycles is helpful to determine if the change is an improvement and permits gradual building of knowledge. Taylor’s et al. (2013) systematic review demonstrates application of the key features of the PDSA methodology and discusses how the methodology is often misunderstood.

As QI implies change, various factors can influence the effectiveness of implementing a new intervention. The evidence presented in this chapter demonstrates that factors interact in a complex manner and can influence the implementation process in various ways. To understand
which factors influenced the design and implementation of QI projects using the Model of Improvement, the participants in this thesis project were asked to share their experience during their involvement of QI initiatives.
Chapter 3: Methods

Qualitative research can be defined as a naturalistic and interpretive approach concerned with understanding the meanings which people attach to phenomena – actions, decisions, beliefs, values – within their social world (Denzin & Lincoln, 2000). A qualitative research approach should be used when the investigator seeks to understand the perspective of participants (Creswell, 2013). This qualitative research uses a case study approach to ask the participants – nurse leaders, QI consultants, unit managers, other team members and healthcare providers impacted by the QI projects - to describe their experience of QI projects implemented in a unit in their hospital. The case study approach was pertinent to the “what” and “how” research questions posed in this study (Yin, 2009). In this thesis, the research sought to describe what factors the participants identified and how the nurse leaders designed and implemented the QI projects within their units using the Model of Improvement.

There is no single accepted way to conduct qualitative research; rather, qualitative research depends on factors such as the researcher’s beliefs about the nature of the social world and what can be known about it, the nature of knowledge and how it can be acquired, the purpose and goals of the research, the characteristics of the research participants (Ritchie, Lewis, McNaughton Nicholls, & Ormston, 2003, p. 2), and the methods used in the study (Patton, 2002). To produce more valid findings, Morse, Kuzel, & Swanson (2001) states the importance of maintaining consistency between particular philosophical assumptions, and stresses that researchers should maintain consistency between the philosophical starting point and the methods adopted for the study (Ritchie et al., 2003).

This study explores how the nurse leaders applied the Model of Improvement using the PDSA Cycle to test change based on the five key principles suggested in the theoretical “PDSA” framework. The study also presents the participants’ perceptions of the implementation of QI projects. The main question looks at which factors may have influenced the effective application of the PDSA methodology based on the theoretical framework, using two cases. Several QI projects took place within the Leadership Program, and two of these QI cases were selected through a purposeful sampling technique. The cases were selected to maximize the opportunity to learn about the implementation of QI projects in a hospital setting. First, selection criteria were identified, then a review of all the QI projects taking place within the Leadership Program
was performed, and then the two cases were selected. Five subgroups of professionals to be interviewed, representing a broad variety of perspectives, were identified: 1) nurse leaders, 2) QI consultants, 3) unit managers, 4) other team members, and 5) healthcare providers affected by the QI projects. Three sources of evidence were used in this study: semi-structured interviews, participant observation and document review. A detailed description of the data collected in the two cases was produced, and this was followed by thematic analysis across the cases.

This chapter outlines the methods used in the study and begins with a description of the chosen research paradigm. The sampling method and recruitment process are presented. The data collection and analysis carried out for this qualitative research are then outlined in detail. The final section of this chapter discusses how issues of validity and reliability were addressed.

**Interpretivism framework**

Beliefs and philosophical assumptions can inform the choice of theory that guides the researcher’s investigation. These assumptions can be deeply ingrained in the type of problem the researcher will study, the research questions being asked, and the data collection methodology that will be used (Creswell, 2013). This interpretive case study engages both the “how” and the “what” of social reality.

It is centered both in how people methodically construct their experiences and their worlds and in the configurations of meaning and institutional life that inform and shape their reality-constituting activity. (Denzin & Lincoln, 2000, p. 488)

Creswell (2013) adds that interpretivist research is focused on the cultural and historical context in which the participants evolve. I perceived my research as a way to describe how the participants in a phenomenon of interest – an implementation of a QI project in a hospital setting – understand their own situation and actions. Since its object is to understand the world from the participants’ point of view, and to place emphasis and value on meaning, interpretivism was the most appropriate approach to take in this study.

**Methods**

The aims of this study were to understand a complex social phenomenon, to interpret particular processes, and to investigate phenomena within the context of real-life events. A case study approach best serves the aim of identifying a current phenomenon within a real, specific context with an empirical study using multiple sources of evidence (Robson, 2002). For (Yin,
2009), a case study method is preferable to other research strategies in social science research, when the questions are descriptive and the investigator has little control over behavioural events. This method will typically have exploratory types of questions starting with “what” to foster the development of hypotheses and propose further inquiry (Yin, 2009). Another descriptive study method where the researcher has no control over the events – the survey – could have been used. However, a survey would not have fully captured one of the research questions in this study: “How did the nurse leaders apply the PDSA to design and implement their QI projects within the Leadership Program?” This question is needed to trace the process, and deals with operational links rather than with frequency or incidence. Moreover, the theoretical framework used in this study aims to assess the application of the PDSA methodology to understand barriers and facilitators in QI interventions.

The case study research method allows for multiple data collection methods providing converging lines of inquiry, which enable the process of triangulation, increasing the validity of the findings (Yin, 2009). Data can arise from multiple sources such as documents, archival records, interviews, direct observation, participant observation, and physical artefacts (Yin, 2009). This study examines qualitative data derived from semi-structured interviews, participant observations and documents such as project charters, evaluation reports, emails, and educational materials. Therefore, the case study strategy was an appropriate design method in this context, while other types of research would be less likely to provide insights and exploration as compared to the case study design (Patton, 2002; Yin, 2009).

For Yin (2009), it is critical to have a clear definition of the unit of analysis to delimit the boundaries of the study. Yin provides a matrix to visualize two types of designs with the same two levels: the single-case (either holistic or an embedded) design or the multiple-case (either holistic or an embedded) design. A single-case design aims to provide a deep understanding of a particular phenomenon and provides a rich description of the context in which it occurs. A multiple-case design focuses on comparing across organisational contexts or across case analyses (Armstrong, Laschinger, & Wong, 2009; Eisenhardt, 1989) and generalizes the single-case findings (Merriam, 1998). There are some critical trade-offs between the two designs, such as being able to perform in-depth study of one versus multiple cases, and deep versus surface description. For Creswell (2013), the study of multiple cases dilutes the overall analysis, although researchers might consider a large number of cases to generalize findings. Taking into
account these trade-offs, this study looks at two cases to develop a deep understanding of QI projects taking place within the Leadership Program. The Leadership Program represents the single-case design involving two other cases that represent the embedded units. The two embedded units of analysis were selected through purposeful sampling that is described in the next section.

Thick description allows the reader to move away from researcher-centric perspectives to appreciate the social conditions being studied (Armstrong et al., 2009). To create thick description, this study describes the QI projects, the units in which the QI projects were implemented, how the nurse leaders designed and implemented their QI projects using the PDSA methodology, and the perceived participant factors impacted by the implementation of these projects.

**Sampling**

Purposeful sampling was used for this study. According to (Creswell, 2013)

> This is not a probability sample that will enable a researcher to determine statistical inferences to a population; rather, it is a purposeful sample that will intentionally sample a group of people that can best inform the researcher about the research problem under examination. (p. 147)

Sixteen forms of purposeful sampling have been proposed by Miles and Huberman (1994). Two forms were considered in this research study: the critical case strategy and the snowball or chain strategy. The critical case permits logical generalization while the snowball strategy involves the identification of cases of interest from people who would know the people who can provide the richest information. In this research study, the most appropriate of these strategies was the critical case sampling one. The snowball or chain strategy was not chosen because it was difficult to meet with HCPs to discuss the different QI projects taken place in the hospital. The people who knew the most about those QI projects were the QI consultant team and they might have a bias towards certain QI projects that could have work better then others. In the context of this study, the critical case strategy permitted me to learn from all the case and chose the ones that would yield the richest information and have the greatest impact on the development of knowledge of the phenomenon under study. For Patton (1999), this sampling strategy permits logical generalization and maximizes application of information to other cases.
Four inclusion criteria were employed in this study (see Appendix A). The first criterion was that the two cases needed to take place within the Leadership Program. The second was to allow for a broad variety of perspectives by interviewing and observing various participants. Subsequent choices, to select specific subgroups of participants, were made. For each of the two cases, four subgroups of participants were initially identified: (1) nurse leaders, (2) QI consultants, (3) unit managers, and (4) other team members. In this study, all these participants were identified in the project charters completed by the nurse leaders and the QI consultants as team members. In this specific group of team members, unit managers and QI consultants were identified as “team members with managerial responsibilities”. After the first interviews and participant observation took place, it became apparent that a subgroup of key informants was missing: the health care providers (HCP) impacted by the QI project. These were clinicians involved in one way or another in the implementation of the two projects. The complete list of participants can be found in table 3.1. The third criterion stated that the nurse leaders designed and implemented their QI projects using the Model of Improvement and changes were being tested using the PDSA Cycles. The fourth selection criterion was that the nurses involved in the Leadership Program were given adequate time to carry out their projects. As PDSA cycles are iterative, it was important that the nurse leaders carried out at least one complete PDSA cycle to have gained experience and perspectives on the application of the PDSA method and the barriers and facilitators faced by the team.

**Table 3.1 Participants**

<table>
<thead>
<tr>
<th>Subgroups/ QI project</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Total participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager of Quality Improvement for the region</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>QI consultant</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Unit Manager</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Nurse Leader</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Team Member</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>HCP impacted by QI project</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total participants</strong></td>
<td><strong>6</strong></td>
<td><strong>7</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

**Selection process of the two cases**

Introduction to the nurse leaders took place during the first educational session in April 2013. The Manager presented me to all of the participants in the Leadership Program as a researcher.
interested in learning more about these QI projects and looking for specific cases to study. In October 2013, I received all of the nurse leaders’ project charters from the Manager of Quality. These project charters presented the main goals, measurements, team members, and communication tools.

After reviewing the project charters, I spoke with the QI consultants to learn more about each project and discussed which ones could potentially be good study cases. Of the fourteen QI projects that were initiated, four were not completed because nurse leaders decided to leave the projects. Of the ten QI projects still ongoing, six were put aside because they were not advanced enough and therefore did not meet the fourth criterion. Of the four projects left, one nurse leader did not wish to participate in the research study.

For one case amongst the shortlist of three potential cases, the unit manager supporting the QI project left the hospital during the project, and it was therefore not possible to interview him/her. Because of this potential disruption to the project this case was not retained. Consequently, the two remaining potential cases were selected for the study.

**Recruitment**

The Manager of QI and Patient Safety was also interviewed to obtain a broad overview of the Leadership Program. QI consultants supporting each of the projects were the first subgroup who agreed to participate in the research study.

A letter outlining the research study was provided to the two unit managers supporting the selected QI projects. The support of the unit managers was sought to facilitate the recruitment process, ensuring easier access to the nurse leaders, team members and other HCPs impacted by the QI project. Unit managers supported the study by allowing me to meet with personnel during their work hours.

The QI consultants supporting the projects contacted the nurse leaders to seek their involvement in the study. Two nurse leaders led one of the case studies, while one nurse led the second case study. A consent form providing more details about this study was sent to the nurse leader, informing him/her that his/her participation was voluntary and confidential. Team members were selected based on project charters and discussion with the nurse leaders. Contact with team members was made only after the nurse leaders first contacted them. All the team members chosen via this process agreed to take part in the study.
The healthcare providers impacted by the QI project subgroup were identified through the snowball sampling method. These participants were named during other participants’ interviews and participant observation. In total, the sample consisted of 14 individuals across the two cases.

**Data collection**

Several methods of data collection can be used in a case study. The most common are interviews, participant observation, document review, and collection of visual data (Creswell, 2013; Mayan, 2009). The method of inquiry will influence the data collection techniques. In this case study (which tries to understand experiences), semi-structured interviews, nonparticipant observation and review of documents were appropriate methods of collecting the data (Yin, 2011). This section describes the methods and procedures used during the data collection phase.

**Semi-structured interviews**

The purpose of conducting individual interviews was to have each participant act as a key informant, providing insight and expressing his/her opinion. Semi-structured interview guides were developed to provide a structure. Yin (2009) suggests the use of semi-structured interviews to probe further into a specific topic if something is not clear, or if different interviewees appear to have similar or contrary views.

For this study, three interview scripts were developed: one for the nurse leaders, a second for the QI consultants and team members, and a third for the unit managers and the HCP impacted by the QI projects (see Appendix B). All three interview guides had three sections: background information, the experience of the QI project in which they were involved or which had an impact on them, and the factors influencing implementation of the QI projects. In the first section, participants were asked to briefly state their title and functions, their role in the Leadership Program and in which QI projects they were involved or which had an impact on them (HCP providers impacted by the QI projects did not necessarily feel they had a particular role to play). The nurse leaders’ interview script also included questions about their participation in the educational opportunities provided by the program, their involvement in other QI projects and their knowledge of the PDSA approach before starting the Leadership Program. In the second section, participants were asked to talk about their experience during the design and implementation of the QI project. In the nurse leader and the team member and QI consultant interview guides, more emphasis was put on the PDSA cycles to understand how this approach was applied to the QI project. Questions also focused on the key features of the PDSA cycles to
understand whether or not the nurse leaders followed this systematic approach during the entire design and implementation phases of their QI projects. Since team members/QI consultants had a supporting role to the nurse leaders, this second section was similar for the two groups. The last section of the interview guides asked similar questions of all participants. It specifically focused on the participants’ perspective on barriers and facilitators they experienced during the time they were involved in or impacted by the QI project.

**Observation**

Observation is another approach used to collect data in qualitative research, and is particularly useful in case studies. Observation is an appropriate method when the goal is to learn about the culture of the participants and to interpret the world as they do (Hammersley & Atkinson, 1995, pp. 6-7). Understanding behaviours, and how activities and interactions affect behaviours and meaning construction among the participants was one of the elements of interest. Observations of physical setting, participants, activities, interactions, and conversations between the subjects brought a new dimension to understanding the environment and context (Creswell, 2013). This type of data collection is consistent with my belief that one needs to be immersed in the context of the people one is trying to understand. The participant observation method was one way to achieve these goals (Crabtree & Miller, 1999). Four types of participant observation exists: the complete participant where the researcher is engaged with the individual he or she observes, the participant as observer where the researcher participates in the activity, the nonparticipant observer as participant where the researcher is an outsider of the group and the complete observer where the researcher is not seen or noticed by the people under study (Creswell, 2013). In this study, I attended meetings and activities held for different subgroups, as a nonparticipant observer. As a nonparticipant, I watched and took notes from a distance to enhance my understanding of these interactions. After the participant observation, I completed field notes that form part of the analysis.

**Interviews and participant observation process**

Most interviews and participant observations were done face-to-face, at the hospital between February and April 2014. Since visits coincided with the monthly educational meetings, I had the opportunity to observe these meetings. Two of the 14 interviews in this study took place outside the hospital: one was conducted at the participant’s home and the second by telephone. The limitation with the latter approach was the inability to gauge informal communication. As
this participant lived too far away, conducting the interview by telephone was the only option possible.

QI consultants and team members were the first subgroup to be interviewed, since I wished to obtain the maximum of information from these two subgroups before meeting with the nurse leaders. Conducting these interviews beforehand helped me refine probing questions in the nurse leaders’ interview script. The nurse leaders’ and unit managers’ interviews were conducted one month later than the first group.

Before each interview, I reviewed the consent form with the participant and obtained written consent to take part in the research study from the interviewee (see Appendix C). Participants were given a copy of the consent form for their records. All interviews were audio-recorded except one, as it took place in a critical care unit and the participant preferred not to have sensitive information recorded. Field notes were taken during the interviews, and these were used to assist in the coding. The interviews varied between 45 minutes and one and a half hours in length.

Three sessions of participant observation were done in this study. One session was performed via a WebEx recording. I observed the interactions between the QI consultant and the nurse leaders via a live teleconference. Although this was not the preferred means to do observations it was the only practical way to obtain these data. The participants quickly forgot about the WebEx technology and clearly felt comfortable discussing the project using this interface. The two other participant observation sessions took place at the hospital site: one of these involved observing a meeting between a nurse leader, a team member and a QI consultant, and the second involved an interaction between a nurse leader and a HCP who was impacted by the QI project.

Lincoln and Guba recommend taking notes after interviews and participant observation, to “jog the memory of the interviewer so that other items not noted when they occurred are recalled” (Lincoln & Guba, 1985, p. 272)). I jotted down any sentences or pauses when writing the field notes as well as commenting on (a) the background of the interview, to situate how participants were contacted and recruited, (b) the surroundings, (c) the mood of the interviewer and interviewee, the rapport that was established, and the willingness and eagerness of the participant to answer questions, and (d) my perception of the overall contribution of the participant to the study. These notes were useful as they facilitated reflection on each interview.
and participant observation, as well as adjusting the interview and participant observation guides and for the next interview or observation.

**Documents**

Documents such as educational session material, project charters, emails, agendas, evaluation reports, and final presentations of QI projects were reviewed. With the exception of the emails, which were provided by the nurse leaders, these documents were provided by the Manager of QI and Patient Safety. All these documents available to the participants were reviewed in this study. Yin (2009) suggests using these types of documents to corroborate and augment the evidence from other sources. As an example of how these documents were helpful in corroborating evidence, the review of the educational session material was illustrative, since some of the nurse leaders and QI consultants referred to this material in their interviews. I was thus able to use the educational material to understand what was discussed during the monthly training sessions, not all of which I had attended. Moreover, some documents were reviewed prior to scheduled interviews, and knowing their contents helped me make inferences, which were used to further the investigation during the interview. For example, reviewing the project charters before the nurse leaders’ interviews helped me understand how they planned the implementation of the QI projects in their units. If an important step in the initial planning discussed in the nurse leader did not mention the project charter during the interview, I was able to ask relevant probing questions about its execution.

It is noteworthy to mention that formal documents such as the evaluation framework or evaluation report have audiences and goals in mind, and therefore are inherently normative. Documents are written for a specific purpose (i.e. showing the rationale of having front-line nurses leading QI projects) and for a specific audience (promoting the Leadership Program to upper management and the Ministry of Health). Understanding goals and audiences is important for the proper interpretation of these documents.

**Data analysis**

Miles and Huberman (1994) define the analysis of qualitative data as a process which consists of three concurrent activities: (1) data reduction, (2) data display, and (3) conclusion drawing and verification. Data reduction consists of selecting, focusing, simplifying and transforming the field notes, interview scripts, and other data. This step occurs as the researcher decides on the conceptual framework, the cases, the research questions, the data collection
approach, and how the text will be coded. During this process, new thoughts and ideas are
developed to determine what to include in the data display. Data display helps the researcher
understand what is happening: it renders a large amount of data compact and accessible. Having
a visual format present the information systematically helps organize the data, permits the
viewing of a full data set, and establishes the framework for drawing and verifying conclusions.
The final phase refers to the process of “having the data make sense”, and consists of
formulating conclusions and adding interpretations. This process involves testing the meanings
emerging from the data, and looking at irregularities, patterns, explanations, and consequences.

The following section starts by outlining the interview transcription process and the coding of
the collected data. It also includes a discussion of the detailed data analysis.

**Transcription**

The study comprised a total of 14 interviews and generated approximately 14.5 hours of
recordings. Whyte (1984) suggests doing an evaluation to ensure the overall quality of the
recording and the interview. I listened to all the recordings to confirm that the overall quality in
terms of sound clarity was good. The transcriber and I worked together to develop a set of
transcription guidelines. For example, specific events such as pauses and incomplete sentences
were to be indicated with standard notation, indiscernible words were to be in brackets, and loud
words or phrases were to be capitalized. After the transcription step, I reviewed the transcripts
while listening to the recording, corrected errors and removed any identifying information.

The participant observation sessions were recorded but not transcribed because of quality
control issues. For two of the sessions, the quality of the recording was very poor because it was
recorded in an open space with a lot of traffic sounds. The third participant observation that was
done through a teleconference was not recorded due to a technical problem. However, field
notes were taken during all three participant observation sessions.

**Coding process**

The coding process took place during the data reduction stage, as proposed by Miles and
Huberman (1994): “Coding is analysis. To review a set of field notes, transcribed or
synthesized, and to dissect them meaningfully, while keeping the relations between the part
intact, is the stuff of analysis” (Miles & Huberman, 1994, p. 56). The coding process focuses on
the reduction of data to display it in an explicit form for interpretation (Miles & Huberman,
Before preparing and organizing the contents of the data, I read the transcripts several times to immerse myself in the text (Agar, 1980; Creswell, 2013; Mayan, 2009; Miles & Huberman, 1994). This allowed me to obtain a good sense of the interview as a whole, to appreciate the full picture, and to make connections between participants’ thoughts and ideas.

Crabtree and Miller (1999) suggest three types of organizing style to provide structure to the analytic process: the template, the editing, and the immersion/crystallization. All three types consist of entering the data and reorganizing it in a way that helps the researcher connect and link categories to discover themes. This study used a template organizing style as the analytic process to organize and refine the codes to make connections. In the template organizing style, the researcher defines codes before proceeding to the textual analysis, and these template codes are then applied to the text. Miles and Huberman (1994) propose a “starting list” of codes before collecting the data. This list can come from a conceptual framework, research questions, hypotheses, problem areas, and key variables that the researcher brings to the study. In this study, the starting list consisted of the factors mentioned in the literature regarding implementing new initiatives, and the PDSA phases and key features. Guest and MacQueen (2007) recommend giving a brief definition of each code within the list, guidelines for when to use the code and some examples. Two strategies suggested by Ezzy (2002) for researchers working without a team were used during my coding process: (1) initiate the coding during the data collection, and (2) maintain a reflective journal on the research project with the researcher’s analytical memos. During the data collection for this study, any preliminary words for potential codes were put in a research journal for future reference. These were ideas added for analytical consideration as the study progressed. Ensuring coding was flexible and open helped me look at themes that could be developed further in subsequent interviews, and assisted me in creating questions for follow-up interviews. Reading the transcripts and getting to know the data facilitated the development of further codes. Using a template organizing style that identified “chunks” of text also facilitated the development of further codes for data retrieval and analysis. The process of coding involved assigning codes to text and sorting the segments to get similar text segments in one place. A template organizing style was a good approach as it provided structure to the analytic process and enabled me to focus on specific aspects of the text.

Interview transcripts and participant observations were first coded on hard copy, which gave me more control of the work. Once I gained more experience in coding and felt more
comfortable with the process, I transferred all data to NVivo10™. The use of computer software offered several advantages such as a storage file system, ease of locating material, and the program’s capacity to visualize relationships between codes and themes. Moreover it made sorting, cutting, and pasting operations more efficient. This inductive process helped me organize and group similar codes into categories with shared characteristics.

**Data analysis and display**

The analysis of evidence is considered one of the least-developed and most difficult aspects of doing case studies according to Yin (2009). A researcher requires a clear approach to data analysis. Yin suggests adopting a general strategy that can help the researcher treat the evidence fairly and produce compelling analytic conclusions. The choice of analytic strategy depends on the purpose of the study (Yin, 2009), which in this case was mainly descriptive and, to some extent, explorative. My analysis began with a description of the QI projects and the context of the units in which these projects took place. To understand the complexity of implementing QI projects using a PDSA methodology, the processes were described in such a way as to identify the factors that influenced the effective application of the methodology.

A thematic analysis technique, across the two cases, was used to analyse the case study data. It is noted that participants’ interpretations are significant since they can provide an important source of explanation for their behaviours, actions and thoughts, which fits well with the process of thematic analysis and the interpretivism approach (Creswell, 2003; Hatch, 2002). Namey, Guest, Thairu, and Johnson (2008) speak of thematic analysis in these terms:

> Thematic [analysis] moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas. Codes developed for ideas or themes are then applied or linked to the raw data as summary markers for later analysis which may include comparing the relative frequencies of themes or topics within a data set, looking for codes co-occurrence, or graphically displaying code relationships. (p. 138)

A rich thematic description of the two cases was helpful for understanding the complex data and obtaining a sense of the predominant and important themes. In other words, thematic analysis allowed me to determine the relationship between the data and the emerging themes across the two cases.
Thematic analysis was supplemented by data display. March (1990, p. 55) defines data display as “a spatial representation that allows the researcher to organize data into a compact form and that establishes the framework for conclusion drawing and verification.” For Miles and Huberman (1994), the design of the display is an analytical activity, which shows the data in one place and helps the researcher see where further analysis is called for. This study applied an event listing data matrix, which describes the flow of events and processes by time periods, sorting them into several categories which fall into the PDSA cycles (Miles & Huberman, 1994). This descriptive data matrix was helpful for simplifying the analysis (Marsh, 1990; Miles & Huberman, 1994) and establishing credibility, by presenting data in a physical form and making the process, procedures and tactics transparent for the reader (Lincoln & Guba, 1985).

**Assessing the quality of the case study**

Any research design should be able to present a logical set of statements that can be tested to judge the quality of its design. As a case study is considered one of the five major social science research strategies, it likewise needs to be tested to establish its quality (Yin, 2009). Assessing the overall quality of a case study is particularly relevant in relation to the study’s validity and reliability (Yin, 2009): qualitative and quantitative researchers are seeking both valid and reliable findings. However, these concepts are determined differently when conducting qualitative versus quantitative research (Yin, 2009). Two tests to establish quality are particularly important when conducting case studies: external validity and reliability (Kidder & Fine, 1987; Yin, 2009).

External validity is concerned with whether the findings of a case study can be generalized to a larger sphere (Yin, 2009). Critics of case study design claim that single or few cases offer a poor basis for generalization. In quantitative research such as surveys, the sample selected by the investigator is generalized to a larger population, and therefore relies on statistical generalization. When dealing with case studies, the investigator’s goal is to achieve validity by striving for analytical generalization, meaning to “generalize a particular set of results to some broader theory” (Yin, 2009, p. 44). Consistent with Yin’s approach to case study quality issues, the external validity of this study has been addressed by generalizing the study findings, not to other cases, but rather to theory. One tactic suggested by Yin (2003) for achieving external validity is to use multiple sources of evidence. By relying on several sources, this study was able
to address a wider range of historical, contextual, and behavioural issues as well as to develop converging lines of inquiry.

A reliable study is one in which error and biases are minimized so that its operations and procedures can be repeated to achieve the same results (Yin, 2009). While reliability in quantitative research means that the same results would be found if the study were replicated, this concept is different in qualitative research. Reliability in qualitative research implies that if another investigator followed the same procedures and conducted the same case study from the beginning, then he or she would obtain the same results. This distinction is particularly important as my study focused on two particular cases: very different findings could be obtained if another investigator tried to replicate the study in a different setting. A case study database (see Appendix D) was developed to increase the reliability of this case study by providing a way to organize and document the data collected in this study. The aim of the case study database is to distinguish between two documentation collections: (1) the data or evidentiary base and (2) the report of the investigator (articles, reports or books). Separate collection is important for secondary analysis to distinguish any reports by the original investigator. Quantitative researchers work on a more sequential than iterative or cyclical process while, on the other hand, qualitative researchers adopt “a more fluid – and a more pioneering – position” (Miles & Huberman, 1994, p. 12). Therefore, having a case study database can increase the reliability of the entire case study since the study can be better documented.

Another technique proposed by Yin (2003) – a case study protocol – was applied in this study to increase reliability. The case study protocol is “a major tactic in increasing the reliability of case study research and is intended to guide the investigator in carrying out the data collection from a single case.” (Yin, 2003, p. 75). The case study protocol was developed and applied during my data collection and analysis. The case protocol (see Appendix E) included the following: the objectives of the study, the issues, and field procedures for obtaining access to case study sites, key contact persons, and procedural reminders.

Ezzy (2002) recommends to researchers working without a team during the coding process to verify interpretation with member checks. Lincoln and Guba (1985) support that member checking is a key technique for establishing credibility. Participants were asked to confirm the findings of their interview based on a summary of it. This adds to the credibility of the research by validating the accuracy of the findings.
Chapter 4: Results

The purpose of this study is to understand the factors affecting the design and implementation of QI projects using PDSA Cycles within the Model of Improvement Framework to test change in the context of a hospital QI program. This chapter first presents the context of the Leadership Program, and the study results follow with Unit A findings and Unit B findings.

Leadership Program Context

Source documents revealed that in the Strategic Plan for 2010-2014 of the regional health authority, the first goal is to “Promote a Leadership Environment that empowers all staff to identify and address opportunities for improvement in their everyday work life” (Quality, Risk & Accreditation Strategic Plan 2010-2014). The Quality, Risk & Accreditation portfolio (QRA) has the mission to create a culture where every HCP is responsible for quality and patient safety, which can be achieved through patient-centred care, teamwork, innovation and learning. Based on this regional plan, the hospital developed a Leadership Program with the objective to prepare nurses for leadership roles as well as providing them with knowledge about QI. A detailed plan sent to the Ministry of Health where the regional hospital is situated, showed how to achieve these aims. It reveals educational days were the main tool to achieve various QI initiatives. “With vision and support from the site, the program is taking a one year cohort of front-line nursing staff through quality improvement training.” (Leadership Program, 2013c). In this document, the support of QI managers to implement new knowledge in practice is mentioned: “A QI consultant supports each team member in their learning and their project development” (Leadership Program, 2013c). High-level management supported the Leadership Program without additional funding, with the exception of the one day per month allocated to nurse leaders to work on their projects. The QI managers approached all the unit managers to gain their support for the Program, and most of them agreed to provide one or two nurses to work on QI projects.

The first education session was one full day and involved most of the unit managers, as well as some key members of upper management of the hospital who came to show their support for the Program. The Leadership Program was explained in greater detail to the newly appointed nurse leaders. The educational material provided to the nurse leaders on the first day indicated
“QI Consultant is available to provide consulting for your quality improvement projects. They are available to guide you on your work, but your project is your project. (…) You will have the opportunity to lead your own quality improvement project. Remember, these projects are your projects to try tests of change and make improvements for your area. We are here to provide advice for you along this journey!” (Leadership Program, 2013a)

The next section presents the findings related to the design and implementations of the projects and the participants’ perceived factors to implement QI project in the two cases. The application of the PDSA cycles is displayed in figure 4.1 and 4.2. The findings answer the first sub-question: “How did the nurse leaders and team members use the Model of Improvement and apply the PDSA Cycles?”

For the participants’ perceived factors, each heading represents the main domains of the CFIR framework and the findings identified by the participants for each. A short definition of each construct is provided; these are based on definition of the CFRI construct in Damschroder et al. (2009). The objective for this section of the present chapter is to answer the following research study question: “What facilitators and what barriers do the nurse leader, the team member, the QI consultant, the healthcare providers impacted by the QI project and the Unit Manager identify during their involvement in the QI project?”

Case study 1: Unit A

Context

Unit A is open 24 hours a day, 7 days a week. There could be 1300 patients in a year in the Unit A, mostly short-stay. Registered nurses in this unit work 12-hour shifts. In the day, there are three registered nurses and in the evening there are two registered nurses. All nursing staff are certified with the neonatal resuscitation program. The Unit Manager also administers Unit C specializing in neonatal intensive care. There used to be a monthly meeting between the two units, but now each unit has its own monthly meeting. Unit A shares a nurse educator with another unit, and Unit C has its own nurse educator. Units A and C share a common administrative clerk who processes the orders, admissions, discharges, and supply orders. Other
healthcare professionals may also be called on to assist with births: nurses from Unit C who specialize in newborn and infant care, obstetricians, respiratory therapists (RT), and other staff.

A standardized colour code communication tool is used throughout the hospital to communicate with healthcare professionals who need to respond to emergencies. Colour codes are used to quickly broadcast essential information over the Public Address system of the hospital to appropriate staff. In Unit A two codes are used most often: “code blue” which is related to cardiac arrest and “code pink” which is a call for an obstetrical emergency. When a colour code call goes out across the hospital, all the healthcare professionals whose help is needed are required to come quickly to Unit A.

**Quality Improvement project: aims and measures**

Calling a colour code brings many healthcare professionals to Unit A, some of whom may not be needed, depending on the obstetrical or other types of emergency. For their QI project, the nurse leaders decided to work on a new communication tool to create staging before broadcasting a colour code across the hospital. The intent of the QI project is to plan ahead to have the right people available at the right time, before sending out the colour code call.

The QI project would allow – at specifically determined level of risks - the appropriate people to know in advance whether they might be needed for a specific situation. The main objective of this QI project was to reduce the number of unnecessary personnel attending assisted deliveries (which are emergencies). Some groups, such as respiratory therapists (RTs), work throughout the hospital, and do not have time to communicate amongst themselves when the colour code is called. This can create a situation where many RTs could come to the emergency. In such a situation, not only was the healthcare provider not needed for the particular emergency, but they have also left patients on other units to respond to a code. Moreover, many professionals called for a colour code bring their students, which significantly increase the number of unnecessary professionals present. In one instance, the physician, paediatrician and nurse had all brought a student to the emergency. This led to a difficult situation as there were too many HCPs in the room and they were blocking the way; a lot of stress was created for the patient and family who were witnessing all these professionals rushing into the room.
Another issue the nurse leaders wanted to address with the QI project that was not stated clearly as a goal in the project charter was having a leader who would assign roles to the different HCPs attending an assisted delivery. A clear definition of roles during emergency situations was also needed in this project. Some roles are very clear because the staff are working within their boundaries and professional scopes. The lack of a clear leader in the room during an emergency created some issues about who needed to perform which role, and contributed to a climate of disrespect. This disrespect was felt mostly by Unit A nurses who were pushed away when caring for babies by Unit C nurses. The Unit C nurses, when called to an emergency situation, expected their role to be taking care of the health-compromised newborns. Staff in Unit A complained that Unit C personnel were inappropriately taking over. One of the nurse leaders from Unit A said that “we [nurses from Unit A] ask for their help, but sometimes it’s not the role they think that we need help with”. Another role that needs to be filled during emergency situations is that of the recorder; few professionals seem interested in taking this role. One of the team member with managerial responsibility recognized that it was an ongoing issue and said “they [Unit C] have some sharp elbows in there, they’ve [Unit C nurses] pushed people [Unit A nurses] away (...) who are doing a perfectly good job.” (P2). The nurse leaders said they wanted to address this concern now since some Unit A staff were close to retirement, and they did not want to let it “keep compounding if we don’t solve it” (P5).

To assess whether the changes were going to lead to improvement, the nurse leaders decided to conduct a survey of the professionals who attended emergencies. The nurse leaders were asking stakeholder impact by the QI project to fill out the surveys, after each emergency, throughout the implementation of the project. At the beginning of the design of the QI project, the nurse leaders met once with the Unit A Manager and the QI consultant. The two nurse leaders explained the goal of the QI project. No other formal meetings took place between the team members that included the QI consultant, the unit manager, the nurse leaders, and other stakeholders identified in the project charter.

The two nurse leaders wrote their own project charter with the help of the QI consultant. They identified the main goal of the project (to reduce the number of unnecessary personnel attending assisted deliveries), the team members (the Unit A Manager, the QI consultant, one nurse from Unit A, and one HCP from Unit C), and the measurement tool. The Unit Manager
and the QI consultant are referred as team members with a managerial role (as mentioned in the chapter 3).

**Application of the PDSA Cycles**

The following changes were tested using the PDSA Cycles approach. The first PDSA Cycle was defining the risk levels and roles of HCPs involved in the intervention. The PDSA Cycle 2 test was trialling an administrative clerk to call in advance the HCPs involved in the intervention. Standardizing material in the rooms was tested in the PDSA Cycle 3. Laboratory and physician communication boards were trialled in the PDSA 4 and 5, while the last PDSA tested in the Unit A was a trial of a communication tool during an intervention. Figure 4.1 at the end of this section provides a display of the Model of Improvement application and use of the PDSA Cycles to test for change.

PDSA 1- Define risk levels and role.

To implement the communication tool, some initial steps were planned. The nurse leaders’ first requirements were to establish the different risk levels of each delivery, and to clarify which specialities were needed based on specific risk factors. To establish the risk levels for their patient population, the nurse leaders first reviewed the scientific literature. However, they did not find specific levels of risk in obstetrics, as most of this research is done in Emergency Room (ER) or in Operating Room (OR) units. They subsequently contacted another facility to find out if they worked with specific risk levels and roles based on these, but nothing like this was in place. They therefore decided to base the level of risk on the Neonatal Resuscitation Program (NRP) guidelines, which outline three levels of risk (low, intermediate, high). The next step was to determine each HCP’s role, depending on the risk factors. The nurse leaders emailed the ER and OR units, and met the nurse educators from each of these units, to learn which roles were used for specific risk factors. They received a list of roles from both sites; however, these were very specific roles, which could not be implemented on their unit (due to the setup of the Unit A rooms, and the too-specific nature of the roles). The two nurse leaders decided to adapt the roles to their unit. They first asked the staff in Unit A to determine what the roles could be, using the list given by the OR and ER as a starting point. Following this brainstorming with the Unit A staff, they asked for feedback via email from the Unit C staff and paediatricians, without receiving any response. The nurse leaders labelled the roles on a piece of paper and each HCP
involved during the intervention should wear the role tag. For example, the HCP responsible for recording the minutes should wear the tag written “minute taker” so everyone in the room would know his/her role.

The nurse leaders then presented the proposed levels of risk and associated roles to one paediatrician who asked about the QI project. The paediatrician reviewed the risk levels and suggested some changes to the initial risk assessment guidelines. The nurse leaders in Unit A continued to ask for feedback from Unit C nurses and also asked one of their team members to gather feedback from the Unit C. According to the nurse leaders, the Unit C nurses never provided feedback to them. The nurse leaders decided to approach the Unit C nurses in one of their formal monthly team meetings. The first scheduled meeting was cancelled, and the Unit Manager scheduled a second a few months later. The Unit Manager, the nurse educator from Unit C, the two nurse leaders and one Unit C nurse, attended the second meeting. Following the meeting, the Unit A nurse leaders put all the information about the proposed levels of risk and roles into two binders: one each for Units A and C. All nurses had to sign a form at the end of the binder to acknowledge that they had read the information. The nurse leaders continued to visit Unit C whenever they had time, to talk to the nursing staff and see if they had any questions or comments.

The nurse leaders also planned to inform physicians who were called during assisted deliveries. They wanted to present their project to the Perinatal Committee, which included the physicians coming to an assisted delivery; they were not able to attend the committee meeting, however, as it was restricted to the nurse educator and the group of physicians. The nurse educator presented the QI project on Unit A’s behalf and reported back to the nurse leaders that the Committee was receptive to it. The nurse leaders used other means to inform healthcare providers about their project: they hung posters describing the project in Unit A and in the Unit A and Unit C shared staff bathroom, and role tags were put in all the Unit A rooms.

PDSA 2 – Transfer of staff

The next step to implement the communication tool was to have someone who would be responsible for calling the HCP to inform him or her of an emergency. The nurse leaders believe that the best person would be an administrative staff member. As Unit A did not have administrative staff sitting at the front desk, the nurse leaders asked the Unit Manager to move
the shared administrative clerk who had her desk in Unit C to Unit A. This was done on a trial basis for a few weeks, and then the move was made permanent.

PDSA 3 – Standardize medical surgical supplies

The nurse leaders also decided to standardize the material in each room. Previously, rooms differed in their set-up, and there was no checklist for the items. The Unit A nurses responsible for placing the surgical supplies in the rooms were just putting a “handful of things” (P3), without grouping or organizing them. The nurse leaders drew up a list of all items required in the rooms, with the help of their colleagues. They also talked to the nurse educators from Unit A and Unit C to make sure that the final list was in agreement with all guidelines. When the final list was completed, the nurse leaders informed all Unit A staff of the new list, and during quiet shifts they worked to standardize the material in the rooms. It took three weeks from the time the new list was defined to complete the changes to the surgical supplies inventory.

PDSA 4 – Instruction board for Lab samples and PDSA 5 – Doctor duty roster Board

Two other changes were planned later during the implementation of the project to facilitate communication during an assisted delivery: the addition of an instruction board for sending samples to the laboratory and a doctor duty roster board. The lack of instructions for sending samples to the lab was an issue that the Unit A nurse leaders wanted to correct. Any healthcare provider available to help during an emergency could be asked to send samples to the laboratory. However, not every HCP knew the procedure for sending samples, so many of them came back to the room to ask for help. Following the addition of the instruction board, the nurses noticed they were rarely disturbed by questions concerning the laboratory, and they received some positive verbal feedback. They decided that no changes to the communication board were necessary. The doctor duty roster was another communication issue the nurse leaders wanted to change. During emergency situations, staff had been calling paediatricians who were not on duty, because there was no clear sign-off sheet. A board indicating available paediatricians and their phone numbers was made easily accessible.

PDSA 6 – Trialling tool during an intervention

The communication tool that the nurse leaders wanted to implement in the Unit A was tested once. This trial took place almost one year after the nurse leaders started the QI project in the unit. The nurse leader who was there when the first trial was done said that the trial went as
planned: the Unit A staff called the HCP to notify them about a high-risk intervention and they had a clear leader in the room. She explained that she did not see any issues during the trial. This participant said that she had not had the opportunity to seek feedback from the participants who were involved in the intervention, as they all went back to their units.
Figure 4.1. Unit A: Application of the Model for Improvement using the PDSA Cycles to test change
Factors influencing the design and implementation of the QI project in Unit A

This section presents the participants’ perceived factors to implementing the QI projects in Unit A. Findings are presented in a descriptive manner and supplemented by data displays at the end of the chapter.

Intervention characteristics

Relative advantage of tool

“Stakeholder’s perception of the advantage of implementing the intervention versus an alternative solution.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

Several participants believed that the communication tool would benefit the carrying out of a medical intervention. They agreed that the communication tool would permit having fewer unnecessary HCPs in the room during the intervention, leading to less distress for the patient and their families. One participant mentioned the safety issue of having too many HCPs in a small room while another participant talked about the negative patient experience when having too many unnecessary HCPs during the intervention: “This poor [patient] (...) looking at that crowd scene who has arrived (...). How does she feel?” (P2).

One participant noted that the QI project would also allow the unnecessary HCPs to stay on their unit so it “should not draw them away from their patients” (P4).

Another goal of the QI project mentioned by another participant was to define the HCP roles during an intervention to prevent “disrespectful” (P2) situations arising between the Unit A and C nurses. One participant claimed that having a leader assign when different HCP would come during an intervention would help clarifying each person’s role.

…What role was everybody supposed to be doing and what did they want to do. And then there were times when, some people would come in, and just take over a role that somebody was already doing even though they were doing it effectively. (P3)

Not all participants believed that the project would bring advantages, nor would it meet the needs of the different players. The statements from another participant suggested that the Unit C stakeholders did not perceive any problem when they were coming to help with an intervention. According to this participant, in the Unit C nurses’ views, the roles were already clear before the QI project: the nurses in Unit A were responsible for caring for the mother, while the Unit C
nurses’ responsibility was taking care of the new-born. This was also supported by the comments from another participant who explained that the Unit C nurses “feel that [the patient] is theirs” (P2) and there’s a “possession of the work” (P2) from Unit C to take care of these patients.

One participant also added that Unit C nurses told her that the QI project was not well applied during the first trials of the communication tool. A Unit C nurse told this participant that she did not understand why she was called for an intervention at a low risk level, while at the same time there was a higher risk intervention that was taking place, but none of the Unit C nurses were called.

**Complexity**

“Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

Two participants mentioned that the QI project would lead to the change in practices. One nurse leader explained that Unit C nurses were accustomed to coming in for an assisted delivery intervention and taking care of the new-borns:

They [Unit C nurses] just kind of came in and, usually the [Unit C] staff would take the newborn so they would do that, and then we [Unit A nurses] would just do the mother. (P3).

One of the team members with managerial responsibility acknowledged that the Unit C nurses were specialized in care of newborn, but claimed that the nurses in Unit A could also provide good care to these patients. The two other team members also supported the idea that the Unit C nurses specialized in the care of a particular type of patient. According to them, the QI project was “…not just changing procedures, it’s changing cultural norms, and that’s hard to do” (P2).

According to one participant, implementing a change that only involved Unit A staff was less complex because “…it was easy to do with our staff first because we see them every morning or night” (P3). Meanwhile, the two nurses shared their perceptions on the difficulties with the QI project when it involved other units: “…to get all the different areas: respiratory, shift coordinators, everybody to set up scheduled meetings.” (P4), “…it’s difficult to go and find
them in the hospital” (P4), and “...tracking down people was probably the hardest barrier.” (P3).

**Design quality and packaging**

“Perceived excellence in how the intervention is bundled, presented, and assembled.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

One team member identified the binders that were provided by the nurse leaders to the Unit C nurses as a useful tool because they gave information on the risk levels and the roles developed in the QI project. One of the nurse leaders expressed mixed feeling about whether the binder was used or not: “[I] hoped that people browse through when they have a couple of minutes” (P4). Another participant remarked that the marketing with a poster in Unit A and in the shared bathroom of Unit A and C was a “brilliant idea” (P2). One participant stated that the posters helped catch the attention of the physicians and thus they were asking questions about the QI project and “that was basically how the teaching went for the physicians” (P3).

**Inner setting**

**Structural characteristics**

“The social architecture, age, maturity, and size of an organization.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

One of the nurse leader believed that working the opposite shift from the other nurse leader was “convenient” (P3). The participant explained that, for her, being on different shift rotations facilitated reaching more HCP. It was usually during the shift changes that the nurse leaders said they were going to meet with the other units. One participant noted that it was sometimes difficult to do this during shift changes because “there would be [specific interventions] happening or emergencies” and also that when “shift change would come, then those staff would leave. Nobody’s willing to stay” (P4).

One of the participants with a managerial role mentioned the challenges for HCPs to implement QI projects because of work scheduling in the healthcare field. This participant revealed that she was surprised that some of the HCPs working in the same units were sometimes not seeing some colleagues for weeks because of shift structure. She mentioned that it was also difficult for her to meet with the nurse leaders because she would not know when the nurse leaders were working.
Networks and communication

“The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

Two participants attributed the communication and team nature of Unit A nurses as factors that helped implement some of the changes in the unit. One of them suggested this was because the group of nurses in Unit A had been working together for a long time. According to the other participant: “[we] get everybody’s input on where they want it, where they thought things would work best and define it.” (P4).

The same participant commented on the communication among the previous Unit C nurses who were replaced by the newcomers:

A lot of older more experienced nurses retired [in Unit C], who we’ve worked with for years. We’ve never had this problem, it flowed beautifully. And now (…) there’s no communication. (P4)

Another participant also noted that the previous teams working in Unit C were “working together a long time” (P2) and that those Unit C nurses “really respected these guys [Unit A nurses]” (P2).

One participant explained that a committee was put in place to solve communication problems between the two areas; Unit A and Unit C were both under the authority the same unit manager. Monthly meetings took place over a one-year period until the committee was dissolved, for reasons unknown to this participant. One of the participants with a leadership role in the hospital acknowledged that there is a communication issue between the two units, and they’ve “had conversation back in the past which cast kind of a punitive spin to it” (P2).

When talking about how the different team members communicated with the involved stakeholders after an intervention, one participant explained that communication was not happening because “people go back to their area”(P3). The participant mentioned that it was particularly stressful for Unit A nurses and that even when an event had “poor outcomes...there’s no debriefing meeting like even between the doctors” (P3). She continued her reflection on the poor communication and stated that all stakeholders should “get [together] and talk about it” (P3).
Culture

“Norms, values, and basic assumptions of a given organization.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

Several participants believed that one of the barriers to implementing the QI project was the different norms, values and beliefs among the different professionals involved in the QI project. According to one participant, Unit C nurses had “different personalities”, “different education”, and “different ideas” (P3) than the Unit A nurses had. Another described the new staff in Unit C as “young staff, lots of adrenaline, and insecurities” (P4). One of the team members with managerial responsibilities also acknowledged the difference between the nurses in the two units, and described the Unit A nurses as “more mature” (P2) and “not thrill seekers” (P2), and those working in the Unit C as “very proud of working” (P2) in their unit and “adrenaline junkies” (P2). This participant noted that the nurses in Unit C had an “I can do this better than anybody” (P2) attitude and were excited when a code was called which, in this participant’s view, was the “wrong attitude” (P2). She claimed that this is an ongoing problem in Unit C which she described as “a cultural problem” (P2), and that they have been trying to work it out.

The same participant continued to explain that other HCP also have different views on the nurses working in Unit A or C. According to her, there’s a strong attachment between the specialized physicians and the Unit C nurses as these doctors’ “heart is definitively [in Unit C], their bread and butter is definitively [Unit C]” (P2). In this participant’s view, it was because the physicians “live in” Unit C and therefore, the Unit C nurses “have rights and privileges” (P2). The participant with managerial responsibilities went on to say that the Unit A nurses do not receive encouragement from these physicians unlike the Unit C nurses. The participant said she would like to have them provide more positive feedback to Unit A and be “a little more supportive” (P2), but continued her reflection: “…they [Unit A nurses] don’t need the same reinforcement, and they [Unit A nurses] don’t need the same feedback as this group [Unit C]” (P2), because, as the participant explained, the Unit A nurses are “hardwired” (P2). The participant recognized that implementing the QI project implied changing behaviour, but was “very optimistic” and claimed that Unit C nurses are “very well educated … they are more adaptable to that kind of change” (P2).
**Tension for change**

“The degree to which stakeholders perceive the current situation as intolerable or needing change.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

According to one participant, the lack of communication between the nurses working in Unit A and C created a lot of tension for the Unit A nurses during an intervention: “I’m sure they don’t realize the stress that we [Unit A nurses] go through” (P3). The participant hypothesized that Unit C nurses might also be stressed when coming to Unit A for an intervention because they were not in their “comfort zone to do emergency stuff” (P3). However, the participant believed that Unit C staff did not see any issue when they were attending assisted deliveries.

One participant stressed the importance of changing the situation of the Unit C nurses when they were coming for an intervention because the problem would “just going to keep compounding if we don’t solve it” (P4). Another participant recognized that “it was more of a professional disrespect” (P2) when Unit C nurses came to help in an intervention, and “this is an ongoing situation”(P2).

The nurse leaders and the other team members reported that too many unnecessary professionals attending an intervention could create a lot of distress for the families. Although one of the team members with managerial responsibilities noted that this was not an important safety issue, she recognized that there was potential to harm patients because there were too many HCPs.

**Compatibility**

“The degree of tangible fit between meaning and values attached to the intervention by involved individuals, how those align with individuals’ own norms, values, and perceived risks and needs, and how the intervention fits with existing workflows and systems.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

The values attached to the QI project taking place in Unit A did not seem to be compatible with the values and beliefs of the Unit C nurses. According to two participants, the nurses working in Unit A had the skills to perform specific manipulations of the patients: “we [Unit A nurses] quite often take care of the newborn without them [Unit C nurses] being involved.” (P3)
Statements from a participant about the beliefs of the Unit C nurses seemed to go in the opposite direction, as the nurses in Unit C believed that to “get the good baseline for the level of care required in Unit C” (P2) newborns should be taken care by them. According to another participant, the Unit C nurses believed that they were responsible for taking care of the newborn and this is part of their job description, and not Unit A’s responsibility. Although she did recognize that taking care of the patients was part of the Unit C nurse’s job description, this participant added that the nurses in Unit C should “look at the job description of the people who work beside [them]. We [HCP] all have a responsibility. This is a shared responsibility.” (P2)

Relative priority
“Individuals’ shared perception of the importance of the implementation within the organization.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

There seems to be disagreement between the statements of two participants concerning how the Unit C nurses perceived the relative priority of implementing the QI project. According to one of them, the sense of urgency to implement the project was not felt by the Unit C nurses; the QI project was “a low priority” (P4) for this particular group:

They had their agenda, list of priorities, and other things on their agenda that they wanted to address (…). Their staff meetings are only so long (…) people write down what they want to discuss and they take so many to each staff meeting. (P4)

This participant also explained that the Unit C nurses were busy and it was hard to meet with them because they have “their own accreditation and education unit” (P4). According to the same participant, Unit C nurses were very busy as “there are so many quality projects going on” (P4). According to one of the team member with managerial responsibilities, the Unit C nurses shared the perception of the importance of implementing the QI project: “I think they [Unit C nurses] see it as a very big priority.”(P2). Concerning the other HCP who came during an intervention, one participant believed that it was not a priority for her because “they’re just
supposed to come for an emergency (...) they’re leaving patients, they’re leaving their staff” (P4).

Organisational incentives and rewards

“Extrinsic incentives such as goal-sharing awards, performance reviews, promotions, and raises in salary and less tangible incentives such as increased stature or respect.”
(Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

Only one participant noted that the lack of extrinsic incentives was a barrier to implement the QI project within Unit A. The participant explained the HCPs were not attending their educational sessions because they did not get paid to go. She compared it to other programs in which HCPs received compensation incentives to take the training: “they get more people on the education days of course because it’s a paid thing” (P3).

Goals and feedback

“The degree to which goals are clearly communicated, acted upon, and fed back to staff and alignment of that feedback with goals.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

There are discrepancies between the statements of two participants about how the goals of the QI project were communicated to the stakeholders. For one of these, there was a lack of communication of the QI project goals; she explained that “as grown up adults” (P5) the nurses working in Unit C wanted to know the objectives. This participant also added that in Unit C, the difference between a colour code and the QI project alert was not well defined. According to the other participant, the goals were clearly expressed and the nurse leaders had “been very specific” (P3) about differences between the colour code and the QI project.

Leadership engagement

“Commitment, involvement, and accountability of leaders and managers with the implementation.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

One participant affirmed that all the QI consultants, who were assigned to a team within the Leadership Program, were asked by the manager of QI to be “hands off” (P1). This echoed comments from the other participant who had managerial responsibilities and who explained that her role in implementing the QI project was to “basically approve it” (P2) and that
managerial responsibilities in the project were “very limited” (P2). This participant said that if the nurse leaders did not ask for meetings and for help, she would not schedule formal meetings with them because she believed that it was “not my project” (P2). This participant with managerial responsibilities said later in the interview that she empowered the nurse leaders to implement their QI project and encouraged them to “meet with the different staffs to talk about it [QI project], and to get their posters out to get their, their algorithms up.” (P2). She added that “broadcasting it far and wide” (P2) with posters and discussing with other HCP were good.

This participant who has managerial responsibilities added that the nurse leaders did not ask specifically for her help to involve the other HCP in their project, with the exception of organizing a meeting with Unit C nurses and the nurse leaders to explain the QI project. The nurse leaders hoped that having this participant organizing this meeting with these stakeholders would help to project to move along. Statements from three participants showed how they differed in their perceptions of how the scheduled meeting to discuss the project went among Unit C and nurse leaders. On one side, two participants were frustrated that only one nurse from Unit C attended this meeting. According to one team member with managerial responsibilities, the scheduled meeting went well:

> It was a pretty good turnout and really, there wasn’t much feedback at all in there. There was nothing, nothing negative came of it. I was there very, being very vigilant; because I want to make sure they understood exactly what they were talking about. (P2)

This participant with managerial responsibilities shared that if there were any issues between the nurses from the two units, she would first try to manage this “on an individual basis” (P2), and if there was “a more serious outcome” (P2), she would go to a high-level decision committee to examine the issue. This participant went on to explain that she’s been supporting the nurse leaders in Unit A because she did not want “…any road blocks to them [nurse leaders Unit A] as they were starting to get this out” (P2).

One nurse leader acknowledged that the one team member with managerial responsibilities had been keen to help her in their project “all the ideas that we took to [P2] she implemented” (P3) and provided one example where the Unit A nurse leaders asked to transfer an administrative clerk to their unit.
The other team member with managerial responsibilities shared that because of the instructions coming from the leaders who developed the Leadership Program she was not “super involved in the project at the beginning” (P1). This participant believed she did not need to support the nurse leaders in the measurement piece because she was supposed to be hands off of the project “I didn’t really feel like I needed to or was supposed to direct them in any ways” (P1). She also added that one other reason why she was not involved as much was because the professionals who were implementing the QI project were “not coming to me” (P1). According to this participant, the other team member with managerial responsibilities did not have “any hands on, involvement” (P1) in the QI project. She went on to say that she did not have any communication with this team member after the first meeting that was scheduled at the early phase of the design of the QI project.

This participant said that after realizing that the nurse leaders in Unit A were not moving forward quickly enough in their QI project, she became more pro-active in her follow-up with them; she added that after being more involved in the implementation of the QI project, it helped her to know more about where the nurses leader were at in terms of timelines:

Go down there and ask them how they’re doing and ask them questions, and keep poking them a little bit (...) I try to give them, push them for a deadline (P1)

Available resources

“The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

For one of the participants, a facilitator for the implementation of the QI project was the staff transfer from Unit C to Unit A. Different participant perspectives were noted concerning the impact of transferring support staff from Unit C to Unit A. According to one participant, there shouldn’t have been any negative impact of the departure of the Unit C support staff because the tasks performed by that person in Unit A “…weren’t necessarily tasks that should have been hers anyway” (P3). For the participant who was transferred from Unit C to Unit A, she believed she had to “switch” (P6) her tasks because before her transfer she mostly helped Unit C whereas after her transfer, she provided more support to Unit A.
Individual characteristics

Knowledge and degree of belief

“Individuals’ attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

One participant who has a managerial role was optimistic that the QI project would be implemented in Unit A. For this participant, the QI project will be implemented in the unit by “it will insert itself” (P2) in the unit.

Process of implementation

Planning

“The degree to which a scheme or method of behaviour and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

According to two participants, finding literature on implementing risk levels and defining roles in a unit of the same type as Unit B was difficult. They agreed that there was not a lot of relevant literature. For one of them, the research part was “time consuming” (P3), especially because both of the nurse leaders were working full time. This participant claimed that she was not competent to do research and that she did not know that she would be held responsible to “do all the research part” (P3).

Engagement

“Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

Most participants perceived the failure of the process to engage the different stakeholders, especially the Unit C nurses, to be one of the most important barriers to implementing the QI project. “We tried to get feedback from the [Unit C] mostly because they’re the one that are involved, and nobody really gave us feedback.” (P3) “Our first scheduled meeting with the [Unit C nurses] was delayed by two and a half months” (P4) because they did not feel it to be a priority.
One participant shared her frustration when she tried to communicate by email with various HCP. The participant mentioned always waiting for the professional to provide feedback and “hoping they get back to you, and they don’t, and emailing again” (P3). According to another participant, she assumed that the other team members were “going to talk to them, and get some of those to recruit them to be part of their team” (P1) but in her view, this did not happen. For this team member (with managerial responsibilities), the engagement with other HCP did not go as planned because the nurse leaders did not put in the time to engage with the stakeholders “they don’t recognize the importance of spending that time. To them it’s not important” (P1). This participant hypothesized that the nurse leaders were uncomfortable engaging with the stakeholders.

One of the team member reported that the nurse leaders came to her asking if the Unit C nurses had any feedback concerning the QI project, but she claimed that none of the Unit C nurses had mentioned anything to her. According to this participant, she was asked to seek feedback from these HCP, but she explained that there was not a lot of reaction to the project and she believed that the Unit C nurses did not feel committed to the project.

One nurse leader also shared her irritation of not being able to present to the Perinatal Committee group, which includes physicians attending assisted deliveries. Only certain clinicians are able to attend those monthly meetings, and therefore another team member went to present the QI project to this committee. This participant believed she could have provided more information to them than what her team member presented.

**Execution**

“Carrying out or accomplishing the implementation according to plan.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

According to one of the participants (with managerial responsibilities), the QI project was not accomplished as planned because the nurse leaders were not putting in the allocated time to execute it:

One of the big issue is, they’ve been given time to participate in this program. But they didn’t really do it. So they didn’t really take the time that was given to them to specifically work on this project. (P1)
Reflecting and evaluating

“Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

One barrier that a participant with managerial responsibilities mentioned concerning the evaluation of the project was that the nurse leaders responsible for the QI project were not interested in doing this part of the QI project, since “they don’t like it and they don’t want to deal with it” (P1), and therefore “it’s often the piece that comes to the [other team member involved in the QI project].” (P1) The participant went on to explain that for some of those involved in the Leadership Program, the measurement component was considered “not important” (P1) so they did not recognize the value of spending time to do it. This participant hypothesized that it was also “totally overwhelming” (P1). This participant noted another barrier in the measurement piece: she believes that the majority of the participants who completed the surveys were from Unit A, while the other HCPs impacted by the QI project were not filling it out.

Some of the changes that took place on the Unit A were easily measured according to one of the participants. This participant said that testing small changes such as the laboratory or the physician’s boards did not necessitate a lot of time to receive feedback from the HCPs using those tools.

Case summary - Unit A

The aims of the Unit A QI project were to reduce the number of unnecessary personal attending an intervention and to increase recognition between health professions. The latter goal which was specifically targeting nurses working in the Unit C was not mentioned in the aims section of the project charter, but was cited by most participants in this study. Little feedback was provided by other units who were involved in the QI project, especially the Unit C staff. Some changes were planned, but most of the changes were developed as the project was being implemented. Changes that involved solely the Unit A staff such as the standardization of medical surgical supplies, the instructions for sending lab samples and the doctor duty roster board were rapidly tested and implemented. The first trial of the communication tool that was developed in the Unit A took nearly one-year after the start of the QI project. Perceived barriers by participants during the design and implementation of the QI project were the difficulty to
involve HCPs coming from other units because of different priorities, work schedules and lack of financial incentives. Most participants spoke about the difficulty to have HCPs filling the surveys after each intervention to measure changes. The lack of involvement from the team members with managerial responsibility also hindered the design and implementation of the QI project.
Table 4.1. Key influential factors identified by the participants in Unit A

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<th>Facilitators</th>
<th>Barriers</th>
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<td><strong>Intervention characteristics</strong></td>
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<td>Relative advantage</td>
<td>- Less unnecessary personnel</td>
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<td>Triability</td>
<td>- More respect from Unit C nurses</td>
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<tr>
<td>Complexity</td>
<td>- No problem seen by Unit C nurses</td>
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<tr>
<td>Design quality and packaging</td>
<td>- QI project not well applied</td>
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<td>barriers</td>
<td>- Difficult to predict when testing could be scheduled</td>
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<td>- Change in practices/cultural norms</td>
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<td>- High turnover of educators and Patient Care Coordinator in Unit C</td>
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Case study 2: Unit B

Context

Unit B operates from Monday to Friday, and hosts 40 to 45 patients. Most of the unit’s patients are short-stay and are waiting to be discharged from the hospital. Since 2012, arrangements have been in place for some patients – between one and six – to stay overnight in the unit. These extended hours run from Monday to Thursday, and overnight patients need to be discharged by 7:30 am, before the regular patient population arrives. If overnight patients are not ready to leave (e.g., when a physician asks that patients not be discharged until they have seen them), the regular day staff needs to take care of them. Unit B can also host in-patients waiting for surgery (and thus not discharged home). This (infrequent) situation occurs when there are no beds available in the surgical units. The pre-surgery population is taken care of by floating nurses who come from the surgical units where the patients will go next.

Ten permanent nurses, a mix of registered nurses, licensed practitioner nurses, and the occasional nursing student comprise the staff of Unit B. The day staff work 8-hour shifts, the first starting at 6 am and the last ending at 9 pm. Night staff is composed of three nurses with 12-hour shifts from 7:30 pm to 7:30 am. Unit B has one Patient Care Coordinator (PCC) who works from 7:30 am to 4:30 pm, five days a week. The PCC is responsible for the organization of the day-to-day flow and activities in the unit, as well as the implementation of new processes, communication of any changes, and liaison with other units. One nurse educator working flexible hours three days per week is shared between Unit B and another unit. The nurse educator’s role is to orient new employees and provide support in terms of the units’ educational needs. A unit manager is responsible for the staff and manages the budget of Unit B. The manager and the PCC are both responsible for bringing in casual staff, if the unit is over capacity, and for calling in floating nurses as needed.

A communication tool named the Kardex is used throughout the hospital, and includes patient information such as administrative data, demographics (patient name, allergies, and details written by the treating team concerning patient health) and details of prescriptions (drug name, dosage, medical indication, details provided by doctors, etc.). The Unit B Kardex only includes the drug orders section, as most of the patient population is staying less than a day.
Nurses are accustomed and strongly encouraged to use verbal communication for exchanging information about those patients staying less than a day in Unit B.

**Quality Improvement project: aims and measures**

Because the Kardex used in Unit B was incomplete, and communication was largely verbal, staff and management raised concerns about missing or forgotten patient information. One adverse event that could have potentially harmed a patient prompted a decision to review and improve practices. The preventable adverse event was due to a communication breakdown regarding the patient’s condition. Information had not been exchanged between a floating nurse and staff working on the unit. The nurse leader consequently decided to work on a communication project, and searched for a standardized tool that could facilitate effective handover communication between shifts.

The next section explains how the nurse leader, with the help of her team, designed and implemented the handover communication tool for the three nurse populations – floating nurses, night staff and day staff – in Unit B.

At the beginning of the project, the nurse leader completed a project charter in which she identified the improvement of handover communication in Unit B as the main objective of the QI project, as well as the team members (the Unit Manager of Unit B, QI consultant, two nurses from Unit B, two nurses working in other units, and all Unit B staff). In this case study, the participants from the team who were interviewed were the Unit B Manager, the QI consultant, one nurse working in Unit B, and the nurse leader. The Unit B Manager and the QI consultant are referred as team members with managerial role. At the beginning of the design of the QI project, the nurse leader met with the Unit B Manager and the QI consultant to explain what she wanted to do. No other formal meetings were scheduled between these three team members.

A survey was also identified in the project charter to assess the change. Statements between two team members differed concerning the use of the survey. According to one team member with managerial responsibility, the nurse leader was conducting a survey with the different nurse population (floating nurses, day and night staff in Unit B). Meanwhile, the nurse leader mentioned that she decided not to conduct survey in her unit, because she believe she already knew what the problem was, and therefore did not need to ask the staff.
To identify a standardized handover communication tool, the Unit B nurse leader reviewed the literature, but she did not find any tools that would correspond to the needs of the unit. The QI consultant was aware that a handover communication tool was being trialled in another facility and arranged contact between the nurse leader and the healthcare provider responsible for the trial. The handover communication tool used by a HCP (who was also interviewed in this case study) was being tested in an emergency unit where staff were giving patient information over the phone to other units. The nurse leader concluded that this handover tool was relevant to Unit B and decided to use it for the floating nurses “So I stopped searching at that point and just moved ahead with the application and introduction of his tool” (P9). She also then recognized that the tool could be applied to other nurse populations for different uses, namely, the night and day nursing staff. Night staff could give patient information to day staff at the beginning of a shift, and day staff could receive patient information over the phone from other units, as well as relay information to the night staff.

Once the nurse leader had selected the handover tool, she introduced the same handover communication form to all three nurse populations at the beginning of the process. By doing this she wanted to “give it the first time, and you let that settle for a while then you continue to support and restate things that will help them [staff] with their practice” (P9).

**Application of the PDSA Cycles**

This section presents how the nurse leader and team members applied the PDSA Cycles and the detailed design and implementation of the handover communication QI project for each nurse population (floating nurses, night and day staff). Figure 4.2 at the end of this section provides a display of the Model of Improvement application and the use of the PDSA Cycles to test for change.

**PDSA 1- Floating nurses**

The project charter identified the floating nurses as the target population for testing the new handover communication tool. This form was made available to the floating nurses in an orientation binder intended to familiarize them with Unit B. The binders were available at the Unit B nursing station. If the nurse leader was available and saw a floating nurse coming to take care of patients, she would take some time to educate her/him about the form. The nurse leader may never have directly approached some floating nurses, as they would arrive when the nurse leader was not available. One team member and the nurse leader both observed that floating
nurses were not using the tool because there were no forms provided for the other (unit) nurses who came to take care of these patients. Realizing that the floating nurses were not systematically using the tool, the nurse leader recognized that they needed more education about its use.

To address this issue and to be able to inform all the floating nurses who came to Unit B about the handover communication form, the nurse leader looked at all the floating nurses who had come to Unit B in the last year. She attempted to get a list of the names of all the floating nurses, with the goal of sending them a group email. During a participant observation that took place in March 2013, the nurse leader asked the QI consultant for help in sending this group email because she was not sure how to do it. The group would restate the goals of using the tool, so the floating nurses would become more familiar with it. When I last met with the nurse leader in April during the last educational session, the group email had still not been sent to the floating nurses.

PDSA 2 - Night staff

Night staff were identified by the nurse leader as another nurse population that could benefit from the new handover communication tool. The form was provided in the Kardex to the night staff at the beginning of the process. As night staff only started shift at 7:30 pm, they did not attend the informal meetings that had been provided to day staff to discuss the tool. After a few months, the team member and nurse leader mentioned that they did not believe night staff were using the tool. To remedy this situation, the nurse leader approached a student nurse working during both day and night shifts in Unit B for help in encouraging use of the tool. In the same week, the team member noticed that this student nurse had filled out the form. It was the first time the team member had noticed a form being completed by night staff. The QI consultant recommended talking to both the personnel who had received the communication tool and the healthcare provider who had completed the form to obtain their feedback.

During a participant observation that took place in this case study, the nurse leader met with the day staff that had received the form. The day staff member reported that she had found it very helpful. The nurse leader then sent a “thank you” email letting the night staff member who had filled in the form know that the receiver found it very useful. The night staff replied by email saying it would be a good idea for the day staff to also fill out the form to give to the night staff. There was no more follow-up to see if the night staff were continuing to complete the
handover communication tool for the day staff. To observe how the morning handover was going, the nurse leader was contemplating changing the current work schedule to observe the handover at 7:30 am, and wanted “…to build some more resources from them, restating statistics, evidence, why they’re using it, why it’s important” (P9).

PDSA 3 AND 4 – Day Staff

The Unit B day staff received the same handover communication tool for two different uses: 1) as a handover report to provide patient information to night staff, and 2) as a handover report to receive patient information over the phone.

PDSA 3- Day staff using communication tool over the phone

The tool for exchanging patient information over the phone chosen by the nurse leader was being trialled in another facility by the HCP participant impacted by the QI project. This participant came to Unit B twice to help the nurse leader introduce the tool to day staff receiving patient information over the phone. The first time the HCP participant impacted by the QI project came to the unit was to review the tool with the nurse leader and a team member, and to provide materials such as little memo cards that could be taped to the phone. The HCP participant also presented the form to day staff that was available during the few hours he was in Unit B. A second meeting was scheduled to reintroduce the tool and answer questions that staff may have had about it. When day shift nurses received patient information from other units, they could use the handover communication tool and refer to memo cards attached to the phone to prompt questions for the individual providing the patient health information. Team members and the nurse leader observed how the day staff used the tool. They both reported that the day staff were using the form. On the other hand, one other study participant mentioned the tool was not being used systematically. As an ongoing process, the nurse leader continued to observe how the day staff used the tool, and the nurse leader and one of the team member wished to continue providing more education about the tool to reinforce its use by the staff over the phone.

The testing phase was still ongoing when the data collection was terminated for this case study. The nurse leader explained that she was going to communicate with the HCP who was trialling the handover form in another facility because she had heard that some changes were being made. The nurse leader claimed that: “so certainly [I] want to speak with [HCP impacted by QI project] about the new edits and if I think it’s a better tool, we’ll, we’ll just carry on” (P9).
PDSA 4 – Day staff to transfer communication tool to night staff

Following the suggestion of the participant working on night shift that day staff could also use the form, one of the team members who was helping the nurse leader for the implementation changed her work schedule to observe handover communication between the day and night shifts. This participant observed that verbal communication was chaotic during the change of shift. The nurse leader and one of the team members planned to make the handover tool available to the day shift to provide patient health information to the night staff. The nurse leader made the handover tool available to the day shift, and conducted an informal educational session, along with team member, to acquaint them with the use of the form.

After the tool had been available to the day staff for a few weeks, the nurse leader and team member agreed that not all day staff were using it, and when the handover form was filled out, it was incomplete. The participant working on night shifts confirmed this information, saying that she had received some incomplete reports. To remedy this situation, the nurse leader said that more training for the day staff would be needed. The nurse leader was contemplating changing the current work schedule to come in at key handover times, at 7:30 am and 7:30 pm. The unit manager was considering making use of the handover form mandatory for the transfer of patient information from day to night staff.
Figure 4.2. Unit B: Application of the Model for Improvement using the PDSA Cycles to test change
Factors influencing the design and implementation of the QI project in unit B

This section presents the participants’ perceived factors to implementing the QI projects in Unit B.

**Intervention characteristics**

**Intervention source**

“*Perception of key stakeholders about whether the intervention is externally or internally developed.*” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

The fact that a nurse from Unit B developed the intervention was a facilitator in a participant’s view:

> I was very willing to do it, and in order to pass it on with purpose, and show them that it wasn’t just, it wasn’t coming from management, it was coming from another nurse who found it really useful. (P12)

**Relative advantage of tool**

“*Stakeholder’s perception of the advantage of implementing the intervention versus an alternative solution.*” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

The new handover communication tool tested in Unit B was not universally seen as having an advantage over existing practices by the stakeholders involved in the project. According to some of the participants, the tool had several advantages for the different nursing staff (day, night, and floating nurses) by clarifying whether to receive or provide patient information to other nurses. According to a participant, the use of the tool to exchange patient information from day to night staff (and the reverse) would be an improvement compared to how the nurses currently exchanged patient information:

> It will take you [day or night staff] five minutes to fill it out, but how long is it going to take you to sit down verbally and go through this whole thing with another person you’re handing over to? It takes longer. So it’s going to save you time in the end. (P8)

According to one participant, not only would it save time when exchanging information, it would also mean “*less of a likelihood of something being missed.*” (P10).
Another participant explained how health information might get missed if the nurses did not complete the tool:

*When you give a verbal report, it’s not a big deal if you’re only giving a verbal report to one person. It’s easy. But then, things get missed if only that one person knows and then all the others who are also working with your patients weren’t given that verbal report, (...) it tends to get quite messy, and things do get missed.* (P12)

During a participant observation meeting, participants discussed the use of the handover communication tool to provide or receive patient information to or from the night staff. One of them did not think completing or receiving the new communication tool was useful: she believed the tool was redundant since all the information could already be found in the Kardex. This participant also commented that she did not understand some of the categories to be filled out on the tool nor why it was useful. Another interviewee acknowledged that the tool is slightly repetitive on patient information, whether used for day or night shifts. This participant hypothesized that that the day nurses were not filling out the handover report because they were “stuck on the fact that there is repetitiveness” (P12).

Statements from two of the participants demonstrated that the handover communication tool for use over the telephone was seen as useful. One believed that it was important to have a standardized tool so that no information would be missed, because the method insures that “...the receiver has had all their questions answered and that [handover communication] tool just prompts what questions to ask” (P9). Another participant claimed to use the handover form to receive patient information over the phone, and in this interviewee’s view, it was better to use the form rather than the sticky notes that could be lost before the patient even arrived on Unit B.

**Trialability**

“The ability to test the intervention on a small scale in the organization (Greenhalgh et al., 2004), and to be able to reverse course (undo implementation) if warranted.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

Most participants believe that having the opportunity to test the handover tool without it being made a requirement was beneficial. According to a participant, the handover communication tool in Unit B was not mandatory and she claimed that the “tool itself might not
be the one that the ward ends up using. So they’re trialing that tool” (P7). Another participant emphasized, “it’s not mandatory, it wasn’t a mandatory tool to be used” (P9) and it was a good thing for the staff so they could “see how it goes. Try it out, fill it out” (P9) without any stress. This view also echoed what another participant explained about the implementation process that took place in Unit B:

I think it’s easier for people to take it when it’s a gradual process; you know, get familiar with it, have a look at it, see how it works for you. I feel like that sometimes it makes a difference and people are more willing, it’s not being dictated to them. (P10)

The tool was also a trial according to a participant, who explained how the nurse leader in Unit B approached her: “She said it would be a good idea to use them for handover to day shift” (P12). However, another participant who has a managerial role had contradictory comments about how the tool should be used in Unit B: “…it is mandatory for handing over anybody from nights to day” (P8). This participant goes on to explain that the use of the communication tool started as voluntary for day staff to give reports to night staff, but the participant was contemplating obliging day nurses to use the tool too: “I haven’t gone to that extent from days to night yet” (P8).

Complexity

“Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

During a participant observation of a meeting of Unit B team members, the members noted that the QI project implementation was complex since it affected non-routine processes in Unit B. The study participants said that day and night staffs were not using the communication tool systematically to either receive or provide patient health information because of this major change in practice:

This is behavioural change. And it’s very difficult to change behaviour (…). The challenge I think is that, this is handover and it’s behaviour, and it could be very hard. (P11);

Once you find kind of a working system even if it’s not a perfect system but it works and it gets your job done and you’ve gotten used to it then you’re going to keep doing that. (P12)
Design quality and packaging

“Perceived excellence in how the intervention is bundled, presented, and assembled.”

(Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

According to one participant who was there when the tool was made known to the Unit B day staff nurses, the introduction was not well presented or accessible to the users.

It [education on tool] was a very sort of haphazard approach. It wasn’t terribly well organized. (...) Certainly wasn’t in the format of you know a staff meeting or something like that. And I know that staff meeting is very, it’s very difficult to get all the nurses to a staff meeting. (P11)

This participant warned that taking this kind of approach can “…often do more damage than good, and it will come back to hurt you in other ways cause you have to work with these people” (P11).

Inner setting

Structural characteristics

“The social architecture, age, maturity, and size of an organization.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

One participant identified the shift overlap period as the “education opportunity” (P9) window that happens every day in Unit B and during which the day shift nurses received some education to understand the tool. Only one participant reported that the many changes happening in the healthcare system was a barrier because HCPs need to constantly acquire new knowledge:

It’s the nature of this kind of area of health, cause there is constantly changes, and updates (...) So it, it’s just the nature of the game. But that would probably [be] the biggest obstacle: “oh, here we go, one more new thing again! (P10)

One participant mentioned the difficulty to do PDSA cycles because of the way the work structure based on shifts of 8-hours or 12-hours in healthcare. This participant mentioned that HCPs working four shifts in a row will less likely come to work to do their QI project, especially because when the nurse leaders were “trialling thing, you can’t necessarily do it in an eight hour” (P7). Another barrier to implement the QI project was due to the difficulty for shift workers to see each others: “it could be five or six days before we’re actually at the
hospital at the same time together” and therefore, it was harder to training sessions. The
overcapacity of the hospital also identified by two participants as a barrier to implement the QI
project within the units: “they were a lot of complications with overcapacity in the hospital and
people just couldn’t, couldn’t get away and couldn’t get backfilled” (P7).

**Tension for change**

“The degree to which stakeholders perceive the current situation as intolerable or needing
change.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

According to two participants, the handover communication at the start of the night shift
required change. One participant described the exchange of patient information from day to
night as “chaotic” (P10), while the other also noted that it was “confusing and time consuming”(P9). A tension for a change was also felt by another participant who was
dissatisfied with the handover communication in the morning and recognized that the tool could
address this problem:

Instead of having 4 nurses coming up to me and asking: “ok, so what’s going on your side?” or “what’s going on, what are you leaving for us?”. It was easy just to refer them to the green sheet, and everything was on there, anything that needed to be done with the patient. (P12)

**Relative priority**

“Individuals’ shared perception of the importance of the implementation within the
organization.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 1)

One of the barriers mentioned by some of the participants was the change undertaken by the
day staff in Unit B in recent years. One team member reported, “…probably the biggest concern
because there has been a lot of change in this facility [Unit B]” (P10). Another participant
acknowledged that the many changes such as adding the extended hours hindered the ability of
the unit to fully implement changes. According to one participant, the day shifts could have
assigned a low priority to exchanging patient information with the night staff

They [days staff] have trouble even getting the orders in, like the orders in the computer, like the really important [duties], [they] don’t even worry about filling the form to the next nurse cause there are all these orders to be put in the computer. (P12)
The different statements from these participants also echoed the reflection by a participant who claimed that a “challenge of doing nursing education period is that, they’re inundated with new stuff all the time, and when everything’s a priority therefore nothing’s a priority.” (P11)

**Goals and feedback**

“The degree to which goals are clearly communicated, acted upon, and fed back to staff and alignment of that feedback with goals.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

One participant confirmed receiving feedback from the nurse leader, after the participant had filled in the form providing patient information to the day staff. According to this participant, the positive feedback received by the day nurse facilitated the introduction of the information exchange tool. The participant noted that she herself did not provide any feedback on how she found the handover communication tool:

Maybe I should be sending an email to our educator saying like: “this is what I found has been working for me”? (P12)

During one participant observation session, one person argued that the form was repetitive because the patient information could be found in the Kardex. The team member responsible to gather the feedback did not appear to accept this criticism on the tool’s pertinence; for this team member the form contained different information.

**Leadership engagement**

“Commitment, involvement, and accountability of leaders and managers with the implementation.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

The two team members with managerial responsibilities mentioned they had a limited role in the design and implementation of the QI project in Unit B. One of the participants said that she was given instructions from senior management stating that she should let the nurse leaders do their own projects. The other team member participant reported that her role in the Leadership Program was to “help identify employees that were interested in the program, and then forward their names through the quality department” (P8).
Available resources

“The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

Two participants believed that they did not have sufficient time for the project, which hindered the implementation of the handover communication tool:

My time has been pressed with other things (...) And, I think we would have wider adoption and be further ahead if I had given the project more time. (P9)

…I had five projects [to support in the Leadership Program] that I was supporting. So there were times when there was a couple of meetings I wasn’t able to attend. (P7)

According to one participant, the day staff also seemed to be overloaded with their usual workload, which was a barrier for them to complete the handover communication form.

Access to knowledge and information

“Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

Having an expert conducting the training of staff for a new intervention can facilitate the implementation process. Two participants said that the expert had been a good resource and an effective advocate promoting the use of the handover tool in Unit B. For another participant, doing a quick training and then assuming that knowledge was transferred is a mistake and said, “[i]t doesn’t happen that way, its pretty old school lazy way to do a thing actually in my view”(P11).

One of the participants explained that not everyone was aware of the communication tool:

Still lots of people who aren’t aware of it even though it is available, there’s lots of forms that are available that people don’t know actually exist, unfortunately. (P7)

Just because the form is there though doesn’t necessarily mean people are automatically using it. (P7)
This was also supported by one of the users who explained that before being engaged by one of the team members, she was not using the tool:

I didn’t even know what it was, like I really didn’t until [team member] came and she pointed it out to me again. I remember seeing it before, I think it was probably, I don’t know how long they’ve been around, but I imagine it would have been my orientation last year. (P12)

This participant also insisted that the training provided to the staff was not enough, as “it doesn’t give us a chance to use it and get comfortable with it” (P12) which led to the form not being completely filled out by the users. One participant explained that when she received the forms, information was missing:

Most of them [handover communication reports] are pretty much the basics, there were the first couple [of questions that] were filled out, but not really the bottom half, which is the bottom half I found the most useful. (P12)

One of the participants who were asked to complete the form to receive patient information over the telephone mentioned she was “quite indifferent about it [handover communication tool]” (P12). The participant claimed that it would “help to have more education around it” in order “to be more familiar with it” (P12).

**Individual characteristics**

**Knowledge and degree of belief**

“Individuals’ attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

Several participants had a high degree of belief in the attractiveness, feasibility and utility of the handover communication tool. During a participant observation session among the team members, all agreed that everyone in the unit would use the tool and a high adoption rate by day staff was predicted.

One interviewee recognized that the handover communication tool, which was also being trialled in another facility, had had some modifications to its original format. This participant
did not know yet what those changes were and she explained that she needed to discuss this with the HCP who was trialling the tool in the other facility.

This participant planned to meet again with the professional:

“It’s nearly a year since I’ve met up with [HCP trialling the form in another facility]. So I will see, and rather than doing any other larger searches, I’m going to go back to him, because he’s already done a preliminary [study] and I want to see what he has gathered since our initial meeting (...) I don’t know what kind of unit it was trialled on and why those edits were driven, so I need to have that conversation with him. (P9)

Process of implementation

Planning

“The degree to which a scheme or method of behaviour and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods.”

(Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

According to one participant, the use of the PDSA methodology to test the handover communication tool was not clear: “I didn’t think that the work that I was doing clearly could be slotted in the PDSA cycles as I was understanding it.” (P9) This participant went on to explain that her plan was to see a “change” (P9) and after finding the tool, she decided to implement it on Unit B and “introduce” (P9) the tool and “watch how the uptake came” (P9).

This participant also recognized that there was a lot of evidence to support the importance of bedside handover communication, but mentioned the difficulty of finding a tool that applied to Unit B’s unique situation.

Engagement

“Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, and other similar activities.” (Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

One participant who was responsible for gathering feedback from users of the new handover communication tool explained that she was not always on the front line to watch how the day nurses used the tool. She noted that “if there’s an opportunity to hear someone give report over the phone, then I’ll stay and watch and I’ll just make that work” (P9). Since she was not always
on the unit floor, she found that having another team member working on the front line with the
day nurses was helpful to engage with the staff to use the handover tool. Another participant
also agreed that working closely with the day shift nurses helped the implementation of the QI
project and positively influenced the day staff to use the tool since the team member “is the one
who’s actually on the front line” (P7). However, to observe the handover from the day to the
night shift, the team members needed to change their work schedule since all of them worked
during the day.

In the case of the nurses working the night shift, one participant explained that she had
changed her schedule to engage a night shift nurse to use the handover communication tool. For
the participant who was approached and who described herself as “very adaptable to change”
(P12), this engagement was a good decision because “she got me to get the ball rolling.” (P12)
Another participant confirmed that having a nurse who embraced change helped promote the
tool to others:

[Unit B has] new grads that are working a fair number of night shifts,
they have just taken it on wholeheartedly and they embraced that as a tool
to handover information. So they’re getting the others on board as well.
(P8)

On the other hand, one of the participants recognized that as a graduate student who recently
started working on the unit, she might not be the right person to influence the implementation
process: “I’m not going to start driving those changes myself.” (P12)

**Execution**

“Carrying out or accomplishing the implementation according to plan.” (Damschroder et al.,
2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)

The execution of the QI project by some of the key professionals implementing it was a
barrier for one of the participants. This participant felt that the execution of the QI project “was
more on the side of the desk kind of work.” (P11)

**Reflecting and evaluating**

“Quantitative and qualitative feedback about the progress and quality of implementation
accompanied with regular personal and team debriefing about progress and experience.”
(Damschroder et al., 2009, Additional File 3: CFIR Constructs with short Definitions, p. 2)
According to one of the participants, the evaluation of the project itself, after implementation of the tool, was a barrier. She reported several reasons why it was difficult to collect data to evaluate and reflect on the project. According to her, as significant changes took place in Unit B, she justified not doing the survey as initially planned in the project charter because she did not want to bother the staff with data collection.

This participant also claimed that she was not always with the day nurses to be able to get their feedback. She recognized being distracted with other projects and she was not always available to observe the day staff when they were receiving patient information over the telephone. This participant also mentioned that she did not want “to data click the [Unit B day] staff to death” (P9) because of all the changes that occurred in Unit B.

Collecting data from the floating nurses was also one of the barriers mentioned. A participant explained that the only way to find all the floating nurses that came to Unit B was to “go back and try to pull those stats to figure out how often that might have occurred” (P9).

In another participant’s view, collecting information to move a project along can be a challenge because it takes a lot of time:

It’s really ethnographic research (…) It’s really living in the, it’s observing the lived experience of your participants, and you draw from them where the expertise is, so it’s incredibly labour intensive. (P11)

**Case summary - Unit B**

This QI project was triggered by an incident with potential threat to patient safety, due to lack of transmission of information between staff of various units. The initial goal of the QI project in the Unit B was to improve patient information handover communication between day care nurses working in unit B and floating nurses from other units. Nurse leader found it difficult to find an appropriate communication tool and the content of existing communication tools was not considered. When the communication tool was selected, other goals were added to the QI project to implement with other nurse populations. No changes were planned at the beginning of the QI project. The tool was implemented in the unit and education to the day staff was done by the nurse leader and one team member during shift changes. No specific training was done for the floating nurse while one night staff was approached by one participant to test the tool. Random observations at nurse leaders convenience were the only measures that the
team reported, to know if the introduction of the handover communication form was going to be an improvement. All other data collection that was initially planned was not implemented. Factors such as the difficulty to select a tool to improve handover communication, the time to train staff, the various concurrent changes that took place in this unit, the lack of time for participants to familiarise with the tool, and having other units impacted by the QI project were perceived as barriers to the design and implementation of the QI project.

Table 4.2. Key influential factors identified by the participants in Unit B

<table>
<thead>
<tr>
<th>Intervention characteristics</th>
<th>Facilitators</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention source</td>
<td>- Developed by front line nurses, not by management</td>
<td>- Redundancy of information between Kardex and tool</td>
</tr>
<tr>
<td>Relative advantage</td>
<td>- Saves time</td>
<td>- Small scale testing takes more time</td>
</tr>
<tr>
<td>Adaptable</td>
<td>- Less likelihood of missing patient information</td>
<td>- Change in practice</td>
</tr>
<tr>
<td>Triability</td>
<td>- Standardized communication tool</td>
<td>- Involves other units</td>
</tr>
<tr>
<td>Complexity</td>
<td>- Reverse if not good for the Unit</td>
<td>- High turnover in night staff</td>
</tr>
<tr>
<td>- No stress to trial it</td>
<td>- Part of the orientation of new staff</td>
<td>- Lack of formal education sessions</td>
</tr>
<tr>
<td>Design quality and</td>
<td>- Save time</td>
<td>- Small scale testing takes more time</td>
</tr>
<tr>
<td>Implementation climate</td>
<td>- Less likelihood of missing patient information</td>
<td>- Change in practice</td>
</tr>
<tr>
<td>Structural Characteristics</td>
<td>- Saves time</td>
<td>- Involves other units</td>
</tr>
<tr>
<td>Networks &amp; Communications</td>
<td>- Standardized communication tool</td>
<td>- Lack of time for participants to familiarise with the tool</td>
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<tr>
<td>Tension for change</td>
<td>- Reverse if not good for the Unit</td>
<td>- Having other units impacted by the QI project</td>
</tr>
<tr>
<td>Relative Priority</td>
<td>- No stress to trial it</td>
<td>- Having other units impacted by the QI project</td>
</tr>
<tr>
<td>Goals and Feedbacks</td>
<td>- Part of the orientation of new staff</td>
<td>- Lack of time for participants to familiarise with the tool</td>
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<td>Leadership</td>
<td>- Manager available</td>
<td>- High turnover in night staff</td>
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<td>Engagement</td>
<td>- Expert providing education on tool</td>
<td>- Lack of formal education sessions</td>
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<td>- Informal meetings</td>
<td>- Lack of research studies to support change</td>
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<tr>
<td>Access to Knowledge and</td>
<td>- Fomal meetings</td>
<td>- Not always on the front line to engage nurses</td>
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<tr>
<td>Information</td>
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<td>- Not always on the front line to engage nurses</td>
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<tr>
<td>Characteristics of</td>
<td></td>
<td>- Newcomer won't make everyone use the new tool</td>
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<tr>
<td>individuals</td>
<td></td>
<td>- Project was executed 'on the side of the desk'</td>
</tr>
<tr>
<td>Knowledge and Belief</td>
<td>- High degree of belief in QI project tool</td>
<td>- Lack of time and being on the front line to get nurse feedback on tool</td>
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<tr>
<td>Self Efficacy</td>
<td>- High degree of self-efficacy of team members</td>
<td>- Need to extract floating nurses from chart</td>
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<td>Other characteristics</td>
<td>- NL independancy and moving alone on her own</td>
<td>- Collecting feedback is doing ethnographic research</td>
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<td>Planning</td>
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<tr>
<td>Reflecting and Evaluating</td>
<td>- Lack of time and being on the front line to get nurse feedback on tool</td>
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Common themes across Unit A and Unit B

The previous section of this chapter presented the data collected from the participants during the interviews, participant observations, and source documents. It shows how the team members designed and implemented the QI projects, applied the PDSA Cycles, and documented the influential factors discussed by the participants by using quotes for illustration and validation. This section presents the common themes that emerged from the data of the two cases. Three themes emerged from the data analysis gathered through the interviews, participant observations and sources documents. The first theme is the disparity between the plan of the QI project and its execution. The second theme is the lack of engagement from the stakeholders in the QI projects. And, finally, the last theme is the difficulty of the test for change and evaluation using the PDSA Cycles.

Disparity between the plan and the execution of QI projects

The review of source documents and the interviews and participant observations process showed that the planning and the execution phases differed in terms of the aims, the measures and the testing of change. The project charter was the tool the nurse leaders used to define and achieve the QI project’s aim. Aims discussed in the interviews were not mentioned in the project charter, the data to evaluate the changes written in project charters were not collected, and testing of changes did not seem to be adequately planned. Also the difference in aims and measurements as described by different team members is noticeable.

Through the Leadership Program, the nurse leader participants were given the opportunity to work on a change, based on an idea of what they would like to improve in their unit. Source documents reveal that the aim of the QI project in Unit A was to reduce the number of unnecessary personnel present during an intervention (an organisational efficiency need), and in Unit B the goal was to improve handover communication among floating nurses (based on an adverse event indicating a potential safety issue). The interviews and participant observation process reveal that other objectives were added to the QI projects. The figures 4.1 and 4.2 showed in the “What are we trying to accomplish” question, other aims were added to the both QI projects.

Discrepancies existed in both cases between what the nurse leaders planned to measure in the project charter and what they actually did. The nurse leaders did not seem to understand the definition of the different types of measurement that were written in the project charter. For
example, one written statement in the project charter identified “patient care improvement” as
an outcome measure; this is clearly more a goal than a measurement. One should question how
patient care improvement could have been measured. Project charters also revealed that some of
the measures identified by nurse leaders were difficult to undertake in a clinical setting; many
different surveys were supposed to be conducted with various types of stakeholders. The review
of the surveys that were actually conducted shows that the questionnaires given to stakeholders
were long, and some questions lacked obvious relevance.

The Unit Managers and the QI consultants did not seem to know how the QI projects were
rolling out, and the current status of the measurements. For one unit manager, the different
stakeholders were providing feedback to the nurse leaders, and this participant added that
everyone was engaged. However, nurse leaders and other participants were mentioning that
some of the stakeholders were not engaging in the process and did not want to provide any
feedback to them. While in the second case, the unit manager and QI consultant believed that
surveys were being conducted to test change, but no survey was carried out during the whole
time of the project.

Most of the ideas of changes described in the project charter were not tested in the units
while other changes not stated in the charter were added later in the implementation process. In
both of the cases, when the nurse leaders wrote their project charter, they did not identify the
communication tool that they wanted to trial in their unit. Without a specific tool to test, it was
difficult for them to know what change they wanted to trial. One of the barriers identified by the
nurse leader participants was the challenge of the evidence-based research to select a tool that
would improve the communication in the units. The research literature suggests that external
input regarding knowledge of scientific literature is sometimes required (Liu et al., 2009). The
participants complained that it was time-consuming to do the research on finding a tool that
would be appropriate for their unit. One participant also felt she did not have the skills to do this
task. These findings are consistent with Bonner & Sando (2008) findings that show that nurses
identify several barriers to undertaking research, such as lack of time, skills and resources. In
both cases, the nurse leaders were unable to find a communication tool when searching the
published literature.
Lack of Engagement from stakeholders

Findings suggest that the nurse leaders had difficulty engaging with potential team members who were identified in the project charter. Source documents show that the nurse leaders selected one HCP to be part of the team and to represent the group of stakeholders involved in designing and/or implementing. Study findings reveal that some key stakeholders identified as team members in the project charters were not engaged. A majority of these unrepresented team members were professionals working outside the unit where the project was taking place, but who were impacted by the project. Having no representation of these stakeholders on their team made it more difficult for the nurse leaders to engage the stakeholders from these groups.

Most of the participants in this study said that engaging stakeholders in the design and implementation of the QI projects was difficult to achieve. Participants expressed their frustration about their capacity to engage with the key stakeholders of their projects. The participants shared several reasons, mainly at the inner setting level, for the difficulty of engagement: not seeing them often, not knowing who to talk to, not being able to attend physician group committee meeting to present the QI project, the need to change their schedule to meet with specific stakeholders, and finally, the lack of interest of some of the stakeholders. For example, the nurse leaders said they did not know whom the manager of the stakeholder was, and this stakeholder was therefore engaged only at the end of the process. Only a month later, when the QI consultant realized that this stakeholder was not engaged, did the consultant find out how to contact this professional. Some of the identified stakeholders were contacted by nurse leaders to be part of the team, but did not participate due to lack of interest. For another nurse leader, she mentioned that the only way to track the HCP coming to her unit was to look at past working rotations. The relatively low priority of the QI project and proposed tools were seen by most of the participants as barriers to implementing the QI projects, due to the lack of interest of HCPs impacted by the QI project, and the many other recent unrelated changes happening in the units. The complexity of working with other units was mentioned by most of the participants in this case study and was probably the biggest barrier felt by them.

Meanwhile, engaging HCPs within their units, as opposed to across units, seems to have been easier to achieve. The participants mentioned several facilitators to engage stakeholders within the units. The tension for change felt by the HCPs working on the unit was the most important. The tool responded to a need identified by some of the stakeholders working in the same units
where the QI took place. Having a close relationship between the stakeholders and the nurse leaders also seems to have facilitated the engagement process. Also, when the HCPs impacted by the QI project worked in the units where the QI project was taking place, they were engaged earlier in the process, promoting success. The literature suggests that engaging stakeholders at the beginning of the process helps to ensure that the root cause of a problem is found, prevents recurrence of a problem, and creates an environment that facilitates empowerment (Dinsmore & Cabanis-Brewin, 2014).

**Difficulty to test for change and evaluation using the PDSA Cycles**

The participants seem to have had difficulty implementing QI project using the PDSA approach. With the exception of the QI consultants, none of the team members who were asked to provide details on design and implementation of QI project using the PDSA methodology were able to speak of the implementation process using the four phases of the cycle. It is noteworthy that none of the nurse leaders had any practical experience using the PDSA approach.

Illustration 4.1 and 4.2 showed that no iterative cycles were carried out, no prediction-based tests of change were done, small and large scale testing took place, and only few qualitative data to assess cycles were reported. Rapid, isolated and less complex small scale testing changes were trialled with the staff working in the same unit. Larger scale tests with various units’ staff and disciplines were trialled; findings suggest that these tested changes were less successful and did not result in an “act”. The difficulty to measure and learn from gains in knowledge is an important theme in this case study. As Langley stresses, not all changes will result in improvements, and therefore supporting change with data is critical (Langley, 2009).

Findings also suggest that the nurse leaders and team members did not ask for feedback following the testing of change. The early adopters who were identified to test the change and help drive the cycle forward need to be provided evidence of progress and feedback. In one of the cases, the first user who tested the communication tool mentioned in the interview that she was never asked to provide any feedback concerning the tool. She added that it may have been helpful to the nurse leader and team member to know what she believed was helpful for her. In this same case, the nurse leader and team member who helped to engage the first user were unable to say whether or not this participant was still using the tool. In the other case, the communication tool was trialled once, and one of the nurse leaders who participated in the trial
believed that it work well. Meanwhile, she did not ask the other stakeholders involved in the test for their feedback. This participant was hoping that the HCPs involved in the trial would continue using the communication tool for future intervention. Meanwhile, the literature supports the idea that stakeholders tend to sustain change when feedback is given regularly to staff, and progress towards goals is made visible (Gordon et al., 2008; Meredith et al., 2006).

Study findings suggest that when small-scale testing took place, the staff felt more inclined to make changes. One participant felt that when she had time to understand the tool and trial it, she was more inclined to use the tool. The literature supports that implementation of the PDSA Cycles is facilitated when staff have time to understand the tool and are engaged on a smaller scale (Vos, Duckers, Wagner, & van Merode, 2010; Wilson, Berwick, & Cleary, 2003). This is one of the reasons why Langley advocates the testing of change on a small scale at the start of the process to reduce risk, and then use subsequent cycles, based on what has been learnt, to scale up the changes (Langley, 2009).
Chapter 5: Discussion

This discussion chapter starts with a summary providing the purpose of the study, a brief review of the methodology, and a synthesis of its findings. The chapter continues with a discussion of the key findings of the study, and concludes on implications for practice and recommendations for further research.

Study Summary

The purpose of this study was to identify factors that influence the design and implementation of a QI project using the Model of Improvement. The case study method was chosen for the research design. The sampling technique was purposeful and critical-case selection was performed. Several techniques were used to collect data: semi-structured interviews, participant observation, and review of source documents. Interviews were recorded and transcribed with the participants’ consent. The Nvivo10 software was used for coding and analysing the transcriptions. Thematic analysis was used to analyse the data.

The study findings show the difficulty of designing and implementing QI projects within the Leadership Program. For the two cases, the QI projects were still being tested in the local units. The nurse leaders had built their teams to help them implement the projects. While designing and implementing the QI projects, the nurse leaders were also receiving educational sessions about QI.

The display of the application of the PDSA cycles based on the key features reveals that no iterative cycles were carried out (only multiple, isolated cycles); some small-scale testing was performed, but no real predictive measurement or data collection was done to support the final action phase.

Three themes emerged from the data analysis: the disparity between the plan to design and implement the QI project and its execution, the lack of engagement by professionals impacted by the QI project, and the difficulty to test for changes using the PDSA Cycles.

Discussion of key findings

Data analysis revealed many factors that facilitated or obstructed the design and implementation of QI initiatives using the Model of Improvement. Not all factors can be
discussed in detail; this chapter weaves the most influential factors framed by the research questions that guided this study, the components of the Model of Improvement identified in the literature review which are fundamental for creating a system of improvement, and the overall influence of the factors mentioned by participants.

It was proposed in the literature review that there are fundamental components of a system of improvement: forming teams, setting aims, establishing measures, selecting changes, testing changes, implementing changes, and spreading changes. In this study, the implementation and spreading change components were not yet accomplished by the participants, since at the time of data collection the participants were still testing the changes in both units.

This section presents the factors that were observed at the implementation of the Leadership Program in the hospital. It discusses the lack of management support for these initiatives. The role of Nurse leaders and key factors influencing the further implementation in the local unit level when applying the QI methodology are then discussed.

**Leadership Program at the institutional level**

The first aim of the Strategic Plan for 2010-2014 of the regional health authority is to promote a leadership environment where employees are encouraged to identify ways to improve patient health outcomes in their work life. The literature recommends that the role of the senior leader and management is to help professionals who come up with new ideas to surmount obstacles, to make things happen and to provide encouragement, and to facilitate and enable the success of the new idea (Richardson & Storr, 2010). The main role of managers is to empower the leaders and teams. When nurses are in a powerless position without access to resources to get the job done, they can feel “stuck” and demotivated. Managers should empower the nurse by providing a work environment with support, resources, and shared information to develop their projects. In this study, the unit managers and the QI consultant team should have created a supportive environment, and empowered nurse leaders to achieve successful implementation. They must create an environment where they support innovations (Walley & Gowland, 2004).

Study findings illustrate that some team members with management responsibilities did not support the nurse leaders during the design and implementation of the QI projects in their unit. Unit managers and QI consultants did not associate themselves with the project, reflecting a lack of clarity of roles. These participants believe that it was the nurse leaders’ responsibility to drive
the QI projects because the nurse leaders chose their improvement project. Where the first educational sessions gathered most of the unit managers and the Health Administrators to support of the program, the last educational session to celebrate the end of the first cohort of nurse leaders only mobilized two unit managers. My observation of meetings also disclosed poor attendance by unit managers at the last educational session celebrating the end of the one-year Leadership Program.

The fundamental question of the model of improvement: (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? and (3) What changes can we make that will result in improvements? are not well addressed. Both these projects demonstrate the importance of a good understanding of the quality issue (if it is a quality issue all together) and the importance of choosing the right intervention, has the potential to resolve the quality issue. The rationale behind the choice of the QI project seems to have been overlooked. The choice of the goals of the QI project in both units was flawed. The Unit A project was clearly prioritizing an organisational culture: a goal to gain respect from other staff which was developed by staff looking for more recognition cannot find solution through a QI initiative, where both professionals have to collaborate; it is more of a managerial issue. The unit B project identified a communication lack in one particular safety situation and assumed that a communication tool would resolve this matter. The nurse leaders focused on finding a tool in literature, without having the necessary background on communication issues. The tool was chosen because it was being tested in another unit and its aim was not taken into account: the tool aimed to improve telephone communication and not handover communication. By superimposing a new tool without taking into account the big picture of all available communication tools, the QI project lacked strategic vision. Understanding the rationale behind a QI project and setting goals is a complex task that QI consultants should be responsible for, and should not be delegated to newly appointed nurse leaders.

The goals added later in the QI projects seem to have created confusion about the “real” aims and the tasks to be accomplished by some team members. Some aims may have not been clearly communicated to all stakeholders, in contrast to what the literature recommends. Project management literature suggests that if planning is inadequate and goals and methods are not clearly communicated, the project will be compromised (Dinsmore & Cabanis-Brewin, 2014).
The literature also states that project leaders should ensure that all set goals could be achieved, to avoid a greater focus on certain goals (Dinsmore & Cabanis-Brewin, 2014). Interviews with the participants suggest that some goals seemed to be more important than others for the team members. In both cases, the team members seemed to engage specific stakeholders to achieve certain goals, while other key stakeholders were not engaged with similar effort or not engaged at all.

Findings suggest that team members in the management group claimed to be available and supportive of the nurse leaders during the implementation of the QI projects, but results also suggest that nurse leaders had some barriers that were not being addressed. In one project, a meeting scheduled by management between the two units who needed to work together to implement the QI project was scheduled only months later. This suggests that bringing the two units together was not really a priority. Research shows that senior management needs to create a sense of urgency about a project (McDonald, Graham, & Grimshaw, 2004); they should establish a strong implementation climate (Helfrich, Weiner, et al., 2007; Klein et al., 2001) and make sure that all stakeholders understand the importance of the project (Leeman et al., 2007). The literature on factors influencing change states that leaders must be committed and involved to enable the success of implementation (Lukas et al., 2007; Meyer & Goes, 1988).

Findings also demonstrate that the team members in the management group were not more involved because nurse leaders were not requesting their help. These participants explained that the nurse leaders were “independent” (P6) and “knew what they [were] doing” (P1), so therefore, these participants with a managerial role did not provide more support. Professional autonomy that provides freedom, independence, and discretion to determine the procedures and plan to carry forward seems to be valued in the Leadership Program. Meanwhile, the lack of managerial support appears to have hindered the implementation of the QI projects, as management believed that the nurse leaders needed to “act” as leaders and use their leadership skills to solve problems. As one of the QI project was not going as planned, one of participant with managerial role’s solution was to give more deadlines to the nurse leaders to move faster in to implement their project. Meanwhile, it seems that this strategy did not work out for the nurse leaders as they were still facing barriers such as lack of involvement from other HCPs to implement their project. The literature says that management control systems can be
demotivating because they can put an additional stress on the individuals doing the tasks, without giving them solutions to overcome barriers (Walley & Gowland, 2004).

Study findings also suggest that unit managers believed that the implementation was moving along and going as planned. But, in reality, the nurse leaders were frustrated that the QI projects were not moving as planned. This reveals a lack of communication or follow-up from management team. In one case, the nurse leader and other team members mentioned that the staff were not using the communication tool consistently, while the unit manager claimed the contrary. In the other case, the unit manager said she did not hear anything wrong coming from the implementation of the QI project taking place in her unit. But other interviewees said that there were issues implementing the QI project. Statements on how to measure change were an example of how opinions of the team members regarding support from management were contradictory. This validates Lloyd’s statement which is that many leaders will assume that someone else is responsible to take care of the measurement “monsters nipping” and that they don’t need to be involved in this journey (Lloyd, 2007, p. 34). However, the literature suggests that this is a mistake because it leads to deviation from the road map; the senior management team should be actively involved in the quality measurement piece and provide strategic direction. While leaders are not involved in the details of the data collection and analysis, they should be providing tools to help those who are involved in those tasks. These two last examples also illustrate some lack of communication between management team members and nurse leaders.

In parallel to the Leadership Program, many other major projects were taking place. It seems that other local projects took priority over the QI projects selected within the Leadership Program. The literature suggests that a high level of priority given to the implementation of an intervention can lead to a more successful implementation (ref). Having other projects rolling out at the same time or other changes that are taking place in the same setting can lead to staff feeling overwhelmed and assigning lower priority to the implementation.

**Leadership program at the unit level**

The expected role of the nurse leader is an important explanatory factor of the various barriers encountered at the local unit level. The front line nurse participants in the Leadership Program
were asked to be leaders and assume the overall responsibility for planning, executing, monitoring, and controlling the project. The literature on project management suggests that a project manager role encompasses many activities, such as defining the scope and aim of the project, building a team, ensuring the allocation of specific resources to adequately use them, managing risks and issues that arise (Dinsmore & Cabanis-Brewin, 2014). The nurses involved in the Leadership Program should have skills such as managing change, transferring knowledge, and leadership to influence others to accomplish goals (Dinsmore & Cabanis-Brewin, 2014). It is noteworthy that none of the nurse leaders who participated in this study had project management experience. The support of management and the QI consultant was really needed to help the nurse leader attain the aim of their project. Meanwhile, as mentioned in the section above, findings in this case study show that the nurse leaders received very little upper management support.

As discussed previously, the role of overseeing the fundamental questions of the Model of improvement, which is a QI related competency, was also very complex for recently appointed nurse leaders, receiving a parallel training in QI, during implementation phase. Findings showed that the participants to the Leadership Program had a different understanding of the nurse leader’s role, and for some of the tasks that they needed to do as leader, they did not think they should do, nor were they qualified to undertake the activity. This was also mentioned by the Manager of QI, who said they would need to be clearer on the roles required because some of the participants of the Leadership Program did not know exactly what they were embarking on. One consequence of not having clarity on the role of nurse leaders was that they did not want to take over some of the responsibility, particularly the measurement aspect that is essential to QI.

The nurse leader was expected to be supported by the rest of her team. Prior discussion has highlighted many factors that hindered the engagement of stakeholders in the process: the difficulty of reaching stakeholders working in other units, poor communication between units, and stakeholders’ lack of interest in the QI project. The literature also shows that the involvement of different disciplines and poor communication between these groups can be a key barrier to implementing change when using the PDSA Cycles to test change (Dubar III et al., 2006). Without the engagement of stakeholders, the iterative approach was not achieved as no feedback was provided to support learning from one cycle to inform the next one. This “learning loop” to build on what was learned from previous cycles was not completed. The data needed to
produce the learning loop that takes place in the Study Phase of the cycle comes mainly from feedback received from stakeholders (the measurement will be discussed further in the next section). The use of the data in a cycle to facilitate learning, which will result in an action (modify/abandon/adopt the change), is a key aspect of the PDSA cycles. The PDSA Cycles proposes a structured problem-solving approach with a participative style (Pescod, 1994) in which stakeholders are engaged early in the process of implementation. In this case study, some key stakeholders were not engaged or did not feel engaged during the implementation process. These findings suggest that the full benefit of the PDSA cycles could not be realized because of the lack of engagement from stakeholders. Lack of financial incentives (time and resources) to the team members who helped the nurse leaders design and implement the QI project was another important factor in this study. The Leadership Program allowed one full day per month to the nurse leaders involved in the program, but the team members were not provided with any additional resources for the tasks that they needed to do in their team member’s role. While nurse leaders were provided with additional time to work on their project, other team members needed to perform project tasks above and beyond their normal duties. This lack of time, space and resources seems to have hindered the implementation of the QI projects. The literature suggests that adequate resources need to be provided for a project to succeed (Denis et al., 2002; Meyers et al., 1999; Perrin et al., 2006; Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008).

Surveys and feedback were sources of data being used to understand if the change was having an impact in the unit. Team members mentioned being frustrated with the measurement aspect of the process which led to two types of behaviours: loss of momentum because collecting information took too long, and lack of interest in measurement because the problem was already “known” to them. In one of the cases, the participants said it took a lot of effort and time to get feedback from stakeholders to learn if they supported the change. In the other case, where different measures on a survey were supposed to be used by the team member, the plan was abandoned as the nurse leader felt she already understood the problem. The literature supports that it is a very common error to develop a QI project under the assumption that there is no need to measure “because we already understand the issue”. Usually, these assumptions have been proven to be wrong where PDSA cycles should have been used to research the topic further (Walley & Gowland, 2004).
The evaluations that took place in the “Study” phase of the PDSA Cycles consisted mostly of feedback and observations; these took a lot of time for the team members to do. The participants lacked time to observe how communication was done, because they either could not observe as they had an active role in the intervention or because they worked on different schedules or in different units. One risk of isolated cycles is that feedback is not given back to the stakeholders engaged in the process. It seems that team members did not understand the “study” phase in which they needed to ask for feedback from users. Participant observation and statements from some of the participants who were HCPs impacted by the QI project show that after a users’ trial, some team members were providing education on the tool rather than trying to get feedback to build knowledge. The literature implies that the purpose of the third phase of a cycle, “Study”, is to build knowledge that is essential for improvement activities (Langley, 2009). All these observations on the difficulties for the nurse leaders to proceed with the PDSA cycles indicates that competencies to enact the various steps of the model of improvement and lack of engagement of other stakeholders represent a major barrier in the QI process of the Leadership program.

Implications for practice

This section provides an opportunity to show how the results of the present study can be applied to practice. This study also gives some insights into how to put QI initiatives into practice. Three suggestions could help alleviate some of the barriers revealed in this study: institutional commitment, adaptation of the Leadership program to nurse leaders’ practical needs, and advocacy for introduction of competency-based QI in nursing curriculums and continuing education.

Institutional commitment

The effort for change to achieve QI is primarily an institutional responsibility: a global vision of a program’s implementation and comprehension of its complexity are imperative. The principles of starting small and testing, as in the PDSA method, can also apply to the leadership initiative at the institutional level. QI support and how to best enhance leadership and QI competencies can be done on a small scale with fewer projects, to be showcased in a second phase.

Another important responsibility of the institution is to create an environment where QI is a crosscutting priority in order to facilitate exchange between units. Existing networks and
communication structures between units and departments should all have QI on their meeting agendas, to permit a fluid exchange on QI projects from top-down and also from local to central. Common exchange spaces for meeting with important stakeholders should therefore be available and conditions for stakeholder’s participation should be available (time and resources). Nurse leaders should not be left on their own to engage all stakeholders, amidst other tasks. Management needs to be committed and to support the QI project by engaging all impacted HCP in the development of the initiatives. Managers should ensure that nurse leaders and team members receive appropriate support and supervision in their new tasks. Also, the cost-effectiveness of QI interventions has not been demonstrated clearly (Schouten et al., 2008); the managerial team has to be aware of the time and resources needed to create change in QI initiatives.

**Transforming the Leadership Program into a Mentorship Program**

The Leadership Program should adapt, following the lessons learnt in the case studies examined in this thesis, to respond to nurse leaders’ needs in partnership with the QI and managerial teams. Any QI initiative based on the Model of Improvement and relying on a Leadership Program should create conditions so that professionals can develop new competencies. A training program that will follow and support all actors in their application of new skills (i.e., leadership, mobilization) will help ensure a smooth implementation, which should start at a small scale to ensure sufficient mentorship. The importance of constructive feedback throughout the activity to rapidly re-adjust efforts cannot be stressed enough. This parallels the steps of the PDSA at the macro level. To maximize the potential contribution of this type of Leadership Program, the roles of the nurse leaders need to be clearly defined, and the nurse leaders also need to have adequate training, time and resources.

The Leadership Program in this study provided knowledge and skills development at the same time that the nurse leaders needed to design and implement their QI project in their units. This may have hindered the ability of nurse leaders to effectively apply the knowledge learned during the educational sessions. Having the design and implementation of the QI project resting almost entirely on the shoulders of the nurse leaders, with little involvement of management and QI consultants, hindered the success of the implementation of the new intervention. A better approach would be a mentorship program where nurse leaders are teamed up with a QI consultant to work together in designing and implementing the QI project.
The three fundamental questions of the Model of Improvement and the PDSA cycles needed to be better understood by the nurse leaders: this is where QI consultants needed to bring their knowledge and support to the front-line nurses. Not only did the nurse leaders start without experience in leadership roles, they also had little or no knowledge of QI. To increase the probability of success of implementation and to give nurse leaders full support during the entire implementation process, fewer QI projects should be developed at the same time.

**Advocacy to include QI competency in HCP curriculum**

QI competency should be integrated in the curriculum of healthcare providers, and particularly nurses, to develop new skills and knowledge. Future HCP should be ready to analyze practice using QI methods, incorporate formative evaluation feedback into daily practice, and locate, appraise, and assimilate evidence from scientific studies. In 2013, Mochan and Nash suggested teaching strategies for HCP to implement QI successfully (Mochan & Nash, 2015). Strategies such as longitudinal mentorships, building a culture of quality and safety transparency, engaging patients and families in treatments, building safety system knowledge, and developing teamwork skills were proposed by these authors. The continuing education network and their licensing bodies should also put QI as a priority theme across the province. Organisations that focus on quality and safety should encourage inquiry and allow nurses ask critical questions (Sherwood, 2013). These organisations should value, recognize and reward workers who are engaged in their work and seek to improve patient-centered care, teamwork and collaboration.

**Limitations of the study**

Previous chapters have referred to some limitations associated with this study. These include the difficulty in generalizing patterns and trends from two case studies to other situations, and the study’s reliance on dense narrative write-ups. However, as noted in Chapter 3, some techniques were used to overcome or at least limit problems related to the data collection and analysis within a case study design, such as the use of a study protocol, the development of the case study database, and thus use of data display.

Another study limitation arose from the fact that the sample was selected purposely rather than randomly. The overarching selection criterion for inclusion in the sample was that the individuals be involved and interested in participating. The case studies were selected based on
the ability and willingness of the different involved participants to provide the richest
description of the design and implementation process of QI projects. The study sample may
have been biased, as those who did not support the QI project did not participate.

I used critical case sampling techniques in this study, which consist of selecting a small
number of important cases that are expected to yield the richest information and have the
greatest impact on the development of knowledge. The case selection was done between the
start and the end of the programs. Some projects might have been more advanced later on, but
these were not selected because they hadn’t completed several tests of change at the time of the
selection.

The semi-structured interviews were time-consuming with respect to data collection and
analysis, and the interview findings are limited to the perspectives of those who participated in
the study. Also, since they were aware that the interview was taped, some interviewees might
not have spoken openly and freely about their perceptions on the factors influencing the design
and implementation of the QI projects. Participants can have a tendency to portray themselves,
and the whole process, in the most favourable light.

The difficulty of the team members to speak about the PDSA cycles to test change using the
specific vocabulary used in this methodology may have limited the ability to display how they
applied the four steps in the results. A summary of the interview for member checks was sent to
participant. This process was to evaluate the rigor of my interpretation of the application of the
PDSA cycles. With the exception of the QI consultants who were satisfied with the summary,
no other participants got back to me with comments.

Further research

This study did not look at the effectiveness of the Model of Improvement framework. This
research took place during the first year when the QI projects were rolling out, and the two
initiatives were not completely implemented in the units. Therefore, the potential outcomes of
the two QI projects, if any, were not yet achieved. Further research should explore whether the
effective application of the PDSA Cycles to test changes and the Model of Improvement leads
to better outcomes. Thus, further research should use validated frameworks for the PDSA
Cycles, as suggested by Taylor et al., in order to reach a better understanding of which steps
could be improved. The theoretical process of the Model of improvement and its application in
practice are disconnected, as has been underlined by Taylor and al. and confirmed in this study. This study shows that many aspects of context have a critical role in the success of QI initiatives (i.e.: leadership, organisational culture); at the same time, it is not clear how to influence these factors. Further research should be devoted to examining the role of context in QI when developing initiatives such as the Leadership Program; the Damschroder framework could be used to standardize the descriptions of the aspects of context that are important for QI success. An initiative such as the Leadership Program necessitates the involvement of many professionals, from upper management and QI teams, to front-line nurses, who devote time and energy to improve quality of care. Research into the cost-effectiveness of these initiatives should be pursued.

Conclusion

The case studies examined in this thesis were designed to understand the factors influencing the design and implementation of QI initiatives using the Model of Improvement within a Leadership Program. The thesis focused on two initiatives, which were led by nurses who participated in the Leadership Program. The findings of this study show that nurse leaders and their teams faced various challenges to implement the QI projects within their units. After the first year of the program, the two QI projects studied in this thesis were still in the testing phase; the communication tools that the nurse leaders wanted to implement in their units were not being used consistently. A lack of careful planning has been one of the restraining factors in these two initiatives. Difficulties in engaging HCP as team members, involving key stakeholders early in the process and testing changes using the PDSA cycles greatly impacted these projects.

The Leadership Program was developed with the support of the hospital administrators, unit managers, and QI consultants. However, there was no additional funding to support the 14 initiatives involved beyond the one day per month allotted to the nurse leaders. Unit managers seemed to believe that their participation mostly involved providing one or two nurses to participate in the program. While QI consultants needed to create QI material to provide guidance to the nurse leaders and, at the same time, support several initiatives. These new tasks were on top of their other projects. In this study, the QI initiatives rested primarily with the nurse leaders and there was the expectation that, with some QI knowledge and a relatively low level of support from unit managers and QI consultants, the nurse leaders would successfully implement their projects. However, these nurse leaders did not seem to be ready to take over the
role they were assigned. For these types of broad initiatives such as the Leadership Program, responsibility also lies with healthcare institutions, management, and other professionals to support such initiatives.

One recommendation made in the conclusions of this thesis is for a Leadership Program to provide more resources and support from upper management and to focus on a smaller number of initiatives to test before expanding to a larger scale. A new program could be built as a mentorship activity, in which nurses would be partnered with one QI consultant to learn leadership skills and competencies, as well as QI knowledge. Quality improvement competency should be included in the curriculum to provide nurses with the tools to evaluate and improve standards of patient care and quality.
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Appendices

Appendix A: Inclusion Criteria

Identification of the two case studies began with the selection of four inclusion criteria:

1. Projects are part of the QI and Patient Safety Unit Leader Program.
2. Professionals involved in, or impacted by, the QI projects are willing to participate in the study.
3. Projects are designed and implemented using the Model of Improvement and changes are tested using PDSA methodology.
4. Projects are well advanced prior to data collection, which started mid-February 2014 (thus, projects must have started in September 2013, at the latest, and the nurse leaders must have completed at least one PDSA cycle between then and the data collection period).
Appendix B: Interview Scripts

1. Nurse Leaders
2. QI Consultants / Other team members
3. Healthcare providers impacted by QI project / Area Managers

Review by co-investigator each section of the consent form with the participant to ensure the participant fully understands all aspects of the form. After signature is obtained the interview process begins.

1. Nurse Leader Interview Guide

1. Background information:
   a. What is your educational/professional background?
   b. What is the highest level of education?
   c. What are your title and your functions?
   d. What is your role in the QIPS Unit Leader Program? Which QI project(s) were you involved in? Did you select this particular project or you were suggested to do it?
   e. Did you participate to every educational day session held every 2nd Wednesday?
   f. Had you ever lead a QI project before? What was your knowledge about QI?
   g. Did you know about the PDSA approach before starting the QIPS Unit Leader Program?

Design and implementation of the QI project using PDSA cycles (key features):
I would like to discuss with the DCS \ DARD QI project that takes place within the QIPS Unit Leader Program. The method of PDSA approach was suggested by the QI consultants to design and implement your QI project (DCS \ DARD).

I would like to hear a bit about your experience related to the application of the Plan-Do-Study-Act (PDSA) methodology within the QI project.
   a. Were you able to go through a complete PDSA cycle? If yes, please provide an example? If not, why was it not possible? What were the barriers?
      b. How did you allocate your time to work on your QI project?
         i. Did you also work on your QI project during regular hours?
         ii. Did you find difficult to find time to work solely on your QI project? Why was it difficult?
         iii. Did the new format of the educational session (from 2 hours in the afternoon to 4 hours in the morning) help you?
   iv. Do you think the allocated time to work on your project was enough?
      c. How did you examine the results of the changes you try to implement?
         i. Can you give me an example when you received feedback? What have you done with the feedback? Did you summarize your learning?
         ii. What was difficult in the interpretation of the results? What did you do when you were facing a lack of feedback? Was it due to the lack of time to get feedback? Different schedule time than yours? Lack of people engagement to provide feedback?
I would like to hear a bit about your experience related to some of the key Features of PDSA cycles.

d. Iterative cycles (multiple PDSA cycle should occur to learn from one cycle to the next).
   i. Did you go through several PDSA cycles? Was it possible because started with small-scale changes?
   ii. If not, why was it not possible? Was it because of your schedule?
   iii. How about your organization of time?
iv. Why most changes happened a same time? Why not test one change after the other one? Was it because it was easier to evaluate all the same changes rather than going to request feedback for each change?

e. Prediction-based of change (PDSA cycles can be used as learning cycles to test and revise theory-based prediction). For each change, did you have a prediction of the outcomes that was developed in the planning stage?
   i. Was a change tested?
   ii. How did you know that it was working? (If had problems with feedbacks, which said they like the changes?)

f. Small-scale testing: Did start with small change in scale and as confidence grows, they undertake more changes?
   g. Use of data over time. Did you collect data over time to understand the impact of change? Track changes?
   i. Why didn’t you collect any data?
   ii. Did the QI consultants support the data collection? Was this helpful?

h. Documentation

Factors influencing implementation of QI project:
   You were involved in the design and implementation of the DCS \ DARD project.
   a. What are some barriers did you experienced when you were involved in the program?
   b. What are the barriers mentioned by others?
   c. What are some facilitators did you experienced during the time you were involved in the program?
   d. What are the facilitators mentioned by others?

Wrap up:
   Is there anything more you would like to add?

Conclusion:
   Thank you!
2. **QI Consultant / other team members interview Guide**

**Background information:**
- a. What are your title and your functions?
- b. What is your role in the QIPS Unit Leader Program?
- 2. Which QI project(s) were you involved in?

**Design and implementation of the QI project using PDSA cycles (key features):**
I would like to hear a bit about your experience related to the application of the Plan-Do-Study-Act (PDSA) methodology within the DCS \ DARD project.
- a. You mentioned your role as (supporter\facilitator\etc.). I am interested to learn about how you supported \ facilitated the nurse leaders to apply of the PDSA cycles to make the change?
- b. From your experience supporting the DCS / DARD project, was there a particular stage in the PDSA cycles that was more difficult for the nurse leader to accomplish? or that was easier to accomplish?

**PLAN a change (identify objective\questions\plan (who, when, where)**
**DO (execute plan\begin data collection)**
**STUDY (examine change\what went wrong?)**
**ACT (adopt the change\run another cycle)**

I would like to focus on specific features of the PDSA. (from what you know, and probably will have more information when I interview the nurse leaders).
- a. Iterative cycles (multiple PDSA cycle should occur to learn from one cycle to the next): can you tell me if the nurses’ leaders went to several cycles? Were you involved?
- b. Prediction-based of change: Did they have a prediction of the outcomes that was developed in the planning stage? So PDSA cycles can be used as learning cycles to test and revise theory-based prediction.
- c. Small-scale testing: Did start with small change in scale and as confidence grows, they undertake more changes?
- d. Use of data over time: did they collect data over time to understand the impact of change? Track changes?
- e. Documentation: from your experience in the DCS \ DARD, did NL collected data?
- f. Did a nurse come to you for these specific features for some help? Can you explain that further?

**Factors influencing implementation of QI project:**
The final section is to understand the factors that had an impact on the project.

You were involved in the design and implementation of the DCS / DARD project.
- a. What are some barriers did you experienced when you were involved in the program?
- b. What are the barriers mentioned by other?
- c. What are some facilitators did you experienced during the time you were involved in the program?
- d. What are the facilitators mentioned by other?
Wrap up:
Is there anything more you would like to add?

Conclusion:
Thank you!

3. Healthcare providers (HCP) impacted by QI project / Area Managers Interview Guide

Background information:
   a. What are your title and your functions?
   b. What is your role in the QIPS Unit Leader Program?
   c. Which QI project(s) were you involved in?

Design and implementation of the QI project using PDSA cycles (key features):
I would like to discuss specifically about QI project.
   a. How did you get involved?
   b. How were you impacted by this QI project?
   c. When did you start to be involved?

Barriers and facilitators to the project:
You were involved some ways to the DCS / DARD project:
   a. What are some barriers did you experienced following the new tasks? (more tasks, change location, more stress)
   b. Have you spoken to your manager or the nurses to help you out?
   c. What are some facilitators did you experienced following the new tasks? (had trainings, more involve in the team).

Wrap up:
Is there anything more you would like to add?

Conclusion:
Thank you!
Research Participant Information and Consent Form for Health Professionals

Study Title:
QI and patient safety through a leadership initiative:
Exploring barriers and facilitators related to application of the
Plan-Do-Study-Act (“PDSA”) method

I. Principal Investigator
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Researcher
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Graduate Student, University of British Columbia
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II. Invitation and Study Purpose: Why I am doing this study
You are invited to participate in a research study to understand the application of the Plan-Do-Study-Act (PDSA) methodology and find out about the barriers and facilitators related to the design and implementation of QI (QI) projects. This research study is for the purpose of a Master’s thesis that takes place within the Faculty of Health and Social Development at the University of British Columbia Okanagan.

III. Study Procedures: Your role in the study
As a healthcare provider, you are being asked to participate in one individual interview about your experience in the “Delivery Assistance Response Defined” QI project being implemented within the Labour and Delivery unit.
If you should decide to take part:

- The interview will be conducted in person by Camille Côté-Marcil (unless for practical purposes or convenience it needs to be done by telephone).
- The interview will be conducted at the Hospital at a time that is convenient to you and will last a maximum of 30 minutes.
- With your permission, the interview will be audio-recorded and transcribed.
- If possible, the researcher will observe a team meeting or educational session related to your QI project in the QIPS Unit Leader Program and will take field notes.
- The researcher will review documents provided by you such as meeting notes or minutes that were used during the development and implementation of your QIPS Unit Leader initiative.

IV. Study Results
The main study findings will be presented to the researcher’s supervising and examining committees and may be published in an academic journal. The final thesis is a public document that will be available to everyone on the Internet. If you wish to receive a copy of the results from this study, you can receive either an electronic or print version.

V. Potential Risks of the Study
Given that discussion of difficult events or uncomfortable situations in the workplace may elicit emotions, it is possible that some topics arising in the interview may cause psychological discomfort. You need only answer questions or express your views when you wish to do so – you can stop the interview at any time. The researcher is not qualified to provide personal counselling or professional guidance.

VI. Potential Benefits of the Study
You may or may not obtain personal benefit from your participation in the study. Discussion with the researcher about your experiences or perspectives may assist you in sorting through issues that are not always easily discussed elsewhere, although there can be no guarantee of this. We are hopeful that your participation in this study will contribute to a better understanding of facilitators and barriers related to designing and implementing QI projects in a hospital setting.

VII. Confidentiality: How privacy will be maintained
All information provided by you and other study participants will be treated with the utmost respect. Specific measures will be taken to protect your privacy and ensure that any identifying information is kept confidential. All audio files and transcripts will be identified only by codes and will be kept securely on a password-protected computer. The signed consent form will be kept in a locked cabinet that is not accessible to anyone outside the study. All data will be stored for at least 5 years after publication or attempts of publication. The only persons who will have access to the data will be the researcher and the principal investigator. Short quotes and interview passages may be used in the final report, but these will not be identified with your name. Pseudonyms (false names) will be substituted for your real name and the names of anyone else mentioned in the interviews.
VIII. Contact for Information About the Study and Your Rights as a Research Participant
It is very important that your participation is entirely voluntary and based on a clear understanding of the study and its goals and methods. You may contact Camille Côté-Marcil by phone: (778) 980-0585 or email: to ask questions or request additional information.

If you have any concerns about your rights as a research participant and/or your experiences while participating in this study you may contact the Research Participant Complaint Line in the UBC Office of Research Services at 1-877-822-8598 or the UBC Okanagan Research Services Office at 250-807-8832. You may also contact the Chair, Interior Health Research Ethics Board by phone at 250-870-4602 or by email at ...

IX. Participant Consent and Signature
Taking part in this study is entirely up to you. You have the right to refuse to participate. If you decide to take part, you may withdraw from the study at any time without giving a reason.

- Your signature below indicates that you have received a copy of this consent form for your own records, you are aware that the interview will be recorded with your permission, and that you agree to participate in this study.

____________________________________________________________________
Participant Signature
____________________________________________________________________
Printed Name of Participant    Date

X. Copy of Research Results

☐ Please check here and provide your mailing or email address if you wish to receive a copy of the results of the study:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Appendix D: Case Study Database

A case study database is a method for organizing and documenting the case study data and analyses in a single space. The case study database will typically include notes, documents, tabular material and narratives.

Data included in the Case study Database:

This case study’s study database was comprised of the following:

1. Interviewee contact list consisting of interviewee names, phone number and e-mail address
2. Written consent forms for the study participants
3. Interview transcripts from the 12 interview
4. Audio tapes from the thirteen interviews and two participant observations
5. Field notes from the researcher
6. Leadership Program educational material
7. Project charters, emails, agenda
8. Evaluation report completed by nurse leaders
9. Survey conducted by nurse leaders
10. Final presentation of project by nurse leaders
Appendix E: Case Study Protocol

I. Case study research questions
Main research question: What are the factors influencing the effective application of the Plan-Do-Study-Act cycles (PDSA) to design and implement the QI (QI) projects within the QI and Patient Safety (QIPS) Unit Leader Program?

Sub-questions:
1. How did the nurse leaders apply the PDSA to the design and implement their QI projects within the QIPS Unit Leader Program?
2. What support and what barriers do the nurse leaders, team members, QI consultants, healthcare providers impacted by the QI project and area managers identify in the implementation of the QI projects?

This study is a descriptive investigation presenting a description of the barriers and facilitators to implement QI projects and looking at a phenomenon, which has rarely been explored, in previous studies.

II. Data collection
1. Gaining access
   a. Meeting with Manager of QI and Patient Safety I.H. West to provide overview and history of the QIPS Unit Leader Program
   b. Meetings with QI consultants to provide QI detail projects and connecting to area managers
   c. Letter of support from Area managers of selected QI projects and Manager of QI and Patient Safety I.H. West
   d. Obtain University of British Columbia Okanagan Behavioral Research Ethics and the Interior Health Board of Research Ethics

2. Establish sample and interview schedule
   a. Identify purposive sampling of X participants consisting of five subgroups who participated in the QIPS Unit Leader Program: (1) nurse leaders, (2) QI consultants, (3) area managers, (4) team member, and (5) healthcare providers impacted by QI project
   b. Schedule interviews and participant observation at the Hospital
   c. Prepare consent forms explaining purpose of study, foreseeable risks and potential benefits

3. Preparing Interviews
   a. Confirm interview appointments
   b. Review interview guideline
   c. Prepare interview consent form
   d. Review background material & preview data collected from other participants

4. Conducting interviews
   a. Prepare interview schedule & participant observations as well as all activities to be completed during data collection (February to May 2014)
b. Signed consent forms
c. Gather all resources necessary for interviews and observation including laptop, tape recorder, paper, consent forms, reading materials

5. Post interview activities
   a. Secure data on computer disks, tapes and transcripts
   b. Write field notes following each interview and participant information
   c. Reflect in overall interview/participant observations and consider adjustments for subsequent interviews or participant observation

6. Gathering other material
   a. Acquire additional materials from nurse leaders, team members, QI Consultants, area managers and QI Manager IH West

7. Case study interview guideline

8. Data analysis plan
   a. Transcription of interviews
      i. Meet with transcriber and set schedule for transcription of 11 tapes interviews
      ii. Discuss procedures to ensure quality of transcription
   b. Code interview transcripts, participant observation and other material
      i. Draft initial list of coding using features from the literature & initial first reading of transcripts
      ii. Define codes
      iii. Start with manual coding of interview transcripts, observations and material

III. Detailed data analysis
   1. Familiarize with data, establish consistencies, look for similarities and contradiction of participant responses; summarize key findings for member checks
   2. Establish how data will be presented for thematic writing and data displays

IV. Findings
   1. Customize to readers (dissertation committee)
   2. Develop chapter outlines
   3. Review chapter outlines with supervisor for content and format
   4. Refine chapters
   5. Develop chapter circulation plan with supervisor and some committee members
   6. Prepare feedback plan