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Practitioners Navigating Context in Healthcare Quality Improvement

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ABSTRACT

In this dissertation, I conducted 2 studies that resulted in 3 manuscripts. This dissertation consists of 6 chapters that include the 3 manuscripts. The overarching research question is *How does context affect the work of quality improvement (QI) practitioners?* To answer this larger research question, central to the quality field, I answer 3 narrower questions related to QI and context: (1) What is known and not known in the literature about how context is operationalized as a concept? (2) How do QI practitioners obtain buy-in from stakeholders? And (3) How do experienced QI practitioners gain and apply QI skills in projects?

In my first study and manuscript, through a scoping review of reviews, I explored what is known and unknown in the QI literature about how scholars operationalize context. The results of my study of 24 reviews show considerable variation regarding how context is operationalized and defined within literature review studies. Still, the review consensus is that context is composed of factors influencing project success. Most reviews viewed context as everything but the interventions. Thus, the concepts of context and factors overlap, but there are factors (i.e., factors related to the intervention) that are not part of the context. To help prevent the conflation of the 2 terms 'context' and 'factors,' authors should define the terms and clarify the type of factors they are referring to (e.g., organizational factors).

Building from the finding from the first study that less is known about the connection between process and context, in my second study and manuscript, I conducted semi-structured interviews with QI practitioners to understand how practitioners are navigating context to obtain stakeholder buy-in. Throughout the interviews, QI practitioners revealed how they employ

strategies in response to the context to get buy-in. I identified ways in which practitioners navigate context to manage the complexity of interrelationships with stakeholders in QI projects. The participants described 5 strategies: (1) involve multiple levels of stakeholders, (2) reframe problems for different stakeholders, (3) utilize information from quantitative and qualitative data to tell stories, (4) make trade-offs to match priorities, and (5) leverage expertise. The strategies identified demonstrate that QI practitioners are trying to obtain buy-in across multiple levels of the context by using multiple sources of data, making trade-offs, and reframing problems.

In my third manuscript, using the same data as in manuscript 2 from the qualitative interview study, I aimed to explore the skills used in QI work and how practitioners learned these skills. QI practitioners use interpersonal, intrapersonal, project, and technical skills. Further, QI practitioners learn their skills and knowledge through formal training, from others, teaching, doing, and self-reflection. These findings show that QI practitioners use skills beyond QI technical skills and are using skills that comprise leadership capabilities. Further, QI practitioners are continuously learning and improving their practice. These findings can inform the curriculum for training QI practitioners and continuous education.

In this dissertation, I operationalize context as a concept based on literature reviews, identify strategies for obtaining stakeholder buy-in, and examine how skills are applied and learned within QI. Based on my findings, I create a conceptual model of how QI practitioners attain QI project success by using the Donabedian model as a starting point. My conceptual model shows QI practitioners use QI processes—including formal methods, strategies, and tasks—to navigate and adapt the structures within and outside the organization to complete

projects. This dissertation contributes to the QI field's understanding of how QI practitioners approach QI projects. Most importantly, the findings inform QI training curricula by highlighting the importance of context, the role of strategies, and the diverse set of skills used to complete QI work.

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ABBREVIATIONS

QI	Quality Improvement
RESET	REdesigning SystEms to Improve Teamwork and Quality for Hospitalized Patients
AHRQ	Agency for Healthcare Research and Quality
NRSA	National Research Service Award
UCANU	University of Chicago and Northwestern University Predoctoral Health Services Research Program
CFIR	Consolidated Framework for Implementation Research
ICU	Intensive Care Unit
CEO	Chief Executive Officer
IRLM	Implementation Research Logic Model
MUSIQ	The Model for Understanding Success in Quality
PARiHS	Promoting Action on Research Implementation in Health Services framework
CRM	Crew Resource Management
KSA	Knowledge, skills, and attitudes
PDSA	Plan, Do, Study, Act
EBP	Evidence-based practice
IPO	Input–process–output
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-analyses
IHI	Institute for Healthcare Improvement
AHRQ	Agency for Healthcare Research and Quality

NAS	National Academy of Sciences
DOI	Digital Object Identifier
EPIS	Exploration, Preparation, Implementation, Sustainment
T-CaST	Theory, Model, and Framework Comparison and Selection Tool
CAS	Complex-adaptive system
ERIC	Expert Recommendations for Implementing Change
EPOC	Effective Practice and Organization of Care
COREQ	Consolidated Criteria for Reporting Qualitative Research
CAUTI	Catheter-Associated Urinary Infections

To my family and friends who supported me through this journey

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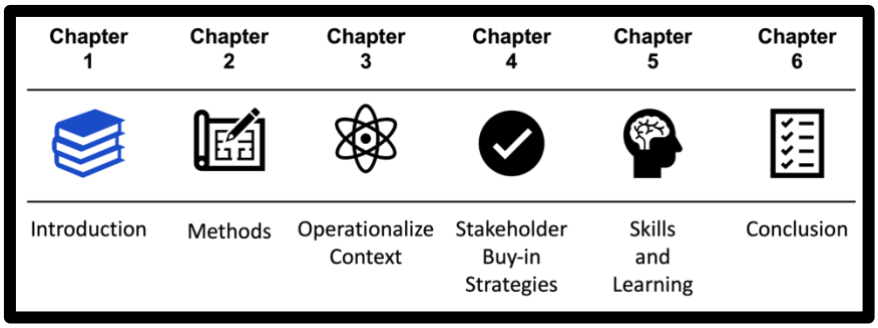
CHAPTER 1: INTRODUCTION



"The human element, the human flaw and the human nobility—those are the reasons that chess matches are won or lost."
- Viktor Korchnoi

1.1 THE PROBLEM

Quality improvement (QI) is a systematic approach to solving complex problems to improve healthcare outcomes—such as reducing adverse events or increasing providers' adherence to clinical guidelines. The QI process includes pinpointing a particular area for improvement, proposing specific changes, iteratively testing the instituted changes, and evaluating their success, all of which require stakeholders to be directly involved in the decision-making process.[1] QI is frequently implemented to change patient care delivery processes, but it often produces mixed results. One example of varying degrees of QI success is the *Michigan-Keystone* study. This multifaceted patient-safety intervention was implemented in 103 intensive care units (ICUs) in Michigan and led to a significant reduction in cases (up to 66%) of central venous catheter bloodstream infections.[2] But when the intervention was similarly implemented in the *Matching Michigan* study in more than 200 ICUs in England, it failed to produce the same successful results. Many units simply implemented a "checklist" intervention of catheter

insertion steps but failed to recognize that social changes were necessary for such a complex intervention to be successful.[3,4] However, the most successful unit in the replica study was a notable exception, as it introduced not only the checklist but flattened the unit hierarchy by empowering nurses and resident physicians to act on any breaches of aseptic technique they observed.[4] Anyone, regardless of their discipline or seniority, was encouraged to speak up if a step in the checklist was missed. The unit made changes to both technical and social processes: the technical steps for catheter insertion and the "social" expectation to speak up when seeing a mistake. The *Michigan-Keystone* study and the *Matching Michigan* study demonstrate how essential the human element is to a successful QI intervention.

In many ways, the *Matching Michigan* institutions that adapted the original *Michigan-Keystone* project as a simple checklist repeated the mistakes described by Richard Feynman [5] in his well-known 1974 Caltech commencement address on "Cargo Cult Science":

> In the South Seas there is a Cargo Cult of people. During the war they saw airplanes land with lots of good materials, and they want the same thing to happen now. So, they've arranged to make things like runways, to put fires along the runways, to make a wooden hut for a man to sit in, with two wooden pieces on his head like headphones and bars of bamboo sticking out like antennas – he's the controller – and they wait for airplanes to land. They're doing everything right. The form is perfect. It looks exactly the way it looked before. But it doesn't work. No airplanes land. So, I call these things Cargo Cult Science, because they follow all the apparent precepts and forms of scientific investigation, but they're missing something essential, because the planes don't land.

In short, they put the same superficial structures and processes in place, but the people involved did not properly understand the mechanisms. When QI initiatives from one institution are implemented by another health institution—without a proper understanding of what those initiatives involve and how they work in their particular context—they similarly risk becoming superficial, and therefore ineffective, imitations of the original intervention.

Many social process mechanisms in QI interventions are often overlooked and related to the intervention itself. The original *Michigan-Keystone* project empowered nurses and residents to speak up when they saw a mistake or deviation from the protocol, but this was not consistently replicated. The authors of the study attribute the successful unit in the follow-up study to flattening the hierarchy in part to leadership, specifically the support of both formal (e.g., CEO) and informal leaders (e.g., a seasoned bedside nurse) at every level of the organization. The QI team had to help these leaders understand the project's goals, recognize why these goals were important, support the interventions, believe the performance measures were feasible and valid, and commit the effort needed to improve care.[6] This example shows how the social skills of relationship-building, and communication, are essential in addition to the technical steps (define the problem, measure, analyze, etc.) outlined in the QI process. Further, this example demonstrates that not only the social processes related to the intervention were overlooked but also those related to the QI team. The project's success was not only contingent on the team's technical skills but also on the social skills of the QI team to make technical and social changes.

1.2 OVERVIEW OF CONTEXT WITHIN QI

The Matching Michigan study demonstrates that QI projects do not always succeed. Research studies on QI have started exploring the reasons leading to success or failure with the goal of helping more projects be successful. Discerning these reasons is often challenging because the contexts in which QI projects take place are so complex, involving different layers of actors and systems.[7] Typically, a team must obtain buy-in from everyone from senior leaders to frontline staff, implement changes to structures and workflow processes that span multiple

departments/disciplines, and adjust the intervention based on lessons learned. To make sense of these complexities, QI scholars have often focused on the broader idea of "context" as a way to explain variations in outcomes.[8] In the following sections, I provide an overview of context and skills to identify gaps within the literature. Subsequently, I outline my dissertation research questions.

Scholars often describe the concept of context in terms of several different factors or components. Collectively, the research literature reveals that the context in which QI takes place is multidimensional, with diverse contextual factors related to the external environment, the organization's features, and the individuals' characteristics.[9] In addition, within the literature, factors related to the process through which QI is undertaken, and the intervention characteristics are also described.[9,10]

In addition, all these categories, such as external, organization, teams, individuals, process, and intervention, are composed of multiple factors. The following are examples of factors in each category: external contextual factors include policy and regulatory environments, whereas organizational factors include QI culture, microsystem capacity, and senior leadership.[11,12] Factors related to individuals and teams include QI skill, QI experience, and leadership.[11] Process factors include understanding the problem, designing the right solution, setting appropriate timelines, developing effective data collection and monitoring systems, and ensuring changes are embedded in practice.[13] Factors related to the intervention include evidence strength, cost, and adaptability.[10] These factors and categories of factors are the building blocks of frameworks that depict context.

1.2.1 What Frameworks Tell Us About Individuals Within Context

Scholars often create various theoretical and methodological frameworks to better describe how varying factors interact and inter-relate to construct the context. As these frameworks have developed, scholars have focused more on the organizational level of context and less on the individual.

The focus on the organization is understandable: in the early days of QI, Shortell et al. [14] found what matters most regarding context for QI is whether a hospital has a culture that supports QI work and a QI approach that encourages flexible implementation. Further, seminal QI work—including Batalden and Stoltz's Framework for Continual Improvement of Healthcare[15] —emphasized QI policy at the organizational level. In a scoping review of frameworks that describe contextual factors, Nilsen et al. [8] found that all the frameworks included some form of organizational support as a contextual factor. The authors argue that the emphasis on the organization level is due to implementation science's roots in organization science (study of organizations) rather than in sociology (study of groups). Also, aspects of context related to the organizational level have the strongest evidence base in the existing literature;[11] yet, this means that there has been less understanding about individuals and their necessary skills. A focus on individual skills highlights the limitations of formal QI process rules and calls attention to the discretionary judgment and actions used in actual QI practice.

A variety of frameworks can be used for different aspects of QI work: some focus specifically on organizational factors, others emphasize process, and some are higher-level frameworks that combine these elements by integrating organizational factors, mechanisms, and QI processes. For example, the Consolidated Framework for Implementation Research (CFIR)

lists factors to retrospectively explain why implementation succeeded or failed—when used proactively—to identify relevant modifiable factors that can help implementation.[10] There are also broad frameworks to understand the connection between context and strategies for implementation. The Implementation Research Logic Model (IRLM) specifies the relationships between factors of implementation, implementation strategies, the mechanisms of action resulting from the strategies, and the implementation and clinical outcomes affected. These core elements are relevant to every implementation research project in some way.[16]

Most frameworks acknowledge that skills are needed to complete QI work. For example, CFIR recognizes individual personal attributes and competence as a factor in QI work. The Model for Understanding Success in Quality (MUSIQ) identifies the skills of QI team members as a factor as well. The Promoting Action on Research Implementation in Health Services (PARiHS) framework discusses how QI facilitators use interpersonal and group skills.[17] However, the skills of individuals are not defined within these frameworks.

The Theoretical Domain Framework, used for behavior change in implementation research, explicitly lists 'skills' as a core domain and defines skills as "an ability or proficiency acquired through practice," and lists the constructs of the domain, including skills development and skill assessment.[18,19] But the only skills explicitly listed are interpersonal skills,[18] which is limiting given that multiple types of skills are needed in QI. Because the framework focuses on behavior change, the skill construct reflects the skills needed to change behavior. While extensive literature exists on 'improvement science' and the facilitators/barriers to QI in

healthcare, less attention has been given to the wider skills needed by improvement practitioners to complete effective improvement projects.

1.3 THE IMPORTANCE OF SKILLS AS A COMPONENT OF CONTEXT

In the following section, I examine skills by first offering a definition; second, discussing how skills are acquired; third, exploring a taxonomy of skills; and last, examining what is known about skills within the field of QI.

1.3.1 Definition of Skills

Skill, as a construct, is unclear and ill-defined. This is problematic for several reasons. Many conceptualizations of skills conflate skills with values, beliefs, traits, and/or behaviors. For instance, in the scholarship on skills in QI, often behaviors or knowledge are listed as example skills. Making a distinction between behaviors, skills, and knowledge is essential because knowledge can be taught, and behavior is only a part of individual skills. Without the clear and consistent application of the concept of skills, it is impossible to accurately connect research findings across studies, which hinders the development of a solid knowledge base.

The word "skill" is used in everyday language and in multiple disciplines, which contributes to definitional indeterminacy. However, commonly cited definitions do emphasize skills as composed of multiple components. Peterson et al. [20] define a *skill* as "the ability either to perform some specific behavioral task or the ability to perform some specific cognitive process that is functionally related to some particular task."[20] The authors suggest 3 distinct components of skills: (1) a domain-specific knowledge base, (2) the means to access that knowledge, and (3) the ability to take actions or thoughts using that knowledge to carry out a

task. The first 2 components, they argue, are necessary precursors to the third component, which is what, in everyday language, we think of as the "skill." A key contribution of this definition is that knowledge is a precursor for skill and that there is a process for transforming that knowledge into action.

Among the various definitions of skill, the concept of execution is central to all of them. That is, skill implies the prerequisites of having and accessing specific knowledge, processes, or sequences of behavior leading to a specific performance. For something to be considered a skill, it must contain an element of action. Matteson et al. [21] define *skills* as "the ability to access knowledge from a domain-specific knowledge base and use that knowledge to perform an action or carry out a task." This definition is simple but highlights the knowledge and action aspects of a skill.

Skills cannot solely be taught but require experience as well. I use the term experience as Benner[22] defined it: self-reflection that allows preconceived notions and expectations to be confirmed, refined, or disconfirmed in real circumstances. Merely encountering situations is not "experience;" rather, experience involves people reflecting on encountered circumstances to refine their moment-to-moment decision-making at an unconscious, intuitive level.[22,23] The conception of skill by Hurrell et al. [24] echoes and expands on the definition proposed by Peterson et al. [20] In their work, Hurrell et al. [24] explain skills as a complex knowledge practice involving cognition of knowledge bases, dispositional characteristics, context-specific knowledge, and prior experience. A skill, according to Hurrell et al. [24], is something that "develops over time, with practice; involves cognitive processes and manipulation of knowledge

. . . and includes an element of discretion that allows performance with economy of effort." This definition introduces the idea that experience contributes to a skill and that with experience, a skill is performed with a level of ease. Still, essential within the definition is the key role of knowledge and the process by which the knowledge is used. [22,23]

1.3.2 How Skills Are Acquired

Studies of skill and knowledge acquisition have sought to understand how performance improves over time.[25] This research helps inform the conceptual relationship between skills, knowledge, and experience. In the Dreyfus Model of Skill Acquisition, Dreyfus and Dreyfus plot an individual's progression through a series of 5 levels: novice, advanced beginner, competent, proficient, and expert.[26,27] Expertise thus refers to the level of skill that one has. In plain language, expertise is often used to indicate whether a person's skill level is high.

Per the model, skill is acquired by receiving knowledge through instruction and experience. Instruction helps provide the 'knowledge of that,' and experience helps provide 'knowledge of how.' However, the distinction is not perfectly clear; 'know-how' can help challenge or extend the current theory to update 'knowledge of that' within a field. The knowledge that is gained through experience is called practical knowledge.[22] For example, watching a cooking show may teach one the recipe for French macarons (knowledge of that). As part of the directions, you learn tips like letting the egg whites rest at room temperature and wiping down the mixing bowl with lemon to remove any residue that would affect beating the egg whites to stiff peaks (still knowledge of that). When you actually make macarons multiple times (experience), you learn how much pressure to apply to the piping bag as you make cookie

circles on the parchment paper and what the macaron shell needs to feel like to indicate it is ready to go into the oven (practical knowledge). Collectively, instructional knowledge, practical knowledge, and experience help a person gain skills—whether it is making macarons or implementing QI interventions.

Skill overlaps with other concepts such as expertise, competencies, and capabilities. *Competencies* are the knowledge, skills, abilities, values, and behaviors that contribute to individual performance; and imply the ability to perform a task properly.[28] Similar to competency, *expertise* refers to the ability to perform a task well. In fact, expertise is the performance of a skill at a high level.[26,27] *Capabilities* is a higher-level concept than skills: capabilities are the doings and states of being that people can achieve if they so choose—the potential ability to achieve.[29] Further, capabilities are commonly used when discussing organizations.[30] While all these terms are similar, they are distinct enough concepts not to be synonyms.

1.3.3 Technical and Social Skills

Technical skills, sometimes called hard skills, reflect tasks used in a profession.[31] Many technical skills are easy to identify because they have a distinct construct with a particular knowledge base and action repertoire (for example, sewing or playing an instrument). The other types of skills are social, sometimes called interpersonal, behavioral, or soft skills. In 1984 Dyer [32] asserted that there is very little systematic knowledge about which social skills are most needed and how to operationalize them. Even with the increase of scholarship within the

management literature and related areas that examine social skills, the concept is not consistently defined.

These social skills are hard to define, and there is still disagreement amongst scholars on the definition.[21] Whitmore et al. [33] defined soft skills as important job-related skills that involve little or no interaction with machines and can be applied in a variety of job contexts. This definition suggests that soft skills are generic skills, contrary to specific skills required for particular fields.[34] Conversely, hard skills refer to the tangible technical know-how needed to complete tasks for work.[35] Marin-Zapata et al. [36], in a systematic review of soft skills, found that social skills have 2 main components: intrapersonal and interpersonal skills. The authors of the review found that the concept of soft skills initially focused solely on interpersonal skills,[37] which may be why terms such as people and social skills became relevant when studying soft skills. Further, the review found that after 2011 other authors complemented the definition of intrapersonal skills, explaining that soft skills comprise not only how to handle interactions with others but also the ability to manage oneself.[36,38]

A more recent trend in literature on work involves a greater focus on social skills.[24] Early research looking at the role of skill in highly technical industries was done in the field of aviation. Siskel et al. [39] described aircrew skills as including the ability to work together, to anticipate others' needs and actions, to inspire confidence and mutual encouragement, and to communicate effectively. By the early 1980s, the aviation industry had recognized that high technical proficiency in pilots was not enough to prevent crashes[40] and implemented formal training in interpersonal skills through Crew Resource Management (CRM) training.[41] Within

medicine, disciplines such as anesthesia, emergency medicine, and surgery have started to recognize that non-technical skills play a vital role in care delivery to lead to good patient outcomes.[42,43,44,45,46] Specifically, teamwork, collaboration, and communication have been a key focus because these skills have been found to improve patient outcomes.[47] The social aspects of patient care delivery within the literature have frequently been examined through the lens of knowledge, skills, and attitudes (KSA). Of note, sometimes the "A" will stand for abilities. Attitudes are "a positive or negative judgment, based in part on emotion, about an outside entity." [21] The literature on teamwork has identified KSAs that are aligned with many known social skills, such as communication and conflict resolution.[48] Even though the teamwork literature within healthcare has rarely focused on QI teams, the social skills identified overlap with skills described in the QI literature.

1.3.4 Skills in QI

Within QI literature, a distinction is made between technical and social skills.[49,50,51] Technical skills within the literature include methodological skills like statistical analysis; Plan, Do, Study, Act (PDSA); and the process waste reduction method, Lean. 'Soft skills' include resilience, transformational leadership, clear and consistent communication, and negotiation skills.[51,52,53] Gabbay et al. [54] propose an improvement pyramid composed of 3 sets of skills: technical, soft, and learning. Learning skills include fostering multidisciplinary, team-based learning that encourages motivation, experimentation, and psychological safety.

Skills beyond the technical execution of tools and methods play an essential role in the QI process. For example, Marjorie Godfrey, a researcher and quality improvement expert, found

that technical skill, which is often the primary focus in healthcare improvement strategies, was the least perceived necessity among QI teams.[55] These QI teams reported that building relationships, being respected, having positive interpersonal communications, and receiving help, were more important for their success. Findings like these have led to the notion that QI is mostly about social processes. As summarized by Godfrey, "improvement in healthcare is 20% technical and 80% human."[56,57]

Many papers have discussed multiple, specific skills needed in QI and have highlighted the importance of skill development for leading QI work.[1] Ferlie et al. [58] suggest strategic leadership in QI is likely to involve core skills in communication, networking across conventional boundaries, analytic and diagnostic skills, creating a shared vision, and effective system design as well, as performance management. Similarly, Ferguson et al. [59] present skills that leaders of collaborative QI work need in order to be effective: communication, managing conflict and difficult behavior, decision-making, adapting to social styles, and intervention skills.[59] The authors argued that system and organization leaders need these skills the most because leaders are the ones who will reduce the barriers to completing QI work. The list of skills discussed by these authors, such as communication, illuminates that the concept of skills accounts for the discretionary steps within the larger QI project.

The idea of skills is often referred to by other concepts in the QI literature. Lucas [60] proposed a list of habits needed for improvement that could help inform what skills would be needed. The habits include systems thinking (making sense of the complexity by looking at the entirety and relationships rather than by splitting it down into its parts), learning, and

influencing, which overlap with the skills proposed by previous authors. In an editorial, Pronovost [61] argues that QI work must address both technical and adaptive issues by describing an example of how it is an adaptive challenge to make changes to people's priorities, beliefs, habits, and loyalties. This challenge is aligned with social skills. He goes on to talk about leadership skills and strategies needed for successful QI work and offers a list of recommendations for QI project leaders.

More recently, research has begun to explore the skills QI teams need to complete QI work. An article that examined how Clinical Nurse Specialists describe the skills and attributes needed to promote evidence-based practice (EBP) in their workplaces identified communication and people skills as most important.[62] Mills et al. [63] discuss the need for interpersonal team skills for QI teams to make progress with their projects. Ginsburg et al. [64] examined frontline teams and found QI helps them develop clinical and technical skills. Montgomery et al. [65] write on the importance of "team capital" (the collective resources, skills, and knowledge within an interdisciplinary team) as being a key factor for QI success. Wright et al. [66] identify six skills and tasks that frontline QI teams employed to complete their work. These authors collectively contribute to the research on how frontline improvement practitioners are completing QI work.

The work on skills in QI has mainly been conceptual and based on expert opinion, with few studies empirically aiming to examine skills: the knowledge base of skills in QI is underdeveloped. There is limited research as to *which* skills are needed by QI practitioners to successfully complete QI projects. This is significant, given the substantial investment in QI training programs and the continual demand for improved practice. More importantly,

understanding skills will allow scholars to understand 'how' practitioners are navigating contextual factors to manage the fit between an intervention and context. A better understanding of the 'how' will help scholars to develop further QI theory where the constructs (factors) are connected by mechanisms (the how).

1.4 RESEARCH OBJECTIVES

My dissertation will be guided by the following research questions to address the gaps in the literature regarding context and skills in QI work:

Aim 1: Identify how context is operationalized within the quality improvement literature.

RQ 1: What is known and not known in the literature about how context is operationalized?

Aim 2: Elucidate how QI practitioners navigate context to obtain buy-in from stakeholders.

RQ 2: How do QI practitioners obtain stakeholder buy-in?

Aim 3: Explain the process by which experienced QI practitioners apply skills in their practice to complete QI projects and navigate context.

RQ 3: How do experienced QI practitioners gain QI skills and apply skills in projects?

It is critical to unpack how context is operationalized as a concept by scholars, how strategies are used to navigate context by practitioners in the real world, and how QI practitioners apply skills in QI projects to navigate context in their practice because context, strategies, and skills directly influence QI project success in practice. This dissertation addresses the disconnect between research and practice, specifically between how context is operationalized in the

literature and navigated in practice by reviewing the literature and conducting interviews with experienced QI practitioners. I aim to better understand context, stakeholder buy-in, and skills within QI work to inform how QI practitioners should be trained and how healthcare organizations can support individuals performing QI work.

1.5 DISSERTATION OVERVIEW

To meet these goals, Chapter 2 provides an overview of my methods and presents the conceptual model that informs this dissertation. In Chapter 3, I address my first research question by presenting my findings from a scoping review of reviews on context. Then I examine strategies for obtaining buy-in and skills in Chapters 4 and 5, respectively. In the concluding chapter, Chapter 6, I summarize the dissertation's major findings and make recommendations. In this section, I tie everything together and help the reader see how the articles, taken together, contribute to the knowledge base regarding context, strategies, and practitioner skills. Further, the conclusion presents a revised conceptual model based on the findings from both studies.

1.5.1 Summary Table

Table 1 provides an overview of the dissertation by mapping the aim to the main research question, gap in the literature, and significance. Each aim corresponds to a manuscript.

Table 1: Overview Table of Dissertation

Manuscript /Aim	Overarching Research Question	Gap in literature	Significance to QI literature
1	What is known and unknown in the literature about how context is operationalized in terms of contextual factors, factor interactions, and	**Known**: QI theory is unable to fully explain why an outcome of a QI project occurred. Context, composed of contextual factors, is the all-encompassing concept to explain a QI project outcome. **Unknown**: It is unclear how the QI literature collectively (1) operationalizes context—	It is important to identify what is known and unknown about how context is operationalized in the QI literature to inform future directions of research.

	mechanisms?	turning the abstract concept into distinct, measurable observations; (2) explains how components of context interact; and (3) describes the activities performed by QI teams to interact with context.	
2	How do QI practitioners obtain stakeholder buy-in?	**Known**: QI practitioners employ strategies to involve and engage stakeholders in the QI process. **Unknown**: There is limited literature on what strategies are used to obtain buy-in.	It is important to conceptualize the ways in which QI practitioners obtain buy-in to inform how healthcare organizations can support the work of QI practitioners.
3	How do experienced QI practitioners gain QI skills and use skills in projects?	**Known**: QI practitioners use multiple skills to complete QI work. **Unknown**: There is limited literature on which skills are used in QI work and how QI practitioners gain skills and knowledge.	Better understanding skills in QI work will inform how QI practitioners are trained and supported at work.

1.5.2 Roadmap Graphic

To guide the reader through my dissertation, I placed a graphic (Figure 1) at the start of all subsequent chapters to remind the reader where they are and what is to come.

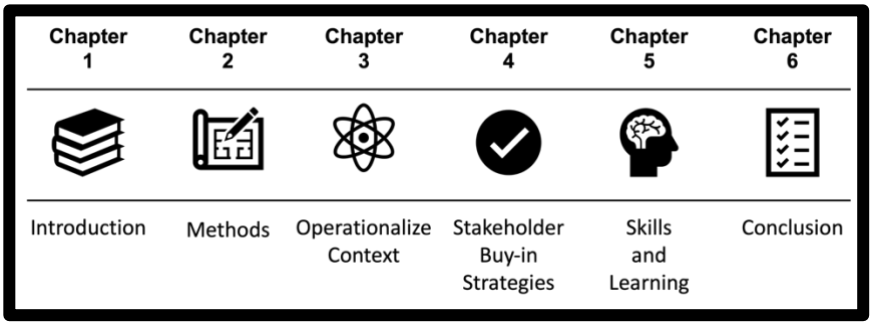
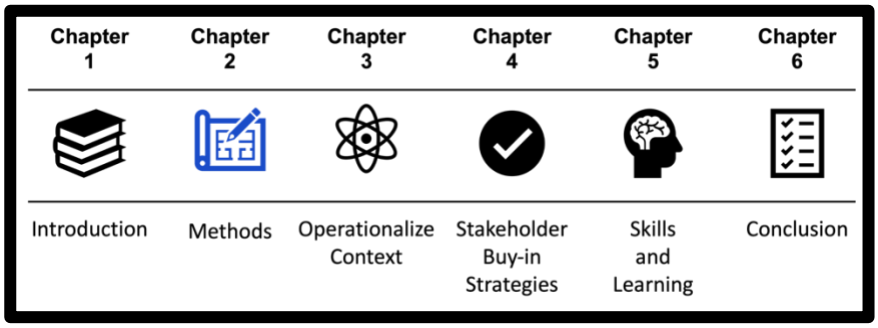


Figure 1: Roadmap Graphic for Dissertation

CHAPTER 2: METHODS OVERVIEW



"All models are wrong, but some are useful"
-George E. P. Box

In this chapter, I outline the methods I used for both studies in this dissertation and present the conceptual model and key concepts that underpin my dissertation. The next 3 chapters, which are the 3 manuscripts, describe a condensed version of the methods described below. In this dissertation, I seek to understand how context is operationalized within the literature, how context is navigated, and how skills are applied in QI projects. I use the Donabedian model, a seminal model to the field of health services research model and the sub-field of quality improvement, as my dissertation conceptual model to serve as a lens to answer each research question.

2.1 CONCEPTUAL MODEL

I used an established theoretical model to be the lens when interpreting the findings of my study. The following section provides an overview of the model for my dissertation and how it informs both of my studies.

2.1.1 The Donabedian Model

In 1966, Avedis Donabedian, a physician and professor of health services at the University of Michigan School of Public Health, published what has come to be known as the Donabedian model in a landmark article entitled "Evaluating the Quality of Medical Care" in *The Milbank Quarterly*. In this article, Donabedian explains how healthcare quality may be evaluated using the quality of care model, which is the triad of structure, process, and outcome (see Figure 2).[67] Structure is defined as the setting in which healthcare is provided (e.g., facilities, equipment, numbers, and qualification of personnel); process as what is done in giving and receiving care (e.g., patient and doctor activities, doctor-patient communication and information); and outcome, as the consequence of the provided health care (e.g., health status, satisfaction, and costs).[67] As Donabedian eloquently puts it: "good structure increases the likelihood of good process, and good process increases the likelihood of good outcomes."[68] The interaction between the categories can be bidirectional, and it is not a simple separation between cause and effect.[67] The movement is an "unbroken chain of antecedents, followed by intermediate ends, which are themselves the means to still further ends."[67] The information gathered from the structure, the process, and the outcome may be analyzed to make inferences and draw conclusions about the healthcare quality of a given healthcare system.[69]

Even though the Donabedian model is simple, Donabedian was far from a reductionist for several reasons.[70] First, the Donabedian model went beyond previous work on quality assessment. According to Donabedian, Ernest Codman's contribution to quality assessment in the early 20th century was his focus on healthcare outcomes. Codman wanted to measure end results, as Donabedian said he also did, to enhance accountability. Donabedian's trinity helped

with accountability by emphasizing structures and processes that lead to outcomes, such as those part of governance and management.[70] Second, Donabedian, in 1998, told an oral historian that he thought his work "is a good way of thinking about these problems."[70] His model is simply a tool for thinking and not a prescription for determining quality. Third, toward the end of his life, Donabedian worried about an "industrial model" of quality improvement. In an interview just before his death, he famously said, "The secret of quality is love. You have to love your patient, you have to love your profession, you have to love your God."[70] Quality cannot be reduced to structure, process, and outcome; intangibles like love lead to good quality.

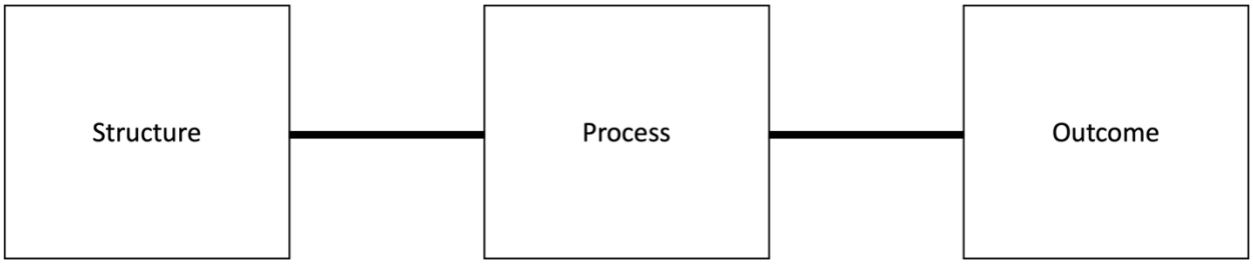


Figure 2: Donabedian Model as Dissertation Conceptual Model

2.1.2 Applying the Donabedian Model to My Dissertation

As discussed in the first chapter of this dissertation, QI improvement projects often fail, and scholars seek to understand better why projects fail to help increase the rate of success. Within QI projects, the Donabedian framework provides 3 areas for measurement that a project team can use. For example, in a project aiming to reduce catheter-related blood infections (outcome), the team may implement a dressing change kit for nurses to use (process) and provide an in-service training to the nurses on each unit on how to use the kit. The QI project may have the outcome measure of the number of catheter-related blood infections, the process measure of the number of catheter dressing changes completed by nurses using kits, and a structure measure

of the percent of nurses on a unit who have completed catheter dressing kit training. Measurement helps the QI team be objective in the success of their project.

The problem of project failure is not unique to healthcare projects but exists across disciplines. The input–process–output (IPO) model is a widely used approach to systems analysis for describing the structure of an information processing program or other processes. This model is applied to teams to explain the factors influencing a team's performance.[71] It rests on the assumption that a team is more than the sum of its members. It suggests that there are interactions and feedback between many contributing factors. Inputs are the conditions that exist prior to group activity, whereas processes are the interactions among group members. Outputs are the results of group activity that are valued by the team or the organization. The IPO model's triad of components perfectly maps onto the Donabedian model.

Context is often conceptualized as being composed of factors that help explain the outcome of a QI project. As seen in the Donabedian model, as well as the IPO model, outcomes (or outputs) are determined by structures (or inputs) and processes. In this dissertation, I use a lens of structures, processes, and outcomes when operationalizing context and exploring the work of QI practitioners. In the following sections, I outline the methods of the 2 studies I conducted.

2.2 METHODS OF STUDY 1

In my first study, I conducted a scoping review of reviews to explore how the literature operationalizes context within quality improvement.

2.2.1 Why a Scoping Review of Reviews?

I draw upon scoping review methodology because this type of review explores conceptual questions and has structured guidelines. Tricco et al. [72 (p 467)] explain "systematic reviews are useful for answering clearly defined questions (e.g., "Does this intervention improve specified outcomes when compared with a given comparator in this population?"); whereas scoping reviews are useful for answering much broader questions (such as "What is the nature of the evidence for this intervention?" or "What is known about this concept?")." Scoping reviews are rigorous in their methodical approach of examining the extent, range, and nature of research activity in a particular field. I will be reviewing reviews because multiple reviews have been published on context or contextual factors in quality improvement and related fields.

2.2.2 Study Design

I conducted a scoping review of reviews where I reviewed other reviews on context. To design this study, I used published guidelines, the methodology manual published by the Joanna Briggs Institute for scoping reviews, and the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) reporting guideline Extension for Scoping Reviews.[72,73,74] I used the 5 stages of Arksey and O'Malley's framework to design my study: (1) identifying the initial research questions, (2) identifying relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing, and reporting the results.

The objectives, inclusion criteria, and methods for this scoping review of reviews were specified in advance and documented in a protocol. The international prospective register of systematic reviews, PROSPERO, administered by the University of York's Centre for Reviews and Dissemination, states on its website that non-systematic reviews are currently ineligible for

registration in the database.[75] I published my protocol prospectively on Northwestern's DigitalHub after completing the pilot screen (described below in the study selection). See Appendix A for the published protocol.

A scoping review is more of an iterative process than a systematic review. Thus, many research design choices were established *a priori*, but there was some flexibility in the design once the study was started. For example, the variables for data extraction and resulting sub-headings changed based on findings. Deviations from the protocol are explicitly highlighted and explained in the review write-up.[73]

1. Research Questions

Arksey et al. [76] suggest an iterative process for developing one or more guiding research questions, where each revision is driven by increasing familiarity with the literature. My initial overall research question was: *How is context operationalized?* It changed to: *How does the literature operationalize context within QI literature?* In doing so, I will answer the following research questions:

1. How have authors of the reviews included in this paper (hereafter referred to as 'review authors') chosen papers to review?
2. How have review authors defined context?
3. How have review authors viewed frameworks in relation to context?
4. What categories of factors comprise context as identified by review authors?
5. How have review authors captured the interaction between factors and/or levels of factors?

6. How have review authors captured activities performed by teams or individuals to address context?

2. Search Strategy

I worked with a librarian to conduct the search. The following electronic databases were searched: PubMed, Cochrane Database of Systematic Reviews, EMBASE, and CINAHL. The search terms were kept broad to capture reviews that discuss context. The search strategy was developed first for PubMed and adapted later to search other databases (with no year or language limitation). Table 2 displays the key search terms for PubMed. Appendix B contains the search strategy for all databases (PubMed, CINAHL, Embase, and Cochrane Database of Systematic Reviews.)

As a double check to my search strategy, I confirmed that the search included the reviews that I am currently aware of that discuss context or contextual factors (see Table 3). To increase the sensitivity of the search, I also reviewed reference lists to identify additional studies and searched Google Scholar (top 200 results). The gray literature was not searched. The gray literature is often searched to capture conference papers, abstracts, and white papers published by relevant organizations. Complete conference papers are not common within health services research disciplines, and abstracts are outside the scope of my study. Further, I did not seek out white papers because prominent healthcare quality organizations such as the Institute for Healthcare Improvement (IHI), Agency for Healthcare Research and Quality (AHRQ), and National Academy of Sciences (NAS) routinely publish their scholarly work to be indexed within PubMed. I did not contact experts in the field. I exported retrieved studies into EndNote™

20 software[77] and then exported them to Rayyan© [78] ; duplicates were removed using the respective software's duplicate function.

Table 2: Concepts in Search Strategy

Concept	Key Search String terms	Reason
Review	Meta-analysis OR meta-synthesis OR scoping review OR scoping study OR rapid review OR critical review OR review	The scope of this review is to only review reviews.
QI	Quality improvement OR implementation science OR Organization change OR Diffusion of innovation OR Improvement science OR Knowledge translation OR Translational research OR implement	The discipline of this review is QI. Since many QI projects also use implementation science and related fields' frameworks, I included related disciplines as well.
Context	context OR environment OR setting NOT "in the context of"	My goal is to identify how context is conceptualized. However, this concept is difficult to incorporate into the search due to differing terminology. To capture all related reviews, I reviewed the terms used in the reviews identified in Table 3 to help guide my search.
Factors	Factor OR driver OR determinant OR variable	

Table 3: List of Articles to Double-check Search

Authors (year)	Title	Journal
Coles, E., Anderson, J., Maxwell, M., Harris, F. M., Gray, N. M., Milner, G., & MacGillivray, S. (2020).	The influence of contextual factors on healthcare quality improvement initiatives: a realist review.	*Systematic Reviews*
Dodek, P., Cahill, N. E., & Heyland, D. K. (2010).	The relationship between organizational culture and implementation of clinical practice guidelines: a narrative review.	*Journal of Parenteral and Enteral Nutrition*
Kaplan, H. C., Brady, P. W., Dritz, M. C., Hooper, D. K., Linam, W. M., Froehle, C. M., & Margolis, P. (2010).	The influence of context on quality improvement success in health care: a systematic review of the literature.	*The Milbank Quarterly*
Kringos, D. S., Sunol, R., Wagner, C., Mannion, R., Michel, P., Klazinga, N. S., & Groene, O. (2015)	The influence of context on the effectiveness of hospital quality improvement strategies: a review of systematic reviews.	*BMC Health Service Research*
Moullin, J. C., Dickson, K. S., Stadnick, N.	Systematic review of the	*Implementation Science*

A., Rabin, B., & Aarons, G. A. (2019)	Exploration, Preparation, Implementation, Sustainment (EPIS) framework.	
Nilsen, P., & Bernhardsson, S. (2019).	Context matters in implementation science: a scoping review of determinant frameworks that describe contextual determinants for implementation outcomes.	*BMC Health Service Research*
Rogers, L., De Brún, A., & McAuliffe, E. (2020)	Defining and assessing context in healthcare implementation studies: a systematic review.	*BMC Health Service Research*

3. Study Selection

After completing the searches with the help of the librarian, I worked with 2 other researchers to select the studies. At the time of the study, Carmen Marina Diaz (hereafter referred to as CMD) was a PhD Candidate at the Kellogg School of Management, and Kendall G. Fancher, an internal medicine physician (hereafter referred to as KGF), was an Academic Fellow in Healthcare Quality and Patient Safety at Northwestern Medicine.

First, the librarian randomly selected 100 articles from the PubMed search for all reviewers (CMD, KGF, and IAT) to complete a pilot screen to help refine the inclusion/exclusion criteria using the publicly available literature review software, Rayyan© [78] (access via https://www.rayyan.ai/). From the pilot screen, criteria regarding scope were added to the exclusion criteria (last 3 bullet points in the table below). The eligibility criteria are based on the scope of the study. The eligibility criteria are broad to ensure a balance between a specific and sensitive search of the literature. See Table 4 for the inclusion and exclusion criteria.

Table 4: Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion Criteria
• Types of studies included ○ All types of reviews	• Non-review papers (ex: commentaries, editorials, etc.)

• Domain being studied
  ○ Context is the focus of the published review, as in the aim of the review explicitly sought to explore context, factors affecting QI outcomes, the environment, or the setting of QI projects.
  ○ The review discusses contextual factors or related terms such as drivers, facilitators, barriers, variables, or determinants
• Participants/population:
  ○ All countries
• Concept:
  ○ Quality improvement (QI)
  ○ Implementation science
  ○ Improvement science
  ○ Diffusion of innovation
  ○ Knowledge translation
  ○ Translational research
  ○ Organizational Change
• Context:
  ○ In the context of healthcare
	• A review without a stated methodology or that is not systematic
	• Review protocols
	• The application of a single framework to interpret review results
	• The focus of the review is an intervention or program
	• The focus of the review is implementation strategies

After the criteria were refined, all search results were uploaded into Rayyan© [78] for review. We conducted a two-part study selection process. First, titles and abstracts were reviewed by reviewers (IAT plus CMD or KGF) to determine eligibility based on the defined inclusion and exclusion criteria. At this primary stage, any records of which we were uncertain were retained for further consideration. Since we encountered a wide range of reporting styles in the abstracts of the reviews, the second stage of study selection required us to independently examine the full text of the remaining articles to determine eligibility. Discrepancies in study selection between reviewers were resolved by group consensus.

4. Data Extraction

Dixon-Woods et al. [79] discuss how to synthesize literature within reviews. The authors recommend utilizing narrative summary, thematic analysis, grounded theory, meta-ethnography, meta-study, realist synthesis, data analysis techniques described by Miles et al. [80], content analysis, case survey, qualitative comparative analysis, or Bayesian meta-analysis. I used the data analysis techniques described by Miles et al. [80] because the authors outline strategies for both inductive and deductive coding. The application of these authors' qualitative techniques for literature reviews has been described by Onwuegbuzie et al. [81]

All eligible papers were uploaded into MAXQDA 2020 for analysis. First, I reviewed and coded a subset of the included articles in the familiarization phase to create an initial codebook. This pilot approach is favored by other authors who have conducted scoping reviews.[73] Codes for data extraction were chosen to provide study characteristics, capture key findings of the articles, and reflect the research questions. Final codes by study objective are presented below in Table 5. After coding all the papers, I created a matrix that summarizes the findings for each code and article. This is similar to the commonly used data extraction chart used for reviews: The codes comprise the columns in the chart (see Supplement 1), and the rows are the summary of findings from each included paper. The benefit of creating the chart from codes in the MAXQDA® 2020 software [82] is that the summarized data is connected to the original data within the matrix. Both CMD and KGF reviewed the results in the extraction chart to ensure the comprehensiveness and accuracy of the scoping review synthesis. (This approach was used in Goertzen et al. [83]) Disagreements were discussed until a consensus was reached.

Table 5: Codes Mapped to Research Questions

Research Questions/objectives	Codes
Overview of articles	• Author • Year • Journal • Discipline • DOI • Aims and objectives of review • Type of review

1. How have authors of the reviews that will be included in this paper (hereafter referred to as 'review authors') chosen papers to review?	• Inclusion criteria used in the review
	  ○ search terms
	  ○ eligibility criteria
	• Number of studies included in the review

2. How have review authors defined context?	• Definition of context
3. How have review authors viewed frameworks in relation to context?	• Frameworks
4. What categories of factors comprise context as identified by review authors?	• Definition of contextual factors • Number of factors (where appropriate) • Factor categories used by the review authors • Categories of factors
5. How have review authors captured the interaction between factors and/or levels of factors?	• Any discussion of role of interactions
6. How have review authors captured activities performed by teams or individuals to address context?	• Any discussion of role of team/individual • Any discussion of role of activities

5. Summarizing Results

In the final phase of my analysis, I looked for patterns in the extraction table (Supplement 1) to answer and write up the findings for each research question.

2.2.3 Ethics

This study does not meet Northwestern Institutional Review Board's criteria for human subject research as the study is limited to publicly published information.[84]

2.2.4 Deviations From the Protocol

I made 3 changes to the protocol. First, I added criteria to the exclusion criteria. I realized there was a need for an iterative process when the initial searches primarily resulted in articles about specific interventions, settings, and disciplines rather than articles about the concept of context in general. My intention to examine context as a theoretical concept prompted me to refine the exclusion criteria to focus on reviews about the concept of context in general or acute care. I excluded studies that focused solely on the context of a specific healthcare setting, such as mental health.

Second, I updated the inclusion criteria. Realist reviews rely on data saturation instead of systematic methods. The criteria were altered from requiring papers to have systematic methods to also including studies that aimed for data saturation to include realist reviews. A realist review answers the question, "what works, for whom, and under what circumstances?" These reviews focus on understanding and unpacking the mechanisms by which an intervention works (or fails to work).[85]

Third, I refined the overarching research question. Initially, I aimed to operationalize context and contextual factors. After reviewing the full text, I noticed an overlap in the aims of the papers, such as listing factors and reviewing frameworks. This led me to extract data related to frameworks and disciplines inductively. Focusing on comparing factors, categories, and frameworks led me to update the overarching research question to "how have factors been grouped to operationalize context within the literature?"

2.3 METHODS OF STUDY 2

In my second study, I interviewed QI practitioners to understand how QI practitioners assess and address context. Initially, in this study, as outlined in my dissertation proposal, I sought to answer 2 research questions: (1) How do QI practitioners consider and assess the context when designing and implementing QI interventions? And (2) How do QI practitioners select strategies to leverage facilitators and address barriers in QI interventions? The initial findings showed that QI practitioners did not take formal steps to assess the context nor engage in an extensive decision-making process for selecting strategies to help them navigate the context. Upon conducting a preliminary inductive analysis of the interview transcripts, the concepts of context and QI practitioner tasks were present in the data. From these broad concepts, I subsequently identified 3 distinct areas: technical QI tasks, non-technical QI tasks, and learning to do QI tasks. The lens of task allowed me to explore strategies and skills since both concepts are composed of tasks. With these distinct ideas in mind, I refined my research questions: (1) How do QI practitioners obtain stakeholder buy-in? And (2) How do experienced QI practitioners gain QI skills and apply skills in projects?

2.3.1 Approach

Research aims dictate the research methods, and my research aims were better suited to qualitative research methods. I conducted a qualitative interview study of QI practitioners in a single health system. Weiss [86], in his widely cited book *Learning from Strangers*: *The Art and Method of Qualitative Interview Studies*, specifies that this approach aims to go beyond answers to set questions (like in a survey) but to capture the full story. In this approach, there are no uniform questions; thus, the flexibility in questions allows a fuller development of information.

Weiss [86] outlines seven types of research objectives that are appropriate for qualitative interview studies: developing detailed descriptions, integrating multiple perspectives, describing a process, developing a holistic description, learning how events are interpreted, bridging intersubjectivity (explain a situation from the insider or participant perspective), and identifying variables and framing hypotheses for quantitative research. I aim to understand better a process, which is an objective a qualitative interview study can answer.

2.3.2 Study Design

I conducted semi-structured interviews with experienced QI practitioners, starting with a set of predetermined open-ended questions, with other questions emerging from the dialogue.[87] Semi-structured in-depth interviews are the most widely used interviewing format for qualitative research and can occur either with an individual or in groups. Most commonly, they are only conducted once for an individual and can be used as the sole data source for a qualitative research project.[87]

Rationale for Semi-interviews

Semi-structured in-depth interviews are the most frequent qualitative data source in health services research.[88] This type of interview involves a dialogue between researcher and participant, guided by a flexible interview protocol and supplemented by follow-up questions, probes, and comments. Compared to structured interviews, semi-structured interviews allow for more leeway for following up on whatever directions are deemed important by the interviewee. Compared to unstructured interviews, the interviewer has a greater say in focusing the conversation on issues they deem important in relation to the research project.[89] The semi-

structured interview is sufficiently structured to address specific dimensions of a research question while leaving space for study participants to offer new meanings to the topic of study.

I selected the semi-structured interview because I could narrow down the areas and topics I wanted to present to QI practitioners through questions. A completely unstructured interview risks not eliciting from the participants the topics or themes more closely related to the research questions under consideration. There are some specific topics that I would have liked to cover, but at the same time, I wanted to hear their stories. Consequently, I used the format of an opening statement and a few general questions to elicit conversation. I had some additional questions designed to probe for information if it did not come up.

Participant Selection

Sampling:

I used snowball sampling, the well-known practice of asking interviewees to recommend other interviewees.[86] Snowballing almost always increases the number of respondents because people become more receptive to a researcher when a friend has vouched for the researcher.[90] The initial interviewees were referrals made by a senior performance improvement leader; subsequently, I asked interviewees for referrals. I used snowball sampling because this recruitment method utilizes a participant's social network to access a specific population that meets the study's inclusion criteria.[91]

Alternative sampling techniques include purposeful sampling and theoretical sampling. The definition of purposeful sampling varies amongst methodologists, and in a review of sampling in qualitative research, Gentles et al. [92] found extensive disagreement about what

qualifies as purposeful sampling. Patton's [93] typology of purposeful sampling strategies is influential and lists 40 sampling practices, including snowball sampling. Many of the practices listed are for a specific type of qualitative study, like a single-participant case study or a comparative case study.[93] The concept of theoretical sampling originated with grounded theory[94] and is broadly influential as authors make increasing reference to it in the general qualitative methods literature outside grounded theory. Theoretical sampling is "a process in which data gathering is guided by the evolving theory and the aim is to develop categories in terms of their properties and dimensions and integrate those categories (i.e., relate them to each other within the theory being developed)."[92] The goal of my study was not theory development. Thus, this sampling technique is inappropriate.

Inclusion/Exclusion Criteria

I define experienced QI practitioners as individuals actively engaged in QI projects and who have led projects.

Inclusion Criteria

- Has completed at least 2 QI projects
- Has led a QI project
- Is a healthcare professional or holds a position related to QI
- Works in a hospital

Exclusion Criteria

- Has not led a project
- Works in a healthcare setting that is not hospital-based
- Adults unable to consent/Cognitively Impaired[1]

[1] I do not believe any adults in these categories are QI practitioners within hospitals

- Individuals who are not yet adults (under 18 years of age) [2]
- Prisoners or other detained individuals[3]

Age Range
- Ages 18 to 89

Language
- English only

Sample Size and Saturation:

In broad terms, saturation is used in qualitative research as a criterion for discontinuing data collection and/or analysis. The origin saturation as a research concept is from grounded theory [94] but has been incorporated into other approaches within qualitative research as an essential element in various forms. This is evident in various qualitative methodologist claims about saturation: Fusch and Ness[95] claim categorically that "failure to reach saturation has an impact on the quality of the research conducted." Morse[96] notes that saturation is "the most frequently touted guarantee of qualitative rigor offered by authors." Guest et al. [97] refer to it as having become "the gold standard by which purposive sample sizes are determined in health science research." A number of authors refer to saturation as a "rule,"[98,99] or an "edict" of qualitative research,[100] and saturation is featured in a number of generic quality criteria for qualitative methods.[101,102]

[2] I do not believe there are any adults in these categories who are QI practitioners within hospitals

[3] I do not believe there are any adults in these categories who are QI practitioners within hospitals

Saunders et al. [103] propose that saturation has different purposes for different types of research. The authors propose 4 saturation models based on the writings of qualitative methodologists, as outlined in Table 6.

Table 6: Saturation Models as Described by Saunders et al. [103]

Saturation Model	Description	Principal Focus
Theoretical saturation	Relates to the development of theoretical categories; related to grounded theory methodology	Sampling
Inductive thematic saturation	Relates to the emergence of new codes or themes	Analysis
A priori thematic saturation	Relates to the degree to which identified codes or themes are exemplified in the data	Sampling
Data saturation	Relates to the degree to which new data repeat what was expressed in previous data	Data collection

The second model in Table 6, inductive thematic saturation, focuses on identifying new codes or themes and is based on the number of such codes or themes rather than the completeness of existing theoretical categories.[103] In this model, saturation appears to be confined to the level of analysis. The fourth model in Table 6 sees saturation in terms of identifying redundancy in the data and no necessary reference to the theory linked to these data. This saturation appears to be distinct from the meaning elucidated through data analysis. Some authors appear to combine 2 or more of the models defined above. Hennink et al. [104 (p 4)] identify "code saturation" as the point at which "no additional issues are identified, and the codebook begins to stabilize." This view seems to combine both inductive thematic saturation and data saturation elements. In addition, the authors identify "meaning saturation" as "fully understand[ing] conceptual codes or the conceptual dimensions of… concrete codes."[104 (p

14) This focus on saturating the dimensions of codes remains at the level of codes rather than theoretical categories developed from these codes, like in theoretical saturation. The authors explicitly position their approach outside grounded theory methods.

I align my study design with Hennink et al. [104], where the focus of saturation is during analysis and not sampling. I made this choice because my goal is not to build theory and thus is not underpinned by grounded theory. Saturation during analysis is aligned with the flexible scheduling of interviews. If I were conducting interviews based on saturation, I would have to space my interviews to allow for a complete analysis of a transcript before the subsequent interview. However, I wanted to keep scheduling flexible to accommodate the time that worked best for the interviewee and thus wanted to be allowed to conduct 2 interviews in a day. Guest et al. [97] found there must be a minimum of 12 participants to achieve saturation. Consequently, I paused data collection after completing 12 interviews to complete my preliminary analysis. When I completed coding, I had both code saturation (codebook is stable) and meaning saturation (understanding the issue with no additional insights arising).[104,105]

2.3.3 Data Collection

I conducted interviews via Zoom that lasted approximately 60 minutes. Interviews were audio recorded. I sent a one-page document in advance of the interview so that interviewees could have time to think about a QI project to talk about. As outlined in the IRB, verbal consent was obtained before the interview's start and recorded.

Interview Guide

Kallio et al. [106] outline a five-step framework for developing semi-structured interview guides: (1) identifying the prerequisites for using semi-structured interviews; (2) retrieving and using previous knowledge; (3) formulating the preliminary semi-structured interview guide; (4) pilot testing the guide; and (5) presenting the complete semi-structured interview guide.

1. Identifying If Should Use Semi-Structured Interviews

This phase aims to evaluate the appropriateness of the semi-structured interview method as a rigorous data collection method answering the selected research question(s). See my discussion of why I chose semi-structured interviews in section 2.3.2.

2. Retrieving and Using Previous Knowledge

This phase aims to gain a comprehensive and adequate understanding of the subject. As part of my dissertation proposal, I reviewed the literature related to context affecting outcomes of QI projects, and this literature review composes the first half of Chapter 1.

3. Formulating the Preliminary Semi-Structured Interview Guide

This phase aims to formulate an interview guide as a tool for interview data collection. The structure of my protocol is an introduction, basic information about the interview, demographic questions, content questions with probes, and a conclusion.[107] First, I introduced myself, explained the plan, and obtained consent. Next, per my interview guide, I asked 4 basic demographic questions about the current hospital: years at the current hospital, current role, years in the current role, and age. These questions aimed to obtain basic descriptive statistics to report about the sample in manuscripts.

For the main content, the interview guide is structured so that I explore how interviewees identified, utilized, and overcame organizational contextual factors as they walked me through a QI project they have completed. The interviews are guided by 3 main interview guide topics: QI experience, an overview of their most recent QI project, and lessons learned. I asked about lessons learned because participants, in answering the questions, often would talk about barriers they faced and how they learned to overcome those barriers. These barriers are part of the context, so their stories about overcoming barriers shed light on how they navigate context.

4. Pilot Testing Interview Guide

The aim of this phase was (1) to confirm the coverage and relevance of the content of the formulated preliminary guide, (2) to identify the possible need to reformulate questions, and (3) to test its implementation. I tested my interview guide by completing 2 pilot interviews.

5. Presenting the Complete Semi-Structured Interview Guide

The aim is to produce a semi-structured interview guide for data collection. After each interview, I examined if I needed to refine any interview questions so as necessary, the previous interview findings inform the questions for the following interview.[90] In the case of semi-structured interviews, the overall topics remain the same, but the probing questions are altered. See Appendix C for the final interview guide.

2.3.4 Ethics

I obtained Northwestern University IRB approval (STU00215660), and the study was deemed low risk. Consent was obtained verbally before the start of the interview; in addition, a copy of the consent was sent to each participant.

2.3.5 Analysis

All interviews were transcribed by a professional service and uploaded into the MAXQDA® 2020 software [82] for analysis. My unit of analysis was the individual QI practitioner. My analysis plan is based on the guidance outlined by Miles et al. [80], and I followed an inductive approach. I utilized first-cycle and second-cycle coding methods, memo writing, and data displays to identify patterns and themes. Qualitative analysis is an iterative process that starts at the time of data collection, in which I simultaneously wrote memos, coded, and made displays. Below I outline the steps I used to code, write memos, and make data displays as well as how I drew conclusions.

Coding Steps

Step 1: Become Familiar With the Data

I checked the transcripts against the original audio recordings for accuracy. As I read through the data, I wrote in-document memos in the margins about tentative ideas for codes, topics, and noticeable patterns or themes.

Step 2: First-Cycle Coding

In this phase, I started to organize my data in a meaningful and systematic way. Coding reduces data into small chunks of meaning. I used descriptive coding. A descriptive code assigns labels to data to summarize in a word or short phrase—most often a noun—the basic topic of a passage of qualitative data.[80] I read through the dataset again when I identified new codes to ensure the consistency of my coding; for example, a concept identified in the data of the last interview may actually also appear in the data of the first interview. Thus, once the code list was revised, the dataset needed to be revisited to ensure these codes were consistently applied.

Step 3: Second-Cycle Coding

Pattern Coding develops the "meta-code": the category label that identifies similarly coded data.[108 (p 212)] Pattern Codes not only organize the corpus but attempt to attribute meaning to that organization. I reviewed my conceptual framework, my memos, and first-cycle codes. I looked for commonalities within the codes, grouped together the different codes into possible categories, and assigned pattern codes. To collect similarly coded passages from the data corpus, I utilized the query function and the 'smart coding tool' in the MAXQDA® 2020 software [82] to group and arrange codes. In addition, I utilized data displays to help organize data as I examined different grouping options.

Step 4: Recode the Data Based on Initial Codebook With Second Coder

After I proposed an initial codebook, I worked with a second coder (CMD). In addition to getting feedback from another coder, I examined how the data "fit" each of my developing categories. First, CMD and I wrote and compared memos for the first 4 transcripts to identify the main ideas. When talking through memos, CMD helped me see that it would be challenging to fully tease out the skills that comprise interpersonal, intrapersonal, and technical skills. After I refined the codebook, we independently coded two transcripts, discussed codes/ideas until a consensus was formed, and made minor refinements to the codebook.

Step 5: Define Themes

I developed each theme by creating a definition and using extracts to tell a story of the data. The definition of each theme was summarized in a few sentences, and I kept in mind that each theme should be specific and not overlap.[109] To create a data narrative for each theme, I

selected data extracts from the displays I created to help identify themes. I made sure to draw extracts from multiple transcripts to show the breadth of the theme.

Visualize Data

Carefully comparing several extended transcripts is very difficult. It is usually poorly ordered and very bulky.[80 (p 106)] Data displays, such as matrices and networks, allow a summary of the data corpus to be visualized, which helps answer the research questions. I created data displays to systematically arrange the data to help me draw conclusions. Miles et al. [80 (p 293)] recommend first creating exploratory, descriptive, and/or ordered display formats intended to answer the research questions. From the coded data in the displays, conclusions of a descriptive sort can be drawn. From the descriptive conclusions drawn, explanatory displays can be built, coded data can be entered, and explanatory conclusions can be made. This process helped me move from first-cycle coding to second-cycle coding. Further, visualizing the themes identified through second-cycle coding allowed me to connect my themes to my research questions.

Memos

In addition to coding, I wrote memos as part of my analysis to document and reflect on my coding processes, the emergent patterns, and concepts in my data.[108 (p 41)] Codes listed in a dataset are nothing more than labels until they are analyzed. Memo writing throughout the entire research process aids in connecting codes to patterns.[108 (p 41)] Coding and memo writing are concurrent analytic activities, for there is "a reciprocal relationship between the development of a coding system and the evolution of understanding a phenomenon."[110 (p 397)] Thus, writing memos helped me move from one cycle of coding to the next, as well as to inform my data displays.

2.3.6 Reliability and Validity (Dependability and Credibility)

What are Reliability and Validity?

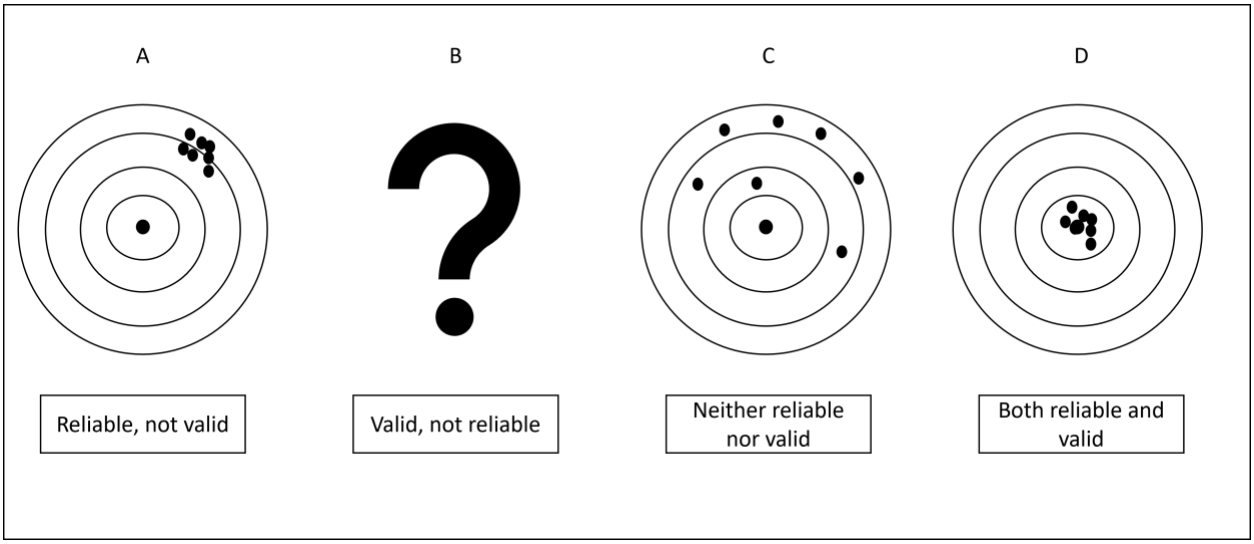
The terms validity and reliability are part of the research vernacular across multiple disciplines, and the connotations associated with these terms are as varied as the fields that use them. Validity is the notion that one is assessing what one intends to assess. Complicating the multiple meanings of the general term validity are various types of validity to which researchers and the research literature often refer. The types most discussed are face validity, content validity, construct validity, criterion validity, and external/internal validity (see Table 7 for definitions).[111] Guest et al. [111] argue that only "face" and "external" validity are applicable to most qualitative research. The other subtypes are more salient for quantitative data and/or experimental designs. Reliability is the notion of consistency when repeating or comparing assessments within a study. The relationship between reliability and validity is often visually depicted using the target analogy in Figure 3, which shows 4 different variations of possible relationships between the two concepts. The graphic is useful for understanding the general relationship between the two concepts, but we find it even more useful for illustrating an additional point: that it is impossible to have a situation of high validity and low reliability. Lincoln et al. [112 (p 316)] sum this relationship up nicely: "Since there is no validity without reliability … a demonstration of the former is sufficient to establish the latter."

Table 7: Definitions of Specific Types of Validity, Adapted from Guest et al. [111]

Type of Validity	Definition
Face	The degree to which an indicator for a concept (e.g., question, scale) intuitively makes sense. Determined by consensus among researchers
Content	The degree to which an instrument has the appropriate range of content for measuring a complex construct or concept
Construct	The degree to which a measure relates to other variables as expected within a system

	of theoretical relationships
Criterion (also called predictive validity)	The degree to which a measure relates to some external criterion that is known to be valid
External	The degree to which study findings are relevant to other populations and contexts (i.e., generalizability or transferability)
Internal	The degree to which one can be certain that changes in the dependent variable were actually caused by the experimental treatment

Figure 3: Visual Relationship Between Validity and Reliability, Adapted From Guest et al. [111]



Scholars argue that the terms ‘validity’ and ‘reliability’ are born of the quantitative tradition and, therefore, have little or no value for qualitative inquiry and should be replaced with other terms (e.g., Auerbach et al. [113]; Corbin et al. [114]; Golafshani [115]). Because of this latter school of thought, many alternate terms have been created. Examples of these with respect to validity include trustworthiness, worthy, relevant, plausible, confirmable, credible, and representative.[116] The most used term among these, however, is still Lincoln and Guba's credibility—which the authors also call truth value.[112] Credibility refers to the “confidence in

the truth of the findings, including an accurate understanding of the context"[117] and is commonly used in qualitative inquiry in place of the term validity.

Similarly, a parallel set of arguments and alternative terms has been proposed for reliability. Examples of the latter include words such as stability, consistency, predictability, and accuracy, as described by Kerlinger [118], but the most employed surrogate term is dependability, made popular through Lincoln and Guba's landmark book *Naturalist Inquiry*.[112] According to Ulin et al. [117], dependability refers to "whether the research process is consistent and carried out with careful attention to the rules and conventions of qualitative methodology."

Reliability (dependability) and Validity (credibility) in the Study

To ensure reliability and validity in a study, researchers must consider strategies at each stage of the research process. Miles et al. [80 (p 272)] outline 12 points to consider for helping to address validity, and Guest et al. [111] describes 15 techniques for enhancing validity and reliability. In Table 8, I discuss how I used each of the strategies that Miles et al. [80 (p 272)] and Guest et al. [111] suggest as applicable.

Another concept that overlaps with reliability and validity that scholars discuss within qualitative research is bias. Miles et al. [80 (p 270)] discuss how there are strategies to address researcher bias. Per suggestions by Miles et al. [80], I detailed my methods and procedures for collecting, processing, condensing, and displaying specific data conclusions. I made a point to explicitly memo my assumptions and biases. Miles et al. [80 (p 272)] also suggest that "forms of peer or colleague review are in place." I utilized a second coder, asked for feedback from my dissertation committee, and presented my findings to my PhD program for feedback as well.

Table 8: Strategies to Address Validity and Reliability, Adapted From Miles et al. [80 (p 272)] and Guest et al. [111 (p 99)]

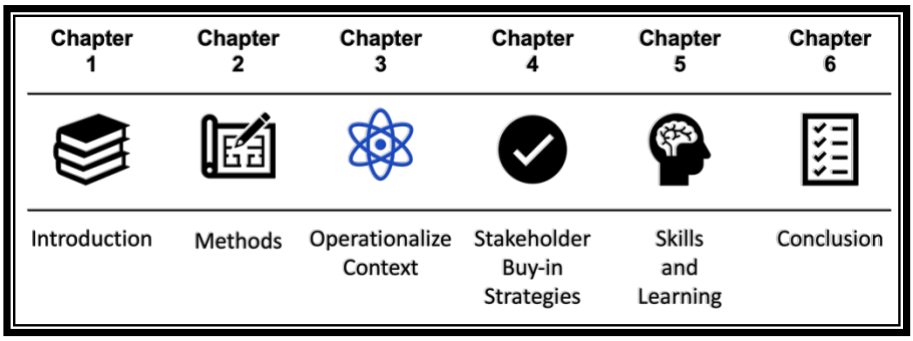
Strategies to Increase Validity and Reliability	How will I address?
Research Design Stage	
1. Team-based instrument development and pretest	I received feedback from my dissertation committee on the interview guide and pretested the guide with a pediatric QI practitioner to ensure the questions made sense to the participants.
Data Collection Stage	
1. Qualitative research training	As part of my PhD training, I completed two qualitative research courses and was a student researcher on other qualitative studies.
2. Collect data so that transcription provides a verbatim account	All interviews were audio recorded so that interviews were transcribed verbatim.
Data Analysis Stage	
1. Descriptions are context-rich, meaningful, and "thick" (Geertz, 1973).	In my narrative story of presenting my data, I included a description of the relevant context.
2. The account rings true, makes sense, seems convincing or plausible, and enables a vicarious presence for the reader.	I received feedback on the narrative story I presented for each theme from my committee.
3. Triangulation among complementary methods and data sources produced generally converging conclusions. If not, the procedures for reconciling the differences and their results are explained.	I conducted an interview study, so multiple types of data cannot be compared.
4. The data presented are well linked to the categories of prior or emerging theory. The measures reflect the constructs at work.	I connected my findings to the QI literature.
5. Findings are clear, coherent, and systematically related—that is, unified (Charmaz, 2006; Eisner, 1991).	I created a thematic map to visualize my themes.
6. Confirmation procedures for assertions, propositions, hypotheses, conclusions, and so on are described.	I detailed my analysis process in my write-up.
7. Any areas of uncertainty have been identified.	I wrote memos about ideas in my data that were unclear.
8. Negative evidence was sought (and, if applicable, found and accounted for in the analysis and write-up).	I looked for negative evidence in my analysis.
9. Rival explanations have been actively considered.	For each theme, I considered rival explanations.
10. When possible, findings have been replicated in other parts of the database than the one they arose from.	n/a
11. The conclusions were considered to be accurate by the original participants. If not, a coherent explanation is offered.	I checked my findings with the participants.
12. If predictions were made in the study, their accuracy is reported.	n/a

2.4 CONCLUSION

In order to answer my research questions, I conducted 2 studies. In my first study, I conducted a scoping review of reviews to operationalize the concept of context. This was the best method to answer my research question because scoping reviews are best for answering broad, conceptual questions, and a review of reviews is best when multiple reviews exist regarding a topic. In my second study, I conducted an interview study to answer two main research questions: how do QI practitioners obtain buy-in, and how are skills applied in QI projects? This was the best method to answer my research questions because qualitative methods are helpful in understanding the "how" and "why." Stories from interviews revealed the granular details of the steps taken in QI projects, which allowed me to understand the types of tasks QI practitioners completed in a QI project.

In the upcoming chapters, I will present 3 manuscripts and a conclusion. The 3 manuscripts are formatted and written to be submitted to journals. Of note, I use the word "we" instead of "I" to reflect that the manuscripts have multiple authors, but I am the first author for all 3. In the concluding chapter, I revisit the conceptual model proposed in this chapter and make connections between the 3 manuscripts.

CHAPTER 3: [MANUSCRIPT 1] The State of the Literature on Context as a Concept within Quality Improvement and Implementation Projects: A Scoping Review of Reviews



"'Context' is one of those words you will encounter again and again, without anyone offering anything like a useful definition. It is something of a catch-all word usually used to mean 'all those things in the situation which are relevant to meaning in some sense, but which I haven't identified."
-Noel R. Williams[119]

3.1 ABSTRACT

Introduction: Quality scholarship focuses on the concept of 'context' to help explain differences in the outcome of the same project at different institutions and to elucidate the complexity of the influence of factors within a project's surroundings. Even though scholars agree that context is critical to project outcomes, the concept of context varies amongst prominent quality improvement (QI) and implementation science frameworks. To provide clarity on what context is, we aim to operationalize the concept of context based on published literature reviews.

Methods: We conducted a scoping review of reviews by searching PubMed, CINAHL, Embase, Cochrane Database for Systematic Reviews, and Google Scholar, as well as hand-searching

reference lists of included articles. Two reviewers screened each potential abstract and full-text paper against the selection criteria. Results were synthesized using a narrative approach.

Results: The application of the search strategy resulted in a total of 3879 unique articles. Twenty-four articles met the inclusion criteria. We asked 6 research questions about how reviews were chosen, how context was defined, how frameworks were used, how factors were grouped to comprise context, the role of interactions, and how activities were discussed. Our findings show that context is not consistently defined across fields nor conceptualized in terms of the same factors or groupings of factors within frameworks. Further, the included reviews rarely explored the complexity of context by exploring how factors interacted or how context can be navigated by QI teams.

Conclusion: Our findings suggest that context is a distinct construct from the quality intervention, QI project process, and QI team. Each of these constructs (context, intervention, process, and team) have associated factors that predict success, but context is only a subset of all factors that contribute to the outcome of a QI project. Thus, researchers and practitioners should explore not only the impact of the context on a project's outcomes but the impact of the intervention, process, and team as well.

Keywords: Context, Contextual factors, Quality Improvement, Implementation Science, Scoping Review

3.2 INTRODUCTION

In quality improvement (QI), the same initiative at different healthcare organizations can have different outcomes due to the "black box of causation."[7] The 'black box' refers to a twofold idea: (1) the unknown complex structures and processes that explain what caused the outcome of a project and (2) the tendency to assume a simple, linear path between the intervention and the outcomes it yields.[120] To elucidate the complexity of the story behind a QI project's outcome, within the last decade, literature started to focus on the concept of 'context' to help explain differences in the outcome of the same project at different institutions as well as identifying components of context (contextual factors) as reasons for a project's success.

Context can be viewed broadly as being composed of factors (also known as components or variables) not directly part of the QI process or intervention. But what does this precisely mean? To try to understand this general definition, let us look at an empirical example where the authors attempt to unpack the 'black box' to demonstrate the role of context in a quality project. In the *Michigan-Keystone* study, 103 intensive care units (ICUs) in Michigan implemented a multifaceted quality intervention that led to a major reduction in the cases of central venous catheter bloodstream infections.[2] When the intervention was similarly implemented in the *Matching Michigan* study in over 200 ICUs in England, it failed to produce the same successful results. Many units simply implemented a "checklist" for the multi-discipline nurse-physician teams to follow but did not address nor adapt to contextual factors that served as barriers nor adapt the intervention to better fit the context.[3,4] The most successful unit in the second study was a noteworthy exception: the QI team addressed the power dynamics amongst the disciplines within the unit, like in the original study. The team, as part of the checklist intervention, fostered

a flattened unit hierarchy and empowered nurses and resident physicians to act on any breaches in sterile technique they observed.[4] Amongst the units in both studies, the intervention (the checklist) and the high-level process (the protocol followed to participate in the study) were the same. The characteristics of the environment surrounding the intervention and process, which is the context, shaped the outcome of the project, and the QI teams needed to take action to navigate the contextual factors that were barriers during the project. As this example highlights, context cannot be understood by discrete factors alone—power dynamics is the result of many factors, such as relationships and beliefs, interacting in the environment. Even though there is much agreement within the literature that context is essential to the outcomes of QI work, the concept of context is nebulous. To understand how context is currently conceptualized, we must examine how other researchers have described and operationalized context.

Scholars attempt to provide clarity to context through the development of theories, models, and frameworks (TMFs), but context plays variable roles within TMFs, and there is no uniform definition of the term.[121] Some TMFs provide a list of factors to consider in the implementation of a QI intervention. In frameworks such as the Model for Understanding Success in Quality (MUSIQ), context is explicit, and factors are specifically 'contextual factors.'[11] In other frameworks such as the Consolidated Framework for Implementation Research (CFIR), the term context is not used, and factors are called determinants.[10] Some frameworks include factors related to the intervention, process, and team, while others do not. There is a lack of clarity as to what context is, and a list of factors is not enough. To understand the black box of causation—the mechanisms by which context affects a project—we need to understand not only the

components of context but interactions and connections between factors. All these aspects together help answer the question of *how* context affects project success.

To address the ambiguity of the concept of context, we conducted a scoping review of reviews. We judged a "meta-review" to be the most appropriate method to address this complex area as there is a vast literature about the term "context," which is highly heterogeneous.[122] Existing reviews tend to focus either on a particular aspect of context or a narrow setting. Conducting a scoping review of reviews enables the findings of individual reviews to be brought together and compared, with the aim of providing a single comprehensive overview, which can serve as a simple introduction to context for QI practitioners and clarify the concept to experienced scholars.

In this scoping review of reviews, we aim to identify, summarize, and synthesize the available review literature on how context is operationalized across quality disciplines. We identify what is known and unknown about context to clarify the concept and provide direction for future research. The purpose of this scoping review of reviews is to explore how the literature operationalizes context within biomedical literature. In doing so, we will answer the following research questions:

1. How have authors of the reviews included in this paper (hereafter referred to as 'review authors') chosen papers to review?
2. How have review authors defined context?
3. How have review authors viewed frameworks in relation to context?
4. What categories of factors comprise context as identified by review authors?

5. How have review authors captured the interaction between factors and/or levels of factors?
6. How have review authors captured activities performed by teams or individuals to address context?

Understanding how context is operationalized is important because this will help inform the language used to help have consistency in application across studies. Further, unpacking context will help researchers know what aspects of context they need to consider in their QI projects and what needs to be reported on in manuscripts. Our goal is not to provide yet another definition or framework of context but to help build consensus based on what has been written about context across quality fields.

3.3 METHODS

We conducted a scoping review of reviews, a type of literature review with systematic searches that are useful for examining a broad topic (in this case, context) to map the published literature comprehensively and systematically.[76] Although scoping reviews do not require a quality assessment, this type of review is still rigorous and methodical in its approach to examining the extent, range, and nature of research activity in a particular field. We followed published guidelines, the methodology manual published by the Joanna Briggs Institute for scoping reviews, and the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) reporting guideline Extension for Scoping Reviews.[73,74,123] We used the 5 stages of Arksey and O'Malley's framework to structure the methods section: (1) identifying the initial

research questions, (2) identifying relevant studies, (3) selecting the studies, (4) charting the data, and (5) collating, summarizing and reporting the results.[76]

3.3.1 Five-Step Scoping Review Framework

1. Initial Research Questions

The research question guiding this scoping review is 'how is context operationalized within the biomedical literature?' This question was formulated because it was broad enough to allow for a wide selection of papers from all healthcare disciplines to be included, but it also was focused enough for a targeted search strategy to be developed.[74]

2. Search Strategy

To find relevant publications, the first author (IAT) developed a search strategy in cooperation with an experienced librarian (LO), and in September 2021, ran searches in the following databases: PubMed MEDLINE; Embase (embase.com); CINAHL (Ebsco); and Cochrane Database of Systematic Reviews (Wiley). The search strategy was developed first for PubMed and adapted later to search other databases (with no year or language limitation). The search looked for all articles on quality improvement, implementation science, and organizational innovation coupled with the concepts of context, environment, or setting. Because this is a review of reviews, we also added a review filter to capture reviews that used systematic, scoping, and meta-analysis study designs. Table 9 displays the key search terms for PubMed, and Appendix B contains a full list of search strategies and terms used for all databases, including Google Scholar.

The references resulting from the searches were entered in EndNote™ 20 software[77] and then exported to Rayyan© [78] ; within these software programs, duplicates were removed. To supplement the initial database search, we searched all references from identified papers, reviewed the first 200 results of the Google Scholar search, and reran an updated search to identify additional reviews in August 2022. We added the search term "enabler" to better capture the concept of factors, and we added additional journals to comprehensively search the area of QI. We did this because these journals publish articles related to QI but may have articles that do not include key QI terms in the title or abstract.

Table 9: PubMed Search Terms.

Concept	**Key Search Terms**	
QI	Quality improvement Implementation science Implementation research Organizational innovation Change management Organizational culture Organization change Diffusion of innovation	Innovation diffusion Improvement science Translational medical research Translational medical science Translational medicine Knowledge translation Translational research
Context	Context Environment	Setting
Factors	Factor Driver Determinant	Variable Barrier Facilitator Enabler
Review	Meta-analysis Review	Meta-synthesis Scoping study

3. Screening and study selection

Before screening articles, the research team went through a preliminary review process to refine inclusion and exclusion criteria. During this preliminary review process, 3 authors (CMD, KGF, and IAT) reviewed a sub-sample of 100 random articles to clarify inclusion and exclusion

criteria and ensure criteria were applied consistently; subsequently, if the reviewers disagreed or were uncertain about the inclusion of any article, the article was discussed as a group. After the preliminary review phase, IAT, with the help of CMD and KGF using the predetermined criteria, completed a title/abstract screening of all articles so that all articles were independently reviewed by at least two authors in Rayyan©.[78] All articles that were marked for inclusion advanced to the full-text screening phase. The same title/abstract screening process was used for the additional results from the searches that were rerun in August 2022 and the Google Scholar search. All references of included reviews were independently reviewed by at least 2 authors.

Eligibility criteria

To assess whether the references found were indeed relevant, all reviewers used the following criteria outlined in Table 10 concerning types of studies, concepts, and methods to screen the full-text articles. Due to the rise in realist reviews (reviews that focus on the mechanisms by which an intervention works,)[85,124] we included not only reviews with systematic searches but also reviews that achieved theoretical saturation, where the authors searched for articles until no significant new findings emerged.

Table 10: Eligibility for Inclusion.

Inclusion Criteria	**Exclusion Criteria**
Any year and any language	Non-review papers (ex: commentaries, editorials, protocols, etc.)
Contextual factors are a major outcome of interest or topic of discussion	The focus of the review is a single intervention or program .
Articles about healthcare broadly	The focus of the review is implementation strategies.

QI, innovation, implementation science, or evidence-based practice are a major theme	The focus of the review is a single setting or discipline.
Methods that included a systematic search or aimed for data saturation	A review without a stated methodology.

4. Data Extraction

To obtain meaningful results within a reasonable amount of time, we focused the data extraction on our research questions. We utilized analysis techniques as discussed in Miles et al. [80] and as applied to literature reviews as described by Onwuegbuzie et al. [81] We used inductive and deductive codes. Deductive codes were identified in the protocol and based on the study questions. As we applied pre-identified codes (deductive), we also coded for ideas that helped answer our research questions (inductive). This approach enabled us to see how studies were similar and different so that we could define and conceptualize context. We used MAXQDA® 2020 software [82] to code all reviews and to summarize the text into an extraction table (see Supplement 1). IAT completed all the data extraction; following, the extraction data table was reviewed by CMD and KGF.

5. Summarizing Results

First, MAXQDA® 2020 software [82] was used to manage the synthesis of data. Next, codes were synthesized into a tabular format in Microsoft Excel™ [125] (see extraction table in Supplement 1). We present a narrative synthesis of results based on patterns identified within the extraction table.

3.3.2 Ethics

This study does not meet Northwestern Institutional Review Board's criteria for human subject research as the study is limited to publicly published information.

3.3.3 Deviations From Protocol

We published the review protocol prospectively[4] on Northwestern DigitalHub[5] (see DOI: 10.18131/g3-gw05-tp04) after completing the pilot screen in September 2021. We made 3 changes to the protocol since it was published. First, we added to the exclusion criteria. The initial searches primarily resulted in articles about specific interventions, settings, and disciplines rather than articles about context in general. Our intention to examine context as a theoretical concept prompted us to refine the exclusion criteria to focus on reviews about the term context in general, acute care, or evidence-based guidelines. We excluded studies that focused solely on a specific healthcare setting, such as mental health. Second, we updated the inclusion criteria. Realist reviews rely on data saturation instead of systematic methods. The criteria were altered from requiring papers to have systematic methods to also including studies that aimed for data saturation to include these types of reviews. Third, we refined the research questions. After reviewing the full text, we noticed concepts such as frameworks, activities, and interactions being discussed within papers, which led us to add additional research questions. A copy of the protocol is in Appendix A.

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[4] Per the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist item 5, ideally, a protocol should be published and, in the write-up, state where it can be accessed.

[5] DigitalHub is an institutional repository for the research and scholarly output of Northwestern Medicine. DigitalHub is available at: https://digitalhub.northwestern.edu

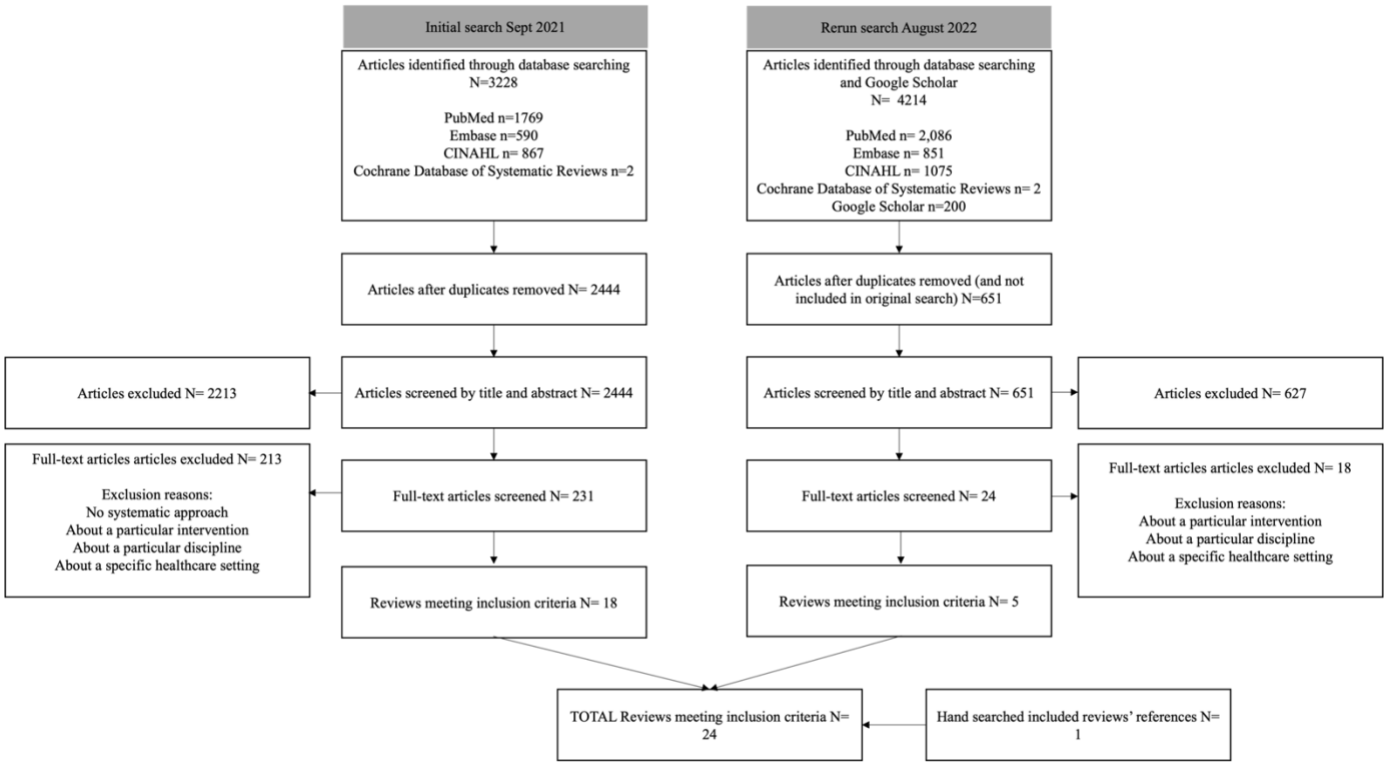
3.4 RESULTS

A total of 3228 articles were found across all databases (PubMed: 1769; Embase: 590; CINAHL: 867; Cochrane Database of Systematic Reviews: 2) in the initial search. After deduplication, the number to be screened was 2444. Rerunning the searches for the most recent articles, conducting the Google scholar search, and deduplicating the results yielded 651 additional articles to be screened. Ultimately, 24 articles were determined to be appropriate for inclusion. Figure 4 demonstrates the screening and selection process. The result section is structured by first providing an overview of excluded and included studies and then answering the 6 research questions.

3.4.1 Excluded Studies

The most common reason for excluding papers at the full-text stage of the screening was because they did not discuss context as a concept within quality projects but instead focused on implementation within a specific setting, discipline, or a set intervention.[126,127,128,129] Many studies that alluded to common quality improvement concepts were excluded if no explicit goal to examine context or factors was stated or if the study was not a review.[10]

Figure 4: PRISMA Flow Diagram Describing the Results of the Literature Search and Study Selection



3.4.2 Overview of Included Articles

For the 24 review articles in this review, the year published, review type, journal, aim, and contribution are provided in Table 11 to present an overview of the included papers. The reviews included were published between 2004 and 2020. Review types were narrative review (N=6), systematic review (N=6), scoping review (N=4), review of reviews (N=4), integrative review (N=2), and realist review (N=2). The number of papers included in the reviews ranged from 8 to 495 (mean 60, median 36). Articles varied in the biomedical fields they were published in, but the majority of the reviews included were published in general health services research journals. Included reviews were also published within discipline specific journals (i.e., nursing,

mental health, etc.), even though this study excluded reviews that exclusively examined context within a specific area or profession of medicine. Fifteen of the reviews identified as being part of the fields of QI or implementation science. The other reviews focused on innovation, clinical guidelines, knowledge translation, or evidence-based practice.

Even though there was heterogeneity in objectives, most reviews (20 out of the 24) aimed, at least in part, to identify factors. The reviews varied in the types of factors they identified. Francke et al. [130] and Correa et al. [131] both looked at factors for the implementation of Clinical Practice Guidelines. Cowie et al. [132] looked at factors for the sustainability of healthcare interventions in a hospital-based setting. Four reviews specifically looked at factors at the organizational level.[133,134,135,136] Some reviews specified a field they focused on to identify factors: Andersen et al. [137] and Kaplan et al. [138] both explored factors related to QI specifically. Fleuren et al. [139] examined factors related to innovation and Braithwaite et al. [140] looked at factors within implementation science. Reviews had some aims that did not focus on identifying factors. Six of the 24 reviews aimed, at least in part, to identify theories, models, and/or frameworks (TMFs).[8,141,142,143,144,145] Two of the reviews focused at least partially on defining context.[8,146] The included reviews encompass a range of aims, but collectively they are all exploring the context and/or factors within quality projects even though they may use slightly different terms (e.g., determinants, setting, evidence-based practice, etc.).

Table 11: Summary of Papers Included

Authors	Year	Review type	Review aim	Contribution	Journal

Fleuren, Wiefferink, & Paulussen	2004	Narrative Review	To gain a better understanding of determinants of innovation processes (dissemination, adoption, implementation, and continuation) in health care organizations through answering which determinants of innovation processes are reported in the literature	This review created a systematic overview list of determinants of innovation processes in health care organizations.	*International Journal for Quality in Health Care*
Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou	2004	Narrative Review	To understand how can spread and sustain innovations in health service delivery and organization	This review provides a parsimonious and evidence-based model for considering the diffusion of innovations in health service organizations and identifies clear knowledge gaps on which further research on the diffusion of innovations in service organizations should be focused.	*The Milbank Quarterly*
Francke, Smit, de Veer, & Mistiaen	2008	Review of Reviews	To gain a better understanding of which factors affect the implementation through answering: What evidence exists regarding factors that influence the implementation of clinical guidelines either negatively or positively?	This review adds to the evidence that multiple strategies for implementing guidelines appear to be more effective than single ones.	*BMC Medical Informatics and Decision Making*
Kaplan et al.	2010	Systematic Review	To (1) identify the contextual factors associated with QI success; (2) categorize, summarize, and synthesize these factors based on their common characteristics and the level of the health care system in which they operate; and (3) understand the current stage of development of this field of research.	This review identified the contextual factors that have been suggested to influence QI success; provides a starting point to standardize definitions, inform theories, and generate hypotheses about the relationships among contextual factors and their influence on QI success that can be rigorously tested; and adds to Damschroder et	*The Milbank Quarterly*

				al. 2009 and Greenhalgh et al. 2004 theories by explicitly classifying context based on a system's view of health care and by identifying those contextual factors that have been suggested to be important to QI success but were excluded from these broader theories.	
Alexander & Hearld	2011	Narrative Review	To (1) assess whether certain organizational features or practices facilitate or impede QI implementation based on the consistency and strength of research evidence; (2) examine whether categories of conceptually related organizational predictors are associated with implementation; and (3) help identify gaps in the existing literature	By reviewing the empirical research on QI implementation in health care organizations, this review created a list of organizational factors, and determined if they are positive, negative, or nonsignificant factors.	*Medical Care*
Flottorp, et al.	2013	Systematic Review	To develop a comprehensive, integrated checklist of determinants of practice	This review developed a checklist that aims to be comprehensive and to build on the strengths of each of the 12 included checklists. The checklist is accompanied with 5 worksheets to facilitate its use in implementation research and quality improvement projects.	*Implementation Science*
Andersen, Røvik, & Ingebrigtsen	2014	Review of Reviews	To identify factors influencing intended outcomes of lean interventions, and to understand when and in which dimension different factors contribute.	The main contribution of this review is a two-dimensional framework for identification and analysis of facilitators for lean interventions in healthcare. This framework incorporates the complex social and organizational context in	*BMJ Open*

				which lean interventions are applied.	
Braithwaite, Marks, & Taylor	2014	Narrative Review	To synthesize the implementation science literature to identify and understand the factors associated with improving the quality and safety of patient care.	This review has summarized the implementation science literature to identify key success factors associated with improving quality of care and patient safety in complex healthcare settings.	*International Journal for Quality in Health Care*
Wisdom, Chor, Hoagwood, & Horwitz	2014	Narrative Review	To identify key theoretical frameworks that address adoption and to synthesize constructs that are hypothesized to be related to adoption of evidence-based practices into a unifying, overarching theory of adoption of innovations.	This review integrated existing adoption theories to generate a ‘‘middle-range theory and found that theories that described adoption in the context of implementation were more likely to include characteristics of the innovation as central to adoption.	*Administration and Policy in Mental Health and Mental Health Services Research*
Innis, Dryden-Palmer, Perreira, & Berta	2015	Scoping Review	To examine and summarize the organizational-level factors, context, and processes that influence the use, uptake, and sustainability of evidence-based practice in healthcare organizations; and to provide implications for practice to healthcare administrators, managers, and providers.	This review demonstrates that there have been clear advances in our understanding of the facilitators and barriers to the implementation of evidence-based practice in healthcare organizations.	*International Journal of Evidence-Based Healthcare*

Kringos et al.	2015	Review of Reviews	To (1) describe the reporting of contextual factors in the literature on the effectiveness of quality improvement strategies, (2) assess the relationship between effectiveness and contextual factors, and (3) analyze the importance of contextual factors.	This study systematically assessed a broad range of associated context factors and their relationship with the effectiveness of multiple quality improvement strategies in health care. This study showed that context factors were poorly reported in the current literature.	*BMC Health Services Research*
Moullin, Sabater-Hernández, Fernandez-Llimos, & Benrimoj	2015	Systematic Review	To identify the extent to which existing implementation frameworks include core implementation concepts and determine if frameworks vary depending on the innovation they target.	This review proposed a Generic implementation framework (GIF)to depict the core concepts of implementation	*Health Research Policy and Systems*
Williams, Perillo, & Brown	2015	Scoping Review	To identify the organizational barriers to the implementation of evidence-based practice and knowledge translation in health care settings	This scoping review mapped the breadth of information available on the organizational barriers to the use of evidence-based practice in health care settings.	*Nurse Education Today*
Michel, et al.	2016	Narrative Review	To examine, organize, and summarize current literature on the association between hospital-level, department-level and individual-level and implementation and/or success of horizontal quality improvement and risk management programs and actions in hospitals.	This review contributes that barriers are possibly more difficult to identify than the facilitators as they are apparently more often psychosocial in nature or relate to interactions between professionals.	*Journal of Epidemiology and Public Health Reviews*
Li, Jeffs, Barwick, & Stevens	2018	Integrative Review	To identify, synthesize and summarize the most commonly reported organizational contextual features that influence the implementation of evidence-based practices across healthcare settings, and to describe how these	This integrative review identified six organizational contextual features that are important to EBP implementation across healthcare settings and proposes a model as to how the factors are	*Systematic Review*

			features affect implementation.	interrelated.	
Watson, et al.	2018	Integrative Review	To inductively develop a taxonomy of external context constructs based on empirical observations existing in the identified literature.	This review developed a taxonomy of 8 external context constructs based on empirical observations existing in the identified literature.	*BMC Health Services Research*
Nadalin Penno, et al.	2019	Systematic Review	To (1) identify existing healthcare TMFs that explicitly address the process of sustained use of research, (2) compare TMFs to identify key concepts and factors that influence/predict the likelihood of successful sustainability of evidence-based practices, and (3) provide a list of relevant sustainability TMFs, concepts, and core factors	This review is the first to include a comprehensive analysis of healthcare sustainability TMFs for the sustained use of evidence-based practices in acute care settings.	*Implementation Science*
Nilsen & Bernhardsson	2019	Scoping Review	To identify and examine determinant frameworks used in implementation science to address 4 issues: how were the frameworks developed, what terms do they use to denote contextual determinants for implementation, how is the context conceptualized, and which context dimensions are applied across the frameworks.	This review showed considerable variation with regard to how the frameworks were developed, the terms used to denote contextual determinants, how context is defined and conceptualized, and which contextual determinants are accounted for in frameworks used in implementation science.	*BMC Health Services Research*
Coles et al.	2020	Realist Review	To understand which aspects of context are important and why, and how these factors can be addressed and managed to support healthcare improvement efforts.	This is the first realist review of context in QI and contributes to a deeper understanding of how context influences quality improvement initiatives. This review developed a generalizable theoretical model to illustrate the interactions between	*Systematic Reviews*

				contextual factors, system levels, and the various stages of the improvement journey along a trajectory where improvements are planned, implemented, sustained, and spread.	
Correa et al.	2020	Review of Reviews	To explore the barriers and facilitators for the implementation of Clinical Practice Guidelines.	This review builds on Francke (2008) work by adding new barriers in the political and social context.	*Health Research Policy and Systems*
Cowie, Nicoll, Dimova, Campbell, & Duncan	2020	Systematic Review	To identify, appraise and synthesize the barriers and facilitators that influenced the delivery of sustained healthcare interventions in a hospital-based setting.	This is the first comprehensive overview of the evidence around how to support sustained use of interventions in hospital settings.	*BMC Health Services Research*
Dryden-Palmer, Parshuram, & Berta	2020	Realist Review	To discover what is known from the literature about the role of context, complexity and process and understand how each might influence the others in the implementation of evidence-based clinical interventions in acute health care settings.	This review revealed an incomplete understanding about the interface between three components: context, complexity, and process.	*BMC Health Services Research*
Esmail et al.	2020	Scoping Review	To identify, describe, and compare available full-spectrum knowledge translation theories, models, and frameworks to subsequently guide users.	This scoping review provides a compendium and comparison of full-spectrum knowledge translation TMFs from planning/design, implementation, evaluation, and sustainability/scalability. The review findings contribute to the field by providing a concise reference source for	*Implementation Science*

				knowledge translation projects.	
Rogers, De Brún, & McAuliffe	2020	Systematic Review	To define, measure, assess, and analyze context within healthcare implementation science literature	This review generated a common definition of context and illustrates inconsistencies in how context is defined and how it is subsequently analyzed.	*BMC Health Services Research*

Note: Reviews that did not follow scoping review, systematic review, or realist review methodology were classified as a generic narrative review.

3.4.3 How Were Included Papers Chosen in the Reviews?

The reviews used a variety of keywords in their searches and varied in the types of papers they selected. Review authors searched a range of databases but consistently searched MEDLINE[6] (all but 2 reviews). Of the 22 reviews that indicated they searched a MEDLINE database, 19 explicitly stated their search string. However, these 19 reviews used a variety of

[6]MEDLINE is the National Library of Medicine's (NLM) premier bibliographic database that contains more than 29 million references to journal articles in life sciences with a concentration on biomedicine. MEDLINE is the primary component of PubMed, a literature database developed and maintained by the NLM National Center for Biotechnology Information (NCBI). MEDLINE is the online counterpart to the MEDical Literature Analysis and Retrieval System (MEDLARS).[147]. National Library of Medicine. MEDLINE: Overview. Accessed July 18, 2022. https://www.nlm.nih.gov/medline/medline_overview.html

search terms and few search terms overlapped between reviews; terms that appeared in at least of the reviews that stated their MEDLINE search string include a form of the words: “innovation” and “implement.” For research design, 3 of the reviews aimed to achieve data saturation versus systematic searches. Four papers examined exclusively other reviews. Two papers conducted searches that were a continuation of a previous review. Correa et al. [131] is a continuation of the review conducted by Francke et al. [130], and Esmail et al. [141] uses and continues the search of Strifler et al. [148] The combination of various search terms, research designs, inclusion criteria, and databases searched led to a variety of papers included.

3.4.4 How was Context Defined?

Ten reviews define context explicitly, but definitions varied across papers. Some definitions were general, such as “details of the setting, organization, political climate, etc.” [143] Many of the reviews’ definitions clarified what context is not. Kaplan et al. [11] define context as “anything not directly part of the technical QI process that includes the QI methods themselves and the clinical interventions.” [11] Andersen et al. [137] define context as “all surrounding factors that are not part of the intervention itself”[137] and add that context contains factors and can be defined by these factors. The idea of factors or components is highlighted in the majority of the definitions. A primary aim of Rogers et al. [146] was to review the definition of context and propose a collective definition: Rogers et al. [146] define context as “a multi-dimensional construct encompassing micro, meso, and macro level determinants that are pre-existing, dynamic, and emergent throughout the implementation process. These factors are inextricably intertwined, incorporating multi-level concepts such as culture, leadership, and the

availability of resources." Within the review, Rogers et al. [146] acknowledge the definition is broad, and the definition highlights the complexity of context. However, the definition does not specify boundaries such as what context is and is not.

3.4.5 How Have Review Authors Viewed Frameworks in Relationship to Context?

Six papers reviewed TMFs, and 4 of the papers examined context within TMFs. Of these 4, all looked at different categories within TMFs. Wisdom et al. [143] and Moullin et al. [142] identified the categories of external, organization, innovation, and individuals. Wisdom et al. [143] also identified client characteristics (potential users), and Moullin et al. [142] identified the local environment as well. Nilsen et al. [8] identified 2 levels of categories: the primary level consists of macro, meso, micro, and across multiple levels. The secondary level of domains overlaps with factors identified in other studies (i.e. leadership, feedback, organizational support). Nadalin Penno et al. [145] grouped factors from the TMFs into 7 main themes: innovation, adopters, leadership and management, inner context, inner processes, outer context, and outcomes. Furthermore, 12 papers proposed their own framework or model based on the review findings. The frameworks that resulted from the reviews all included context within their frameworks or models.

3.4.6 How Were Contextual Factors Categorized?

Except for 5 papers, the reviews grouped factors that authors identified within their reviews. Of the 19 reviews that grouped factors, the groupings were at least partially based on levels such as macro (government/community level), meso (group level), and micro (individual level). For example, Kaplan et al. [138] as well as Kringos, et al.[149] , grouped factors into the

following categories: environment, macrosystem (organizational), QI support and capacity, miscellaneous, QI team, and microsystem. In this grouping, factors related to the organization can fall into either the second or third category, and factors related to individuals fall into the last 2 categories. As another example, Rogers et al. [146] grouped factors into external environment, organizational, team, and individual. The reviews that did not group factors had aims that were very narrow; these reviews' scopes included focusing on the organization level, categorizing of frameworks, and identifying common factors.

Within included reviews, it was not clear if all categories refer to the authors' conceptualization of context. Cowie et al. [132] for example, organizes factors according to the domains of an established framework that includes constructs that may not be context, like 'the intervention design.' Within the paper, the authors state that there is a need to explore "if context plays a role in influencing the main facilitators and barriers." So, it is unclear what factors relate to context and which do not. Other reviews did specify what factors are context. For example, Nilsen et al. [8] asserts context consists of the influences that are external to (i.e., a higher aggregation level than) the individual (e.g., a team, professional group, etc.).

3.4.7 How Were Factor Interactions Captured?

Half of the reviews acknowledged the interaction and/or interconnection between various factors. Kaplan et al. [138] found only a few studies that examined complex associations between factors, such as interactions or effects. Alexander et al. [133] concluded that studies focused on independent effects of factors, and rarely captured interactions among the many factors. Similarly, Moullin et al. [142] found that only 5 of the 49 implementation frameworks they

reviewed described the relationships between or within the elements or mechanisms for operationalization. Rogers et al. [146] found only 3 studies in their review to detail the possible interactions between these system levels within their definition of context, Cowie et al. [132] found that studies acknowledged that the interaction of factors mattered for the long-term sustainability of a project. Coles et al. [9] identified multiple studies that identified interactions between factors across multiple levels. Further, the authors propose a theoretical model which supports the notion that multiple factors interact. However, neither the review nor model explain the ways in which factors interact. Other reviews explicitly excluded studies that described interactions. For example, Nilsen et al. [8] excluded TMFs that describe causal mechanisms of how various determinants may influence implementation outcomes.

3.4.8 How Were the Activities of Individuals or Teams Captured?

Alexander et al. [133] found most QI process implementation studies examine discrete factors that serve as proxies for process, such as leadership, education, and feedback to potential users of the QI innovations, but do not actually measure process directly. The authors argue that process measures provide little guidance to organizations regarding the steps or sequence of activities necessary to successfully implement QI practices, or alternatively, to overcome the barriers to such implementation. Some authors specified factors they identified as mechanisms. Andersen et al. [137] identified 5 mechanisms to facilitate learning and disseminate best practices: external support, accurate data, staff involvement, measurement, and system-wide scope. Similarly, Wisdom et al. [143] identified several mechanisms for change across different aspects of contexts such as leadership, innovation fit with norms and values, and attitudes/motivation

toward innovations. Coles et al. [9] identified mechanisms such as motivation and engagement. The authors acknowledge that a lack of precise definition and measurement of mechanisms can lead to confusion. Li et al. [136] identified mechanisms within factors. For example, the authors identified the factor—feedback—and specified that in action, feedback could be soliciting early feedback from middle managers to help assuage their concerns about the quality initiative.

3.5 DISCUSSION

This scoping review of reviews aimed to understand how the healthcare quality literature operationalized and discussed context by asking 6 research questions regarding how reviews were chosen, how context was defined, how frameworks were used, how factors were grouped to comprise context, the role of interactions, and how activities were discussed. Our findings show that context is not consistently defined across fields nor conceptualized in terms of the same groupings of factors within frameworks. Further, the included reviews rarely explored the complexity of context by exploring how factors interacted or how QI teams can navigate context. The following sections discuss the findings of each research question, provide recommendations, identify gaps and future research directions, and consider limitations. In order to draw connections between context, frameworks, and factors, the third and fourth research questions are discussed together. Similarly, to examine the complexity of context, interactions and activities are discussed in a single section.

3.5.1 Shortcomings From Narrow Inclusion Criteria in Other Reviews

We found that the included reviews spanned multiple fields, including papers that identified as part of the communities of health services research, quality improvement,

implementation science, evidence-based practice guidelines, knowledge translation, and innovation. Even though the choice by review authors to have narrow aims and searches is understandable for the scope of a single review, the reviews' searches did not consistently search across healthcare communities, which is a missed opportunity to reconcile differences and incorporate novel findings from other related communities. As a result, multiple frameworks exist describing predictors of QI project success that overlap and different terms are used to describe the idea of the surroundings of an intervention. For example, when identifying our search terms, we saw that notable quality improvement and implementation frameworks use words like "setting," " environment," and "context" to capture the idea of surroundings. This meta-problem leads to confusion about concepts because consistent words are not used across fields, which results in confusion as to what the overlap and differences in like concepts are entirely.

3.5.2 Context as a Concept: The Definition and Scope

Frameworks that aimed to describe successful implementation consistently identified factors and included categories (groups of discrete factors) related to the healthcare organization. Nilsen et al. [8] found that most frameworks do not explicitly define the context. Instead, frameworks indirectly define context by describing categories that collectively make up context. The finding that context is described in terms of various factors and categories aligns with the views of other scholars. For example, Bate [150] asserts that scholars agree that context is "a slippery notion;" there are various operational definitions that vary in their use of terms for factors. Even though frameworks consistently consisted of categories and factors, the terms used

for categories and factors varied. This matters because each unique term implies something somewhat different about the nature and effects of context—for example, 'determinant' is much stronger than 'influence.'

Our review highlights that the concept of context across fields related to healthcare quality is broad and poorly defined. Less than half of the studies provided a definition of context that identified different characteristics and boundaries of context. Rogers et al. [146], in their review, which sought to define context, emphasize that context is multi-level (micro to macro), and factors interact. Overall, this definition is reasonable and highlights critical ideas about context. The definition does not, however, specify scope: what is context and what is not?

Most review authors acknowledged context, and they organized factors in categories related to the external environment, the organization, and individuals.[136,149] Reviews differed in how they considered categories of factors related to context. Some definitions specify that context is not the intervention,[8,9,137] the process,[8,9,138] or the QI team.[8] Others considered the process and QI team to be part of the context.[149] Consistent across reviews, is that context does not include the intervention.

Even though there is heterogeneity within the literature regarding what is considered context and what is not, this may be partially because the ideas of context and factors are often conflated. The ideas of context and factors are frequently discussed together and are very related. For example, the reviews collectively found categories of factors related to the environment, organization, intervention, QI team, and QI process to impact the outcome of a project. These categories for factors align with other reviews that examine the context. Geerligs et al. [128] in

their systematic review of factors of hospital-based psychology interventions, found that factors that predict project success could be grouped into the system (such as environmental context and culture), staff, and intervention. Frameworks identify key factors related to interventions that help explain project outcomes. Therefore, context is just a subset of factors that explain outcomes: context alone does not explain the outcome of a project, but factors can.

3.5.3 How to View Context

The view of context as being described by a framework, categories, and factors can be misleading. The breakdown of context into categories and factors is not into distinct parts—the categories of factors are interdependent. Nilsen and Bernhardsson provide an example of how a lack of available staff (organizational support) and poor funding for the implementation (financial resources) will likely have a negative impact on the organization's preparedness for implementation (organizational readiness to change).[8] It begs the question: should context be viewed as a collection of discrete factors?

Some scholars argue that it is important to view context in more holistic terms in order to see that it is the combination of multiple factors that leads to a successful implementation of an intervention.[151] Even though extensive, deep descriptions of the wider circumstances of the implementation are valuable for interpreting findings, it may be difficult to capture or establish causality between the external environment and implementation outcomes unless the context is broken down into factors. May et al. [152] argue that a "whole system" approach makes it almost impossible to disentangle the complicated relationships between various factors and to identify the causal mechanisms. Accordingly, it helps QI practitioners (and researchers) to break down

the context into factors. Even with the view that context is best viewed in terms of factors, understanding how factors interact and connect will help illuminate the "black box."

The concepts of context and quality project success are a very broad topic, so no single paper nor TMF captures all factors of context at a granular level nor all the factors that affect success. Moullin et al. [142] points out that many TMFs are not created to be holistic but rather to target a specific implementation concept, such as a stage or list of implementation strategies. Consequently, if an all-inclusive implementation framework is desired to walk a practitioner through all project considerations, an alternative to selecting a comprehensive, holistic innovation-specific framework might be to choose a combination of frameworks to cover the depth of each aspect of context and the project process. Within the QI and implementation science literature, there is some guidance on what framework or combination of frameworks would work best for situations. For example, Birken et al. [153] created an implementation theory comparison and selection tool, the Theory, Model, and Framework Comparison and Selection Tool (T-CaST), to help scientists and practitioners select appropriate TMFs to guide their implementation projects.

3.5.4 Gaps and Future Research

The reviews span from 2004 until 2020. During this time, quality literature has grown, and theory has advanced. Over the last two decades, there have been consistent gaps identified within the literature, including clarity of concepts such as context and factors, how factors interact, the importance or impact of each factor, a list of the most important factors, what factors apply to what settings, and empirical studies using systematic methods in capturing and reporting

of factors. Of the reviews published in the last 3 years, authors have identified that it is still unclear how to choose TMFs best to inform studies,[141] the lack of factors about QI teams, the role of time in relation to factors, and the need for ongoing assessment of factors.[132] These gaps collectively show that the fields within quality are young, and theory is still being developed.

This review examined a breadth of literature available on the concept of context with the goal of identifying the core elements out of a diverse body of literature.[154] This review provides the foundation for venturing into a full systematic review to map factors and constructs of QI initiatives to the proposed QI model. As identified in this review, more empirical studies are needed to have well-designed studies that explore and capture factors so that scholars can better understand what factors matter the most and the relationship between factors. Even with frameworks and factors, many characteristics of factors are still not fully understood, such as how different factors interact and their impact on a project. Dixon-Woods [7] has advocated for peer-reviewed case studies that utilize methods to identify what is necessary and sufficient to achieve QI project success.

Our findings show that review authors rarely explored the interactions between factors beyond acknowledging that interactions exist or how practitioners address factors in practice. Better understanding interactions and connections between factors can help bridge the holistic view and factors-view of context. Scholars may need to learn from complex-adaptive system (CAS) research and look at the context from the lens of the behavior of those who may not be predictable according to the behavior of the components.[155] Dissecting and measuring context in terms of factors may not explain the context as a whole. With this lens, a research goal is to

identify guiding principles for navigating the QI context. It is not feasible to assess for and measure all aspects of context; thus, methods that lead to findings that help scholars and practitioners understand what to prioritize in context are essential for the field to evolve.

3.5.5 Limitations

This review has several limitations that affect its generalizability. First, literature reviews carry the risk of missing studies due to the "file-drawer" problem. The file-drawer problem, better known as publication bias, refers to the fact that important data has been missed because it was never published. Collating heterogeneous studies always runs the risk of adding "apples and oranges" together. There is no way to avoid this problem entirely. Yet, the problem of variability can be reduced by ensuring that studies are conceptually comparable and deal with the same constructs and relationships. In the present review, we did our best to adhere to this rule by only examining papers focused on context or factors. As a narrative synthesis review, it explored the complex concept of context by clearly examining the literature on this topic. It does not demonstrate the rigor of a meta-analysis of multiple randomized trials, and this review provides only preliminary evidence to inform future research directions.

Although we took a systematic approach to identify published articles, we may have missed relevant articles owing to the specific terms we elected to use in the search strategy, the lack of standardized keywords and subject headings, and the possibility that authors may not have used context-related terms in their article titles or abstracts. We did try to identify missed articles by hand-searching references. Our focus on healthcare settings may have led us to miss relevant frameworks used in other fields—such as public health, community-based services, and

disciplines such as psychology, sociology, organizational theory, and political science—which limits the generalizability of our findings. Although it does not necessarily include every paper published on the topic, it provides a reasonable synthesis of the concept of context within quality-related fields. We did not attempt any quality assessment of the included publications or frameworks. This was not considered feasible due to the different publications' variety in study design and scope. We did find considerable variation in the breadth and depth of search terms, so a future systematic review should weigh the quality of the evidence. Another limitation is the difficulty of searching for gray literature.[7] While databases exist, they are limited in the ability to be systematically searched with MeSH terms and Boolean operators. This means that this review may have missed some gray literature. Finally, while the selected articles had their reference lists hand-searched, there was no subsequent review of the reference lists of the hand-selected articles.

3.6 CONCLUSION

This scoping review examines how context is operationalized across quality fields. This scoping review of 24 reviews shows considerable variation regarding how context is defined. The consensus of the included reviews is that context is composed of factors influencing project success. These factors can be grouped into multiple categories and are often grouped into macro,

[7] Gray literature is information produced outside of traditional publishing and distribution channels, and can include reports, policy literature, working papers, newsletters, government documents, speeches, and white papers.

meso, and micro levels. Most reviews viewed context as everything but the interventions. Thus, context and factors as concepts overlap, but there are factors (i.e., factors related to the intervention) that are not part of the context. To help prevent the conflation of the two terms 'context' and 'factors,' authors should define the terms and clarify the type of factors they are referring to (e.g., organizational factors). Further, frameworks that list factors provide insights and are a starting point for practitioners. Still, they only scratch the surface of the complexity of context and the reasons behind a QI project's success or failure. Future research should continue to explore interactions between factors to help researchers and practitioners better understand the complexity of context and QI projects.

3.6.1 Declarations

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Author Contribution

All authors contributed to the study's conception and design. IAT helped create the literature searches, conducted analysis of the data, wrote the main manuscript text, and prepared tables. LO and MB conducted the literature searches and provided guidance on methods. CMD and KF conducted analysis of the data and critical review of the manuscript. JKJ, KJO, and MCR provided supervision for the study at each step and conducted critical review of the manuscript. All the authors listed have gone through the manuscript and agreed to its submission.

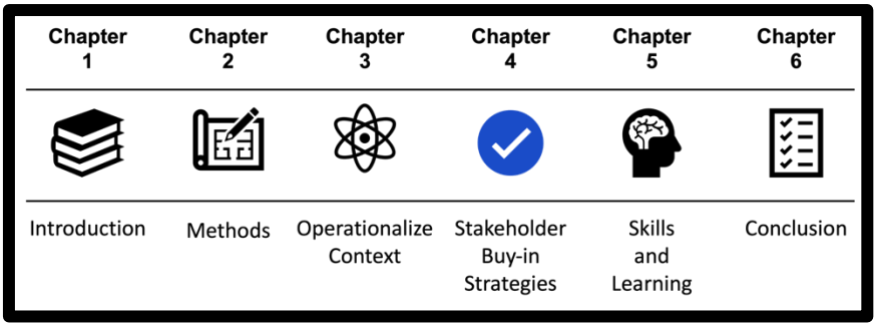
Conflict of Interest

No authors declare a conflict of interest

Data Availability Statement

Data analyzed in this article are available in the databases discussed in our methods. The data used in the thematic analyses are available in the supplemental materials. A list of all articles screened in this review is available from the first author upon request.

CHAPTER 4: [MANUSCRIPT 2] Quality Improvement Practitioners' Strategies for Obtaining Project Buy-in: A Qualitative Study



"The sinkhole of change is communication and motivation. It's where change projects go to die"
-Nancy Rothbard

4.1 ABSTRACT

Background: To complement the structured quality improvement (QI) approaches within the literature, scholars have detailed lists of implementation strategies, developed frameworks describing context, and illustrated case studies on various organizational theories to help scholars understand the complexity of making a change in a healthcare organization. These more detailed descriptions of social forces within the context and actionable strategies to maneuver context are critical to helping QI practitioners avert and address problems that arise. Even with the increase in literature exploring context and strategies, scholars are still adding to the lists of strategies, especially those related to obtaining stakeholder buy-in. We sought to explore how QI practitioners obtain buy-in from stakeholders to complete QI projects by identifying strategies in which practitioners navigate context in QI projects.

Methods: We conducted semi-structured interviews with experienced QI practitioners. Audio recordings of these interviews were transcribed verbatim and analyzed through an inductive approach.

Results: The 12 participants described completing tasks in QI projects that mapped onto 5 strategies: (1) involve multiple levels of stakeholders, (2) reframe problems for different stakeholders, (3) utilize information from quantitative and qualitative data to tell stories, (4) make trade-offs to match priorities, and (5) leverage expertise.

Conclusions QI practitioners can incorporate the strategies identified within this study into their practice, and researchers can add these strategies to compiled lists.

Keywords: Context, Stakeholders, Quality Improvement, Qualitative Methods

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4.2 INTRODUCTION

To ensure quality improvement (QI) project success, scholars have developed structured QI approaches by creating process frameworks, theoretical models, and checklists to guide practitioners through the QI process.[13,156,157] These types of guidance vary in detail but collectively outline a QI process that involves pinpointing a particular area for improvement, proposing specific changes, testing the instituted changes, and sustaining their success, all of which require stakeholders to be directly involved in the decision-making process.[1] Some approaches are specific to a care setting, like a hospital, but many are broad and apply to

multiple settings. Further, the project types and scopes range from large-scale projects, such as changing a hospital system's electronic medical record software, to smaller projects, like implementing a new patient assessment tool within a single unit. Even with multiple applications, these structured QI approaches and their associated tools are essential for QI work: they have been shown to increase the effectiveness of making change by helping practitioners with critical tasks such as gathering information from stakeholders and providing a roadmap for practitioners to pursue a systematic, data-driven effort to improve quality.[9,12,158,159,160,161,162] However, these approaches do not fully communicate the complexity and nuance of the process, especially related to stakeholders, to complete a QI project in practice because structured guidance only provides a roadmap of high-level steps. In reality, these structured approaches are only the tip of the iceberg of what knowledge and action are needed to complete QI projects in the real world.

In real-world practice, structured guidance cannot provide answers for all aspects of a project because every QI project involves a broader context—the surroundings of the QI intervention, such as stakeholders, government policy, and incentives. Elements within context, such as sponsors, resources, and organizational culture, introduce complexity within a QI project that must be considered for a QI project to be successfully implemented.[159] The literature is replete with examples illustrating how context adds complexity to QI projects. For example, in a QI project that aimed to improve teamwork among physicians and nurses to improve quality outcomes, many physicians did not believe there was a problem worth solving and, as a result, did not actively engage in the intervention.[163] It is situations like this where the QI practitioners

must employ strategies to address context, in this case, the buy-in (i.e., believing in and actively participating in a project) of a stakeholder group (e.g., physicians affected by the intervention).

One underdeveloped area is a comprehensive understanding of the actionable steps to engage and involve stakeholders—those affected by, or with an interest or a 'stake' in, an activity.[164] To complement the multiple structured approaches within the literature, implementation science scholars, in particular, have detailed lists of project implementation strategies;[165,166,167] developed heuristics describing context;[10,12] and illustrated case studies on various organizational theories to help scholars understand the complexity of making a change in a healthcare organization.[168] These detailed descriptions of social forces within context, and actionable strategies to maneuver context, can help QI practitioners avert and address problems that arise. For example, the Expert Recommendations for Implementing Change (ERIC) study identified 73 implementation strategies within 9 categories, such as developing educational materials, identifying early adopters, and using data experts.[167,169] These descriptions and strategies expose more of the "iceberg" of knowledge needed to complete QI work. However, scholars are still adding to lists of strategies, especially regarding obtaining stakeholder buy-in.[170] The importance of relationships with stakeholders is recognized within the improvement and implementation literature. Still, theory development has not focused on a nuanced understanding of how QI practitioners obtain buy-in.

Buy-in is broadly recognized as an essential component of QI, as it is frequently part of explaining why an intervention was implemented successfully.[171,172,173] While scholars know it is critical for success, this term is rarely defined. The literature does not comprehensively spell

out strategies and actions practitioners can take to obtain buy-in. So, it leads to the question: how are QI practitioners approaching the stakeholders within the contexts of QI projects in real-world practice? One way to understand how practitioners maneuver the complexity of QI projects is by going directly to the source and examining the work of experienced practitioners in the real world, precisely the steps they take to involve stakeholders, instead of relying on reviews of implementation strategies.

In this paper, we aim to explore how experienced QI practitioners navigate context to obtain stakeholder buy-in to complete QI projects. We conducted semi-structured interviews with experienced QI practitioners to learn about the processes by which they approach context by asking about their experience with challenges they have encountered in QI. Previous research compiling strategies has relied on literature reviews and the expertise of scholars.[167,169] Yet, the experience of seasoned QI practitioners can add to the knowledge base, specifically, strategies routinely used in QI projects to better manage context and involve stakeholders. Our goal is not to identify a better structured guidance but strategies and insights that can be part of an approach. The latter allows practitioners to be flexible, leverage the assets with their context, and manage (or prevent) problems that arise in the project related to stakeholders.

4.3 METHODS

4.3.1 Study Design and Setting

We conducted a qualitative interview study[86] with QI practitioners employed within Northwestern Medicine, a nonprofit health system with 10 hospitals affiliated with Northwestern University Feinberg School of Medicine in Chicago, Illinois. This manuscript adheres to the

Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist.[174] The study was approved by the Northwestern University Institutional Review Board (STU00215660).

4.3.2 Sampling and Recruitment

We used a snowball sampling strategy.[86] We started with one experienced QI professional who was asked to participate in a semi-structured interview and to provide referrals. At the end of each subsequent interview, we asked interviewees to identify additional potential interviewees for us to recruit via email. Eligible participants were healthcare professionals, such as physicians, nurses, and full-time QI professionals, who have led at least two QI projects or are employed by the health system to lead QI projects.

4.3.3 Data Collection

The one-time individual semi-structured interviews were conducted via Zoom between September and December 2021 and were audio recorded. Participants completed interviews from their homes or offices. Interviews were guided by a pre-tested interview guide and were 45-60 minutes in length. Verbal informed consent was obtained before the start of the interview. All interviews were conducted by IAT, a PhD candidate, and a nurse with training, experience in qualitative methods, and expertise in quality improvement. She had had no prior relationship with the participants. The interview protocol was structured to ask participants about challenges they faced in QI through questions about (1) their experience with QI and (2) the story of a recent QI project they led. The full interview guide is displayed in Appendix C. We collected demographic data on years at their institution and professional role. The interviewer wrote a memo after each interview was completed.

4.3.4 Analysis

The audio of the Zoom recordings was transcribed by an independent, professional transcription service and imported into MAXQDA® 2020, a software for qualitative analysis.[82] We used an inductive approach guided by the analysis principles outlined in Miles et al. [80] Two authors (IAT and CMD) wrote summary memos of the first 4 transcripts and discussed concepts in the transcripts to create a draft codebook. Both authors then independently coded the first 4 transcripts and refined the codebook. IAT coded the remaining transcripts. After the first coding cycle, we used pattern coding to compare, synthesize, and map relationships between findings and generate interpretive insights about the data.[80] As part of the second coding cycle, we used tools such as memos and data displays. The conditions for both code saturation (codebook is stable) and meaning saturation (understanding of the issue with no additional insights arising) were met.[105] Transcripts and data analysis were not returned to participants; however, all participants were contacted via email with a summary of findings and asked to reply with comments.

4.4 RESULTS

4.4.1 Participants

Twelve QI practitioners participated in the study. Participants' tenure at their institutions ranged from 3 to 30 years. Three of the 12 participants at the time of the study were in clinical leadership roles, and the remaining nine worked in performance and/or quality improvement full-time. Of the nine currently working on quality work full-time, 4 had prior clinical experience. Employment details are described in Table 12.

Table 12: Demographic Data

# Of Participants	Mean # Years in Organization (Range)	Mean # Years in current QI role (Range)	# Of Participants who are Clinical Leaders	# Of Participants who are Full-time QI professional
12	12.9 (3-30)	5.4 (3-11)	3	9

4.4.2 Themes

The original research question at the conception of this study aimed to explore how practitioners approached context and its impact on the QI process. However, participants focused on their approach to engaging and thinking about stakeholders within context. Thus, the themes from our inductive analysis relate to stakeholders. From our analysis, we identified 5 guiding principles for engaging with stakeholders: The practitioners (1) involve multiple levels of stakeholders, (2) reframe problems for different stakeholders, (3) utilize information from quantitative and qualitative data to tell stories, (4) make trade-offs to match priorities, and (5) leverage expertise. Our findings below are structured to discuss how each of these strategies helps QI practitioners navigate context.

Strategy 1: QI Practitioners Involve Multiple Levels of Stakeholders Because Stakeholders "Don't Typically Burn What They Build"

The participants explained that they take stakeholders into account throughout the QI process. Participants collectively described that people play an essential role and must be considered.

> I know that people try to cut and paste things. I know individuals have tried to take [an intervention] and just drop it into other places without doing the hard work… It's completely

> missing the point. No, we're trying to improve clinical care in a micro-system…. you're dealing with people. (Participant 7)
>
> So, no matter how right something is, if you don't take into context the human factors and the beliefs of the people that you're expecting to change, then you're not going to successfully change anything. (Participant 2)

Participants reported that they partner and engage frontline professionals to solve problems and gain buy-in. Input is needed from multiple stakeholders across the organization.

> We have a couple roles that we won't do a project without. So, we always want an executive sponsor, so someone at vice president level who cares about getting the project done. If that doesn't exist, we're not going to bother trying to do the project because it's not going to happen. So, we have an executive sponsor. If the project is clinical in nature, we want a clinical leader who also cares about the problem and understands the clinical components because again, you can't solve a clinical problem without a clinical leader. And then we will want a sponsor who is usually a director level or such that has some responsibility over areas that connect to the problem we're trying to solve (Participant 5)

At different levels within the organization, stakeholders help the project differently. Diverse stakeholder involvement helps with buy-in.

> Involve the frontline, the subject matter experts, they need to be involved in the design, because people don't typically burn what they build… and I think just taking what they told me and trying to implement some of those things, so their voices were being heard, and people were reacting positively to them. (Participant 1)

Each stakeholder group has a unique perspective; involving different stakeholder groups helps them feel connected to the project. By practitioners addressing stakeholders' concerns and incorporating their ideas into the project, stakeholders become personally invested.

Strategy 2: QI Practitioners Frame Problems Differently for Different Stakeholders and Integrate Perspectives to Tailor the Project to All Collaborators

Practitioners and critical stakeholders identify opportunities for improvement before presenting the problem to a larger group of stakeholders. Participants identified multiple ways that QI projects start, including implementing new guidelines, addressing a poorly performing

quality metric, and problems that senior leaders have identified and chosen to prioritize. However, QI practitioners realize that these starting problems are only sometimes compelling to every stakeholder, so the problem often needs to be framed differently for different stakeholders. One participant gave the example of needing to reframe the problem for frontline staff initially identified differently by a senior leader.

> Projects start at the executive, the president, the CMO level, but then what we have is that challenge with setting the context. We have to think about "how are we going to get people to buy in?"; instead of saying, "The president says we have to do this." Those projects will fall flat very quickly. So, the "what's in it for me," making it meaningful for the nursing staff and the provider, figuring out what their incentives are, and then kind of setting context and alignment with those incentives. (Participant 1)

The QI practitioner does not rely on how the problem is initially defined to have other stakeholders participate in the project. A QI practitioner will take different approaches when communicating with different stakeholders due to each stakeholder's concerns, motivations, and incentives. For example, Participant 8 explains how they applied the knowledge of physicians wanting to discuss problems in terms of the clinical situation; on the other hand, stakeholders in finance want to understand problems in terms of expenditures.

> The way that you might go to a group of physicians to work through change is probably going to be very different than the way that you're going to approach somebody in finance who's focused on a different area or a different part of the change. So, I think having those different tools and resources was super beneficial [in this project]. (Participant 8)

To reframe problems, QI practitioners work to integrate the perspectives of frontline professionals with the perspectives of senior leaders to get buy-in on the problem and the intervention. One participant asks in projects:

> What's in it for [stakeholders]? Has this been designed in such a way that there's a win for them, even if it's not about them? (Participant 5).

Participants described reframing a problem to align with a stakeholder group and emphasized that the intervention needs to be adapted to address the different problems of each stakeholder. For instance, Participant 1 recounted a project where the initial problem was a financial opportunity identified by management. However, the participant reframed the problem for frontline staff to fit with what they cared about and made sure the intervention and the measures spoke to both management and frontline staff concerns.

> To hear it in their words of why it was important to keep more patients. There were the pain points of all the extra work of getting things printed and imaging was causing delays in transfer. But then some of them, they saw all of their information is in the EMR, we can ship that over seamlessly, they have all of our notes, all of our information, so there's no miscommunication. They saw that as a win. (Participant 1)

By focusing on the problems and priorities for multiple stakeholders, practitioners can gain buy-in to the project because the intervention addresses a stakeholder's concerns and motivations.

Strategy 3: QI Practitioners Integrate Qualitative and Quantitative Data to Tell a Story for Stakeholders to Buy-In into the Project

When talking about measurement and data collection, participants discussed how the QI process requires multiple steps to explore the meaning of a problem. First, data needs to be considered within the context. Participants explained that doing this involves feedback from others.

> I think data is great because it doesn't have an opinion. But I think it's always helpful to bring it back to your team to have them give their picture to the data. So, I think context is important when evaluating data…Some things are not black and white, especially healthcare… For me, it's always a conversation. You kind of start off with the problem, and you're like, what do we think is going on? (Participant 4)

The QI practitioner needs to explore the story to identify the problem and the root causes. To do this, they need to collect multiple sources of data.

> You can look at dashboards, scorecards and measures …but that doesn't mean you understand the problem. And so, you either need to do a chart review to understand what happened or observe what's going on so you can understand it…validating that the data is actually telling you the story that you think it's telling you. (Participant 2)

Quantitative data, sometimes in the form of measures, help define a problem, but they are not the only data source used. Participants reported collecting qualitative data through observations and talking with frontline staff to better understand the story.

> Until we walk their workflow and see what's actually being done, we're solving an unknown or an assumed problem or opportunity. So, I think, early on in a project, we use the term "going to Gemba [a Lean term for going to the actual process]," but it's just going to where the work gets done. I think early on when you can go see what the process is, it offers an opportunity to build those relationships, see the workflow, hear their feedback. (Participant 1)

It is important to get qualitative data from all stakeholders. Collecting qualitative data is essential before diving into in-depth quantitative analysis because all data sources inform each other and uncover different parts of the story. The different sources of data together allow the practitioners to develop a story to appeal to the stakeholders' logic and emotion to obtain buy-in.

Strategy 4: QI Practitioners Balance Trade-offs to Make Sure Projects Match Stakeholder Priorities and Concerns

Practitioners take into account incentives when choosing which projects to pursue. One participant explained that they have to take payment incentives into account.

> Different incentive and/or penalty programs drive the work that we do so we're not financially penalized... pressure injuries, VTE, that's a lot of the work that I do because those are the measures that we performed poorly in compared to our peers... sometimes [a quality measure] is high, but it's there's nothing obvious that can be fixed…I have accountability for an inpatient quality composite that has 150 quality measures in it. I have to figure out which ones we're going to work on. (Participant 2)

Measures help hospitals see where they have opportunities for improvement but do not indicate which areas for improvement should be prioritized. A poorly performing measure is only an

indicator of a problem that needs to be solved. In the quote, Participant 2 highlights that there are many opportunities for improvement projects, but not all problems are easily fixed. This is in part due to limited resources. QI practitioners recognize that there are trade-offs in resources and must determine which projects are worthwhile and most urgent to stakeholders. Participant 12 explained that resources and the impact of a project should be weighed.

> Yes, it is a known problem, but it's not the most painful. So then [leaders] do their own assessment of "should we?" How many resources we should devote to solving this system problem, versus how many resources we could devote into solving [another problem]. (Participant 12)

In addition to trade-offs regarding which problems to solve, there are trade-offs when choosing interventions and timelines of projects. As a result, choosing an intervention is not about perfection.

> We didn't let the perfect get in the way of good enough. Right. We knew we couldn't get to a perfect answer and so we landed on one that was a little bit clunky and dumb, but it worked. (Participant 2)

In this quote above, the participant highlights that feasibility is a large part of choosing a solution. In choosing a solution, QI practitioners need to prioritize interventions.

> The team can prioritize [intervention options], …for example, I brought [X intervention] as an option. And the team said, "Great, let's run with it." But then sometimes with different projects... We have to brainstorm all of our solutions, get feedback, and then prioritize that feedback. So sometimes we do voting… Sometimes we [use a] benefit-effort matrix, so we can plot things out. So, this is high effort to get it up and running, and the payoff might not be as great, but this is a high payoff, and it's really easy to implement. So maybe we'll start there…. If the intervention is really going to be burdensome, you're going to lose buy-in. (Participant 1)

Using QI tools, such as the benefit-effort matrix, practitioners consider stakeholders' feedback and prioritize intervention options. In this process, practitioners consider many aspects, such as stakeholder burden.

Strategy 5: QI Practitioners Leverage Expertise and Ask for Help to Obtain Knowledge

QI practitioners rely on others' knowledge in QI projects. Participants reported that they do not need to be experts in the improvement problem underpinning the project.

> Nobody thinks you're the expert on that. What you're supposed to be the expert on is the methodology and working with a team to solve a problem. So, you'll have people on the team who are experts in heart failure, who are experts in discharge, who are experts in all the different relevant domains for that. Over time on a project, you should learn a lot about those things but nobody's looking for you to be the expert, and in fact it's really damaging if you read an article and decide you're the expert. You're going to lose a lot of credibility. (Participant 5)

In QI projects, participants reported that there are barriers that inevitably need to be navigated. Participants report that to help think through addressing barriers and problems that arise, they ask for feedback from peers.

> [In the quality department] we don't always know what each other are working on. But I think what is helpful is that we really do have kind of an open communication of if you're hitting the wall on something or I'm hitting the wall on something, like let's sit down and brainstorm, let's talk through what I've done or what you've done. (Participant 8)

QI practitioners cannot complete QI projects alone, nor do they have all the answers as questions and problems arise. Thus, they depend on peers and stakeholders for help.

4.5 DISCUSSION

This study's initial research question sought to understand how QI practitioners addressed context broadly. However, from the inductive analysis, it emerged that 'stakeholders' was the subcomponent of context that participants focused on and were most concerned with. As a result, the research question was narrowed, and this study aimed to understand how QI practitioners navigate context in the real world related to stakeholders. In their approaches, practitioners pinpoint and refine problems and identify and adapt interventions that resonate with multiple stakeholders' priorities to partner with them. This process often involves reframing problems for different groups, developing stories to explain the problem to appeal to stakeholders' logic and

emotions, strategically building rapport, and partnering with stakeholders so that they contribute to the project and are more likely to accept the final intervention. This idea is reinforced by what one interviewee said, people "don't typically burn what they build." The frontline belief in the intervention is part of the glue that keeps the implementation of the intervention sustained.

Further, practitioners combine multiple data sources, make trade-offs due to incentives and limited resources, and defer to experts. These interdependent actions complement technical QI steps outlined in structured QI guidance to define problems further, identify solutions, and implement interventions. Collectively, our findings highlight how QI work is a balancing act of weighing incentives and beliefs of multiple stakeholders into an integrated change through employing relationship-based strategies at every step. QI practitioners are using relationship-based strategies to obtain buy-in from various stakeholders.

The findings of this study provide a list of strategies experienced QI practitioners use to obtain buy-in from stakeholders that resonate with the broader quality literature and add to the current implementation science lists of strategies. Comprehensive lists such as the Cochrane Effective Practice and Organization of Care (EPOC) taxonomy[175] and the ERIC study strategy list[167] do not specifically use the term buy-in but identify implementation strategies related to front-line staff, such as identifying champions and obtaining formal commitments of participating in the implementation process. Fischer et al. [176] identify an initial list of strategies (e.g., identifying opinion leaders, educational outreach, and local adaptation) to address stakeholder barriers (e.g., lack of agreement, lack of motivation, and lack of collaboration), but these strategies are broad. They do not include specific examples of tasks to be carried out. The

strategies from this study complement these existing lists by adding strategies that QI practitioners can apply as individuals. Further, our strategies align with other scholars' work, such as the need for engagement of multiple levels of stakeholders,[177] storytelling through the change process,[178] the role of payment incentives,[179] and deference to expertise.[180] Yet, this knowledge is not included in lists of strategies; thus, practitioners are left on their own to figure out strategies to involve stakeholders.

The QI process is often depicted as a series of technical steps, but in practice, a large part of the process is building relationships and interacting with stakeholders. The need for multiple strategies to secure buy-in aligns with the literature on the politics involved in QI work and the reframing of QI work as an act of collective action. Taking the time to make sure a project is aligned with the senior leader, as well as frontline staff, is an inherently political process influenced by which practitioners must navigate the hierarchy of stakeholders, a view supported by Rogers et al. [181] The focus on buy-in and collective group change reframes QI from a series of technical steps to a sequence of social strategies to bring about change.[168]

Often the implementation science literature talks about strategies to overcome barriers within context.[176] However, it is slightly more nuanced in practice—strategies are also used proactively to overcome anticipated barriers. Strategies are only part of explaining the knowledge and action needed to approach context. Practitioners employ a stakeholder-centric mindset when approaching QI work; they incorporate stakeholder strategies throughout a project and report consistently taking stakeholders into account.

4.5.1 Implications for Practice

The complexity of stakeholders within context is an ongoing struggle in QI work, even though many papers describe the importance of context.[12] To avoid this pitfall, as described in frameworks, practitioners should think about strategies used throughout the QI process and not just during implementation. Further, practitioners should adopt a stakeholder mindset because stakeholder engagement needs to occur from early priority setting to the sustainment of initiatives.[177] Since stakeholders and buy-in are essential components of QI work, QI practitioners should consider (as part of the structure guidance they use) mapping strategies and actions to potential implementation barriers within the unique context of a project.[16,182] This exercise will help practitioners think through the 'how' and 'why' of navigating context in order to choose strategies that fit the unique project situation. This also demonstrates the importance of the literature not just listing strategies but providing examples of the actionable steps and cases of how a strategy is used to facilitate the transfer of knowledge. With that said, some strategies may consistently apply to most projects, like the strategies we identified to obtain buy-in. Future research should explore what strategies are the most effective to help build an approach for obtaining buy-in from stakeholders.

4.5.2 Limitations

Our study has multiple limitations that limit the transferability of the findings.[183] Our study was conducted with QI practitioners in a single, academic health system. While our sample of 12 participants was sufficient to support a rich preliminary sketch of strategies to obtain buy-in and showcase practical, real-world stories of QI practitioners navigating context, further research is required to develop deeper insight into the nature of how practitioners navigate context in diverse

healthcare settings. Nuanced distinctions, such as the relationship between buy-in and QI project scope, will require a larger multi-site study to explore the ways in which context affects the QI process. Due to the nature of inductive analyses, the identified strategies are one interpretation of the data. We recommend leaders and practitioners use the illustrative quotes provided to identify findings relevant to their local institutions and projects.

4.6 CONCLUSION

This study reinforces the critical role of obtaining buy-in and identifies strategies in which QI practitioners navigate complexity related to stakeholders. These strategies demonstrate that QI practitioners obtain buy-in across multiple levels of the context by employing strategies such as using multiple sources of data, making trade-offs, and reframing problems. Future research should continue to explore strategies and practical approaches for buy-in. QI practitioners can incorporate the strategies we identified in this study into their practice as they see applicable to their setting and researchers can add these strategies to compiled implementation strategy lists.

4.6.1 Declarations

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Author Contribution

All authors contributed to the study's conception and design. IAT developed the interview guide, conducted all interviews, completed all steps of the analysis, and wrote the manuscript. CMD

conducted analysis of the data and a critical review of the manuscript. JKJ, KJO, and MCR provided supervision for the study at each step and conducted critical review of the manuscript. All the authors listed have gone through the manuscript and agreed to its submission.

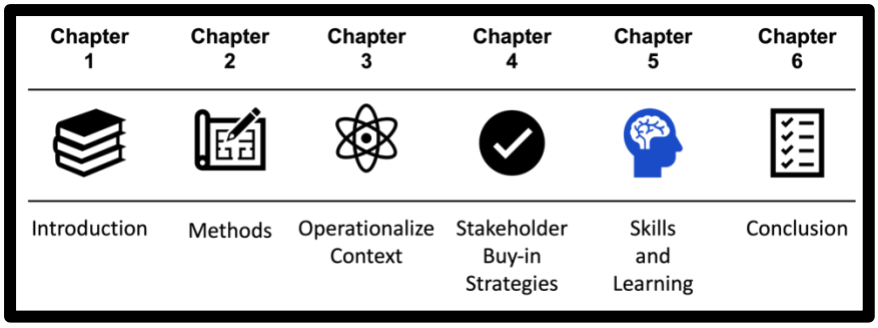
Conflict of Interest

No authors declare a conflict of interest

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author, IAT. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

CHAPTER 5: [MANUSCRIPT 3] How are Skills Used and Gained in Quality Improvement? A Qualitative Study of Practitioners' Experiences



"Skill is the unified force of experience, intellect and passion in their operation"
-John Ruskin

5.1 ABSTRACT

Background: Expertise, a factor that influences quality improvement (QI) project success, requires acquiring relevant knowledge and prerequisite skills. While the current literature helps us to understand some skills in QI work, less is known about the breadth of the skills performed by QI practitioners and how they learned these skills to develop their expertise. The purpose of this study is to explore how experienced QI practitioners develop expertise through examining skills and learning.

Methods: We conducted 12 semi-structured interviews with experienced QI practitioners. Audio recordings of these interviews were transcribed verbatim and analyzed through an inductive and deductive coding approach.

Results: This study demonstrates that QI practitioners rely on multiple skills beyond technical skills to complete QI work, and they learn and develop skills through a combination of formal training, experiences, self-directed learning, teaching others, and from mentors.

Conclusion: The study reinforces the literature that suggests that leadership is critical for QI work. Most importantly, this study helps tie skills in QI to other literature on skills, which can be used to inform QI skill development and underpin the building of a theoretical framework for skills within QI.

Keywords: Skills, Quality Improvement, Qualitative Methods, Learning

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5.2 INTRODUCTION

Quality improvement (QI) involves pinpointing a particular area for improvement, proposing specific changes, implementing changes, and evaluating their success, all of which require stakeholders to be directly involved in the decision-making process.[1] To complete each step in the QI process, practitioners apply skills, specifically in carrying out tasks.[10,12] In the discussion of skills within QI literature, the focus is often on either technical skills such as data measurement, use of QI tools, and application of the Plan-Do-Study-Act (PDSA) cycle;[184,185] or skills that are part of a conceptual discussion of leadership that focuses on broad, high-level tasks such as influence, support, and negotiation.[15]

While the current literature helps us to understand some skills in QI work, less is known about the breadth of the skills performed by QI practitioners and how they learned these skills to

develop their expertise. Expertise, a factor influencing QI project success,[186] requires acquiring relevant knowledge and prerequisite skills.[187] To help QI practitioners develop expertise, a deep understanding of the learning process and the skills used to perform project tasks can inform QI training curricula. This is significant given the substantial investment in QI training programs and the continual demand for improved practice.

This study explores how experienced QI practitioners become adept at QI through examining skills and learning. Scholars use methods that involve direct observation of interpersonal behavior to study skills, such as interviews, work samples, and assessment center exercises.[188] To explore skills, we conducted semi-structured interviews with QI practitioners to help answer two research questions. Because skills are demonstrated through actions, we first need to understand the tasks QI practitioners complete in the QI process. Based on these actions, we could then identify skills. Our first research question is: *How do QI practitioners apply skills?* We wanted to understand how practitioners believe they learned their knowledge and skills to complete QI work. Our second research question is: *How did QI practitioners gain knowledge and learn skills?*

5.2.1 Background on Skills

Even though skill is a commonly used term, scholars have differing definitions. For example, some scholars name skills synonymous with knowledge and others with action.[66] Many scholars do agree, though, that skills are comprised of 'know-what' (knowledge of facts), 'know-how' (knowledge of process), and action (translation of knowledge into performing a task).[21] Instruction helps provide the know-what, and experience helps provide

know-how. For example, a textbook may teach one the steps to draw blood (know-what). As part of the directions, an individual learns tips such as to have the supplies all laid out in the order they will be used and that one should feel for a vein versus just looking visually (still, know-what). When one draws blood multiple times and reflects on the task (experience), they learn how a vein feels and the best angle to smoothly insert a needle (know-how). Successfully performing a blood draw (action) demonstrates the skill of blood drawing. The conception of skill as being composed of these 3 components aligns with knowledge (know-what and know-how) and task performed (action) as distinct concepts. This distinction is critical because research needs to focus on tasks to identify skills for a comprehensive understanding of skills to be developed in the field of QI.

Identifying and studying skills is challenging in QI partially because QI theory currently needs to provide a taxonomy of the different types of skills that compose QI work. A skill taxonomy would portray what QI practice looks like in the real world and showcase the range of knowledge and tasks needed to complete QI work. One view is to dichotomize skills into 'hard' and 'soft' skills. 'Hard' skills are often defined as the tangible technical know-how needed to complete tasks and are sometimes referred to as technical skills.[35] On the other hand, 'soft' skills are socio-emotional skills, such as communicating well, managing conflict, and building relationships. These skills are essential for personal development, social participation, and workplace success. The connotation of 'soft' implies easy, and the association of 'hard' implies challenging. These associations imply that soft skills are easier and perhaps even less important than hard skills. Some scholars prefer to break down soft skills into narrower categories, such as

intrapersonal and interpersonal skills, to avoid these associations.[38] However, there is no definitive way to categorize skills across fields. With that said, categories of skills have been developed in multiple disciplines, and the field of QI does not need to reinvent the wheel regarding skills but instead learn from the work on skills that have already been done.

5.2.2 Background on Gaining Skills

Skills cannot solely be taught but require experience as well. Benner [22] uses the Dreyfus skill acquisition model to explain that nurses develop skills to become experts over time from a combination of a strong educational foundation and personal experiences. Similarly, QI training programs commonly involve structured instruction and trainees completing a QI project to gain experience.[189,190,191,192,193,194] We use the term experience as Benner [22] defined it: self-reflection that allows preconceived notions and expectations to be confirmed, refined, or disconfirmed in actual circumstances. Merely encountering situations is not "experience;" instead, experience involves people reflecting on encountered circumstances to refine their moment-to-moment decision-making at an unconscious, intuitive level.[22,23]

This definition of experience is aligned with experiential learning, the primary source of 'know-how' knowledge that occurs from completing a QI project. Experiential learning is a 4-element cycle (or spiral) in which learners move from involvement in a new experience to reflect on that experience, integrating those observations with sense-making concepts and mental models, then applying these lessons learned to future projects; or, more briefly: experience, observe, conceptualize, and retry.[195] The key to learning QI does not seem to reside in merely gaining experience but in how the individual uses experience as a learning mechanism.[196] The

idea of reflection and feedback is further reinforced by expertise theory: Ericcson[197] in his work on expertise, explains that carrying out a skill is not enough to become an expert but requires deliberate practice (i.e., a practice that focuses on tasks beyond your current level of competence and comfort) that involves receiving feedback in the moment and reflection to the point of coaching yourself. Even though identifying and measuring experts is outside the scope of this study, the framework for skill acquisition to become an expert still applies to understanding how QI professionals are gaining skills.

5.3 METHODS

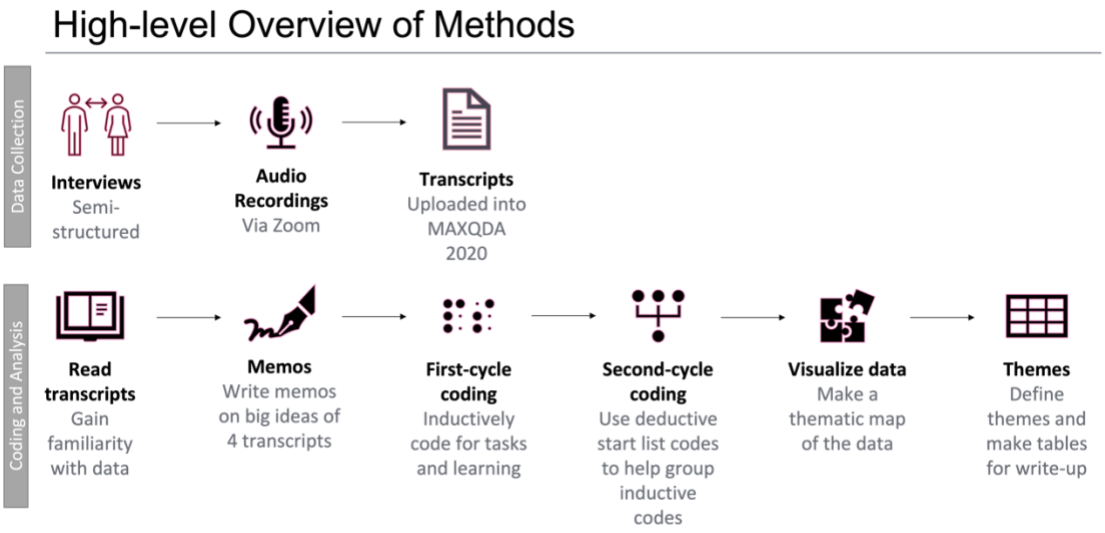


Figure 5: Visual of High-level Overview of Methods

5.3.1 Study Design and Setting

We conducted a qualitative interview study[86] with QI practitioners employed within Northwestern Medicine, a nonprofit health system with 10 hospitals affiliated with Northwestern University Feinberg School of Medicine in Chicago, Illinois. This manuscript adheres to the

Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist.[174] This study was approved by the Northwestern University Institutional Review Board (STU00215660). See Figure 5 for a visual of our methods.

5.3.2 Sampling and Recruitment

We used a snowball sampling strategy.[86] We started with an experienced QI professional, a colleague of author KJO, who was asked to participate in a semi-structured interview. At the end of the first and subsequent interviews, we asked interviewees to identify additional potential interviewees for us to recruit via email. Eligible participants were healthcare professionals who have led at least two QI projects or are employed by the health system to lead QI projects.

5.3.3 Data Collection

The one-time individual semi-structured interviews were conducted via Zoom between September 2021 and December 2021 and were audio recorded. Participants were interviewed from their homes or offices and appeared to be alone. Interviews were guided by an interview guide and were 45-60 minutes in length. We pre-tested the interview guide by conducting a pilot interview with a QI professional in a different hospital. Verbal informed consent was obtained before the start of the interview. All interviews were conducted by the first author (IAT), a PhD candidate and nurse with training and experience in qualitative methods and expertise in quality improvement. She had had no prior relationship with the participants. The interview protocol was structured to ask participants about challenges they faced in QI by asking questions about (1) their experience with QI and (2) the story of a recent QI project they led. The full interview

guide is displayed in Appendix C. We collected demographic data on years at their institution and professional role. The interviewer wrote a memo after each interview was completed.

5.3.4 Analysis

The audio of the Zoom recordings was transcribed by an independent, professional transcription service and imported into MAXQDA® 2020, a software for qualitative analysis.[82] We used an inductive and deductive approach guided by the analysis principles outlined in the work of Miles et al. [80] Two authors (IAT and CMD) wrote summary memos of the first 4 transcripts. They then subsequently discussed concepts in the transcripts to create a draft codebook. Following this, they independently coded the first 4 transcripts and refined the codebook. IAT coded the remaining transcripts. For second-cycle coding, we used pattern coding to group the inductive codes into themes.[80] With crucial concepts in mind from our readings to sensitize us to concepts related to skills and learning (see Appendix D), we first created a coding start list (See Table 13). Using the list as a starting point, we compared, synthesized, and mapped inductively coded activities into groups of skills and ways of learning. As part of the second-coding cycle, we used tools such as memos and data displays. Both code saturation (codebook is stable) and meaning saturation (understanding of the issue with no additional insights arising) were met.[105] Transcripts and data analysis were not returned to participants. Participant member checking has not yet occurred.

Table 13: Coding Start List

Start Code	Definition
Intrapersonal	One's ability to manage oneself

Interpersonal	One handles one's interactions with others
Technical	Involve working with equipment, data, software, etc.
Learning from formal training	Learning from instructions received in courses and textbooks
Learning from doing	Learning by performing a task
Learning from feedback	Learning by getting information on performance

5.4 RESULTS

5.4.1 Participants

Twelve QI practitioners participated in the interviews. Demographic details are described in Table 14. Four skills were identified, and 5 ways of learning are described. The results are organized according to skills used in QI, with example tasks that map onto each skill and how knowledge and skills are learned. Illustrative quotes are displayed in tables.

Table 14: Demographic Data

# Of Participants	Mean # Years in Organization (Range)	Mean # Years in current QI role (Range)	# Of Participants who are Clinical Leaders	# Of Participants who are Full-time QI professional
12	12.9 (3-30)	5.4 (3-11)	3	9

5.4.2 What Skills Are Used in QI?

In describing the process in which participants completed QI projects, QI practitioners described tasks they carried out in each step of their projects. We coded for tasks, identified tasks discussed by multiple participants, and grouped tasks into 4 types of high-level skills: intrapersonal, interpersonal, project, and technical. Table 15 describes each skill, and Table 16 describes tasks performed by QI practitioners that demonstrate each skill.

For each skill, the associated tasks occurred throughout the QI process, not just at one stage. Participants applied interpersonal skills to engage stakeholders at the start of projects to define the project scope, such as asking questions to build rapport and obtain information. Participants continued to apply interpersonal skills through the project, such as storytelling, to obtain stakeholder buy-in. These two examples demonstrate that interpersonal tasks complemented technical tasks. Project skills and intrapersonal skills also complemented technical and interpersonal skills. For example, not internalizing push-back (intrapersonal) complements interpersonal skills of continuing to build rapport with stakeholders. Project skills, such as applying organizational knowledge to navigate the system or anticipating problems, allow participants to define the scope of projects (technical) and implement interventions. All 4 types of higher-level skills identified in this study were used in the projects that participants described, which showcases that all the skills used together move a project forward. Furthermore, multiple skills were used together to complete key QI process steps, such as defining the problem and identifying solutions throughout the process to complete projects.

Table 15: Description of 4 High-Level Skills

Skill	Description
1. Interpersonal	The participants described actions they take during a project to build relationships and to facilitate communication to help a project progress. These actions collectively reflect interpersonal skills.
2. Intrapersonal	QI practitioners expressed taking actions to improve themselves (intrapersonal skills) so that they could better complete their work. Practitioners discussed how they spent time learning about themselves and reflecting in order to better complete the social components of QI work.
3. Project	Participants discussed actions they took to complete the project aspects of QI work. These actions were not unique to QI work, but to projects in general. Participants reported managing meetings, making and presenting presentations, and being responsible for project organization such as scheduling recurring

	meetings.
4. Technical	The practitioners also described actions directly related to the technical QI process such as using tools or conducting data analysis. Participants discussed the tasks they completed that involved the QI methodology. The decision of when to use a tool and how to apply the tool demonstrates a practitioner's technical skill.

Table 16: Tasks Used to Perform Skills

Skill	Tasks that Demonstrate Skills	Description	Quote to Show Activity in Project
Interpersonal	Storytelling	Creating a narrative that communicates the problem to connect the project to frontline staffs' motivation by using the words, phrases, and problems identified by the frontline staff	I think pulling on the heartstrings. … I experienced it myself that people that had a really compelling story, that was my call to action, and I felt more connected to that project and more motivated to do what I needed to do to help contribute to the outcome. So, I think I learned early on the power of storytelling, which is essentially setting context, like why do we care, which sounds harsh, but you have to tie it to people's motivation… And I think just taking what they told me and trying to implement some of those things, so their voices were being heard, and people were reacting positively to them. (Participant 1)
Interpersonal	Ask questions and seek to understand	Using knowledge that other stakeholders or experts have through coming from a place of curiosity, and wanting to understand others' perspectives and experiences	Sometimes I think the approach with my current role today is to just always have experts around you. I don't need to be super versed in it… it is never going to hurt me to really try to understand what the people are doing in these spaces, and not just say, like, I'm here to fix it without really understanding it. So, my advice would just be to take a lot of time and be very observant and ask a lot of questions and just use the time for them to teach you something. (Participant 4)

Interpersonal	Setting expectations	Setting expectations of how to participate in the project	There's really great tools on strategies for brainstorming, so sometimes you can tell people like, “Okay, give us your ideas,” and you're met with blank faces. So setting expectations for everyone, “Give me five ideas,” every single person, each idea goes on a Post-it note, and then we organize those, and maybe a lot of them are similar themed, then you can kind of, I guess, cook those ideas with the group and come up with a brand new idea that's not one specific person's idea, but generated by all these ideas of a new intervention that kind of came out of the group processing through these other smaller ideas, if that makes sense. (Participant 1)
Interpersonal	Admitting mistakes	Being able to say that they are wrong	It's okay to admit you don't know something or it's okay to admit that you made a mistake, because you actually get more buy-in if you say, “My bad…I didn't get that done in the time frame that I had expected I was going to be.” You get more buy-in by being honest and admitting your flaws than trying to cover it up or pushing the blame elsewhere. (Participant 8)
Interpersonal	Building a network	Building connections and relationships	taking the time to get to know various people throughout the organization. Really, especially in opportunities like a team setting, getting to know people that I don't necessarily work with every day. Obviously, I build relationships with my team every day and all day, but people that I don't see as much, trying to really think of how I can get some personal details or think of something that's important to them and really connect on that level is always fun too. (Participant 11)
Interpersonal	Ask for insights from peers	To know how to work with certain leaders, ask others who have worked with them	I've always found that it's true you have to rely on help from colleagues who have been around who kind of know how the place works to pick things up like ... [Senior Leader A] personality is very, very different than [Senior Leader B]. And so, if you're doing a project with [Senior Leader A] versus [Senior Leader B] and you were brand new to the organization and nobody helped you, I think you'd be pretty lost. (Participant 5)
Intrapersonal	Do not internalize push-back	Knowing that questions will be asked that challenge your analysis	Don't take it personally. [Physicians] are trained to just really interrogate this data, question it, is this valid? So, I found that to be very helpful. (Participant 6)

Intrapersonal	Seeking feedback	After projects, seeking feedback	I am a strong proponent of feedback. I always ask for feedback, even after I do a presentation or after I speak to leadership. I'll always email somebody that I know who is in that audience and say, “Okay. What can I do better? Next time, how can I improve?” (Participant 8)
Intrapersonal	Reflection	Thinking through learnings from projects	I think every project is informal training. Right? Every project you walk away from and go, “Boy, I could have done this better, or I should have done it this way or next time I'm going to remember this.” So, I have taught myself over the many years of working either via clinical or through PI that everything is a learning experience. And you have to take that as frustrated as you'll get at times, you have to look at it as this is a learning experience of how not to do this next time. (Participant 8)
Project	Connecting the intervention and problem	Seeing how the intervention relates to the problem to make sure the intervention is addressing the root causes of the problem	I think people really fall back on that, like, “Oh, but we educated [stakeholders].” Okay. You can educate, but that doesn't mean someone's going to change their practice and making sure that things are embedded in the workflow is really the best way to make a change. So, that's really what we thought we were coming at is like really to embed the [intervention tool], you know what I mean? But what we realized is that they were just really struggling with the tool and didn't trust it. (Participant 6)
Project	Anticipate problems (proactive)	Taking proactive action	Naysayers are going to be there. Every project's going to have one, so you might as well just look for them ahead of time and know who they are rather than hoping that they're not going to be there because they're going to be there. (Participant 8)
Project	Navigating the system	Applying organizational knowledge to projects	And so, I think that there is just so much reliance unfortunately on kind of informal knowledge within the organization. And although I'm talking about how that resides within the PI team, the reality is that it kind of extends outward from there of the PI knows a lot because they've worked with different people in different parts and so even when we don't know the answer we might be like, “Oh, you know who would be good to talk to is this person because they know how that team works.” And so unfortunately, I feel like a lot of it is kind of informal networking and leveraging all the different nodes you can find in the organization to understand how things work. (Participant 5)

Technical	Application of tools	Applying QI tools within projects	I would say such things as the five whys when you're trying to understand the root cause of a problem...I've applied it on so many things, and I've given it and taught it to other people and it really does help you get to the root cause of the problem because without that, if you're not, you're not going to solve the problem because it's you're not going deep enough, right? …And we can create basic process maps, one lane process maps. You have the ability to color code by discipline or steps within the process, which then helps tell the story better. So, I'd say Visio but PowerPoint we use all the time as well too. (Participant 10)
Technical	Considering the timeline when choosing an analysis	Matching the data analysis to the intervention and goal	Where manufacturing, if you want to change the way a line works you can usually run it for a week and be very confident, you can use statistical tools and all those to know, is this a meaningful difference? Whereas … if you look at patient falls or pressure injuries… even though they're unfortunately way more frequent than we would like them to be, they're not very frequent events. And so, if you use traditional tools around statistically significant, it can take forever, it can take like a year. (Participant 5)
Technical	Iterative	Completing a small test of change	If you want to figure out what's going on with what works, what doesn't, and then you do another [PDSA cycle] and another one until you get to whatever your desired end point is. (Participant 12)

5.4.3 How Are QI Skills Learned?

When participants described how they learned QI, they explained that they learned not only technical skills and knowledge but also skills related to interpersonal, intrapersonal, and project skills as well. Participants emphasized that the learning process is about gaining a wide range of knowledge that can be drawn upon for projects since each project is unique. Table 17 outlines how QI practitioners perceived to have gained their QI knowledge and experience. This table describes each learning method and provides illustrative examples of how QI practitioners have used each method to learn.

Improvement practitioners report learning knowledge and gaining experience to develop skills in multiple ways, some formal and others informal, in 5 ways: formal training programs, from others, through teaching, through doing, and self-directed learning. Multiple participants described formal training programs providing the "foundation" for QI work but that they learned their most significant lessons from experience, including failures and advice from mentors and peers. Participants reported taking time to reflect on what went well and what could be improved in their performance of projects. In addition to reporting traditional programs and experience as ways of learning, participants reported that teaching others helped them learn even more about QI and that they took the time to refresh their knowledge by revisiting books and other QI resources. Participants reported that learning to do QI is ongoing and occurs in multiple ways.

Table 17: How QI Skills and Knowledge are Learned?

Method	How Learned	Description	Illustrative Quote
Formal Training Programs	On-job course with experiential learning	QI training that involves completing a QI project	"[the hospital] has a program that I was a part of, which allowed me to do my own QI project… So, three months or so of mentorship, sitting in on a class… learning about the curriculum, getting assigned my own project, and then leading [my project]." (Participant 4)
	Higher Education	Learning from completing a degree	Part of my MBA concentration was leadership and change management. So, I was able to take some formal classes about different change management concepts and how to approach change management, which is obviously a massive part of any PI/QI type of initiative. So, that was very helpful just to have some of that book knowledge. (Participant 8)
	Continuing Education	Learning from QI training courses after being on the job	We went to the University of Michigan for a two-day course, and I think it was called Carta in the Lean world. (Participant 10)

	QI training courses	Structured teaching about QI methods	I'm taking a Green Belt course now, and so that's all lean, six sigma, which they're talking about DMAIC and all that kind of terminology, and a lot of it, not all of it, is the manufacturing terminology I'd say, which is applicable to healthcare but it's slightly different, but it's interesting. (Participant 3)
From others	Mentors	Advice and feedback from mentors	I was meeting with my director at the time, who was amazing. She had very good soft people skills and she was like, "I think we need to talk to this physician and hear him out. I think that might help," and I was kind of like, "Okay, sure. Whatever you say," but it did work, so yeah, she was right. For sure. (Participant 3)
	Peers	Learning from peers 1:1	making sure that you're able to build those relationships because the value in learning from each other is so very important. (Participant 10) I think our team is really great at that, whether we're working together or not, just saying, "Hey, what do you think about this? I put this agenda together. I'm thinking about this meeting. How do I do it this way? Or what do you think about this?" So, I think that is the informal aspect of how I've learned and improved my skills. (Participant 3)
	Collaboratives	Learning from peers through learning group	We started cross team buddies. We usually work within our own teams or regions. Last year, for example, I did. We don't usually interact a lot with other regions and know what our peers are doing across the system. What we started doing is we matched each of us with someone else from another region. So [we] created a group of 5 to 6 people that come together every month or every 2 months, and we share what projects we have started, what projects we closed … And then, "are there any barriers or lessons learned that we can share with each other?" That's another way of, not necessarily learning about the tools or techniques, but learning about how people approach their own projects. (Participant 12)
Through Teaching	Through teaching others	Learning from teaching others QI	We do a lot of coaching, and we actually teach intro to PI Excel for DMAIC. And so, we're teaching a lot of these concepts that really help reinforce the methods, the structure and the options that we have, the resources we have to help move projects along. (Participant 1)

Through Doing	Failure	Learning from mistakes and bad outcomes in a QI project	But in my past almost 10 years in quality improvement, process improvement, I think having that experiential training and the failures specifically, like the things that don't work and looking back at *why didn't that work?* It's like, "Aha, I didn't do X, Y, or Z." I think that's been critically important to help hone my skills. (Participant 1)
	Experience	Learning from doing and reflecting on a QI project	I feel that I learned more from just doing it. (Participant 2)
Self-directed Learning	Refresh knowledge with books	Learning from self-study	I mean I still have my books. They're earmarked with little tabs of all the different things that I'll sometimes go back to and be like, "How do I do this again or what's the best way to do this?" Just for brainstorming (Participant 8)

5.5 DISCUSSION

Even though QI scholarship recognizes the importance of skills and expertise in QI work, the discussion of tasks carried out by practitioners is only sometimes mapped to known categories of skills within the biomedical literature and other disciplines. In this study, using a taxonomy of skills and constructs of skill acquisition theory as a starting point, we examined ways in which QI practitioners apply skills in QI projects and how they gained skills. Our results align with previous findings that QI practitioners deploy a wide range of skills beyond technical skills[66] and highlight that learning QI work is ongoing and involves feedback and reflection.[198] The findings for our 2 aims demonstrate that multiple, complementary skills throughout the QI process are learned from training and experience over time to help practitioners develop more expertise. This study identifies tasks that QI practitioners complete in real-world practice, which is then grouped into skills and learning methods; focusing on tasks helps translate what is occurring in practice to what can be taught in QI training.

Our findings add to the literature examples of tasks carried out in QI work to illustrate 4 complementary skills. The different skills are used throughout QI projects and are used together to accomplish key QI process milestones, such as identifying problems and adapting interventions. Stakeholders are an essential part of the QI process, and the QI practitioners employ skills to partner with stakeholders throughout the process. By doing so, practitioners use skills to build relationships (interpersonal skills) to collect data for each major step in the QI project, such as scoping the project (technical skills). The practitioners communicate project progress (project skills) and are self-aware of how they present themselves (intrapersonal skills) to help establish trust and build rapport. Our finding that non-technical skills complement technical skills is consistent with surgical skills literature.[199] Further, our findings highlight the need for the field of QI to focus on how different skills are used together. A range of skills should be part of QI training curricula and taught to be used together.

To gain know-how, our findings reinforce that doing a project alone is insufficient, but feedback and reflection are crucial components of learning how to do QI work. Participants discussed that they learned from receiving tailored feedback during projects from mentors, peers, and QI collaboratives, which all require the investment of time from others. In addition, participants emphasized that they learned from teaching and self-directed learning, both forms of reflection. Thus, more than completing a project is required to gain experience but requires the additional steps of receiving feedback and reflecting. Therefore, QI training programs should build mechanisms to provide feedback and emphasize the importance of reflection.

Expertise is known to affect QI project implementation success[11] and is known to occur over time, but less is known about how expertise is developed within QI. Our study participants report that QI learning occurs over time. Performance has frequently been found to decrease without continued training.[200] This is key because it demonstrates how QI is a profession within itself, and a single project or course will not lead to full knowledge or skill development. Batalden et al. [198], argue "a profession is defined by what it does, not just what it knows, and by doing what it does better all the time, not just doing it well." By applying the lens of a profession to QI work, leaders and scholars will see that QI skill is developed and is not fully learned from a single project, a particular training, or utilizing a specific framework.

We started with a simple taxonomy for classifying skills: interpersonal, intrapersonal, and technical skills. We identified tasks such as communication and organizing that did not seem to fit into the initial categories of skills, so we added the category "project skills." However, there are multiple taxonomies of skills, and some include multiple levels of sub-categories of skills. For example, Flin et al. [201] defined non-technical skills along 3 dimensions: interpersonal (e.g., communication, teamwork), cognitive (e.g., decision-making, situational awareness), and intrapersonal skills (e.g., coping with stress and fatigue).[202] The use of a different taxonomy of skills sheds light on the opportunity for future research to explore sub-categories of skills within QI to better flesh out the range of tasks and skills commonly used in QI work. A common taxonomy of skills in QI will help provide a shared language. Further, using skills as a lens versus simply recounting tasks in project descriptions will take into account that even though

different tasks will be performed in each unique project, there is a commonality in the type of tasks.

The wide range of non-technical skills used at multiple points in the project aligns with skill literature on leadership and can inform QI training curricula. In a review of skills in leadership, the authors categorize leadership skills into 4 general categories: (1) cognitive skills, (2) interpersonal skills, (3) business skills, and (4) strategic skills.[203,204] The scholars' grouping of skills differed from ours and highlights how there is no standard taxonomy of skills. Our findings directly overlap with interpersonal skills, intrapersonal skills overlap with the learning of cognitive skills, and project skills overlap with ideas from business and strategic skills in terms of navigating the organization, problem-solving, and managing the project. Alignment with leadership skills and the emphasis on the importance of leadership in some QI literature suggests that a lot of QI is an act of leadership that goes beyond following QI methods. This reframing suggests that an emphasis on leadership in QI training may be warranted. Future research should explore how a greater focus on leadership helps improve project success, using known evidence-based leadership training techniques such as 360-degree feedback.[204]

5.5.1 Limitations

Our study has multiple limitations. A goal of the current study is to offer new directions for the study of how QI practitioners use and gain skills. Although not interfering with this goal, it is worth noting that aspects of the study limit the transferability of the findings.[183] Our study was conducted with QI practitioners in a single academic health system. While our sample of 12 participants was sufficient to support a rich preliminary sketch of this phenomenon, further

research is required to develop deeper insight into the nature of skills used by QI practitioners in multiple healthcare settings. The nuanced distinction between sub-skills and how non-technical and technical skills support each other will require a more extensive, multi-site study to explore how skills are used in QI projects. Due to the nature of inductive analyses, the identified tasks are one interpretation of the data. We recommend that leaders and practitioners use data in the tables to identify findings relevant to their local institution. Last, we grouped codes (the inductively identified tasks) based on select scholarship on skills. Future research can further explore the best taxonomy of skills for QI, build a taxonomy that includes granular sub-skills within QI, and continue to map tasks with skills to paint a picture of QI work.

5.6 CONCLUSION

This study demonstrates that QI practitioners rely on multiple skills beyond technical skills to complete QI work, and they learn and develop skills through a combination of formal training, experiences, self-directed learning, teaching others, and from mentors. The study reinforces the literature that suggests that leadership is vital for QI work and that QI expertise develops not only over time but also from feedback and reflection. Most importantly, this study helps tie skills in QI to other literature on skills and skill acquisition, which can be used to inform QI skill development and underpin the building of a theoretical framework for skills within QI.

5.6.1 Declarations

Acknowledgment

Authors would like to acknowledge the resources provided by Northwestern University, such as subscriptions to journals that allowed us to retrieve articles and The Writing Place at Northwestern, which provided feedback on multiple drafts of our manuscript.

Author Contribution

All authors contributed to the study's conception and design. IAT developed the interview guide, conducted all interviews, completed all steps of the analysis, and wrote the manuscript. CMD conducted analysis of the data and critical review of the manuscript. JKJ, KJO, and MCR provided supervision for the study at each step and conducted critical review of the manuscript. All the authors listed have gone through the manuscript and agreed to its submission.

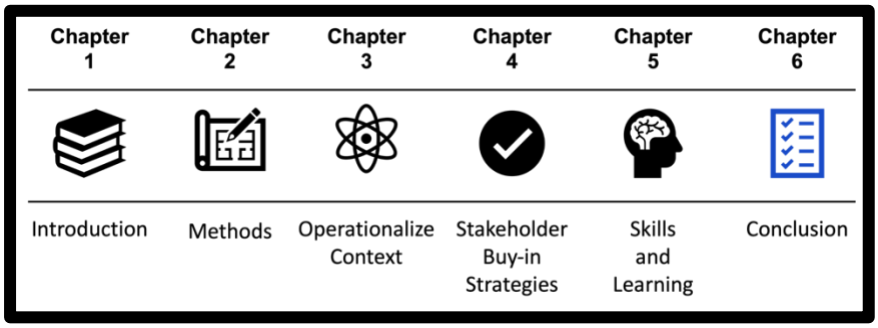
Conflict of Interest

No authors declare a conflict of interest

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author, IAT. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

CHAPTER 6: CONCLUSION



"It is not enough to do your best; you must know what to do, and then do your best."
-W. Edwards Deming

When I started studying QI work, I wondered, "why isn't there a single framework outlining what practitioners need to do to complete a QI project?" Through completing this dissertation, I see that my question was equivalent to asking for a detailed framework for acting in all possible social situations. QI work is very complex and nuanced. As in most complex work, such as performing surgery or flying an airplane, QI professionals learn their craft over time, draw on multiple sources of knowledge and experiences, and consider the effect of context at each step of the process. Therefore, a single framework cannot explain everything a QI practitioner needs to know. This dissertation focuses on the role of the context within QI work and narrows in on two contextual factors: buy-in and skills. I focus on these concepts because all these concepts are known to affect QI project success directly but are not fully understood and explored within the QI literature.

6.1 OVERVIEW OF FINDINGS

In each of the 3 manuscripts of this dissertation, I explore a key concept related to QI work: context, buy-in, and skills. Each of these concepts is a word that is part of the vernacular and is commonly used in QI literature but rarely defined. All 3 of these concepts together inform why the QI process is complex and reinforce why training and support are needed for QI work to be successful. Context is a significant concept: at a high level, context is all the factors that predict QI project success that are not the factors related to the intervention. A subset of these factors relates to buy-in and skills. Below I summarize the main findings from each paper, and in the next section, I discuss the connection between all 3 papers.

6.1.1 Summary of Chapter 3

Chapter 3 (manuscript 1) provides insight into what context is. Through a scoping review of reviews, I explored what is known and unknown in the quality improvement literature about how context is operationalized. The results from the 24 reviews show considerable variation regarding how context is operationalized and defined, but the consensus is that context is composed of factors that influence project success. Most reviews viewed context as everything but the interventions. Thus, context and factors as concepts overlap, except there are factors (i.e., factors related to the intervention) that are not part of the context. Therefore, context is just a subset of factors that explain outcomes: Context alone does not explain the outcome of a project, but factors can. More clearly defining the terms and clarifying the type of factors referred to (e.g., organizational factors, external factors, etc.) will help prevent the conflation of the terms: ‘context’ and ‘factors.’ Using precise terms will allow scholars to compare better findings and aid researchers in describing factors within manuscripts and reports.

6.1.2 Summary of Chapter 4

Chapter 4 (manuscript 2) provides insight into QI strategies to obtain stakeholders' buy-in. Through conducting semi-structured interviews, experienced QI practitioners discussed how they navigated context by describing a recent QI project. In their approaches, practitioners refine problems and adopt interventions to resonate with multiple stakeholders' priorities to partner with stakeholders. This process often involves reframing problems for different groups, developing stories to explain the problem to appeal to logic and emotions, strategically building rapport, and partnering with stakeholders so that they are contributing to the project and are more likely to accept the final intervention. One interviewee summed up this idea by saying people "don't typically burn what they build." The frontline belief in the intervention is part of the glue that keeps the implementation of the intervention sustained.

Further, practitioners use and combine multiple sources of data, make trade-offs due to incentives and limited resources, and leverage the knowledge of experts. These interdependent actions complement technical QI steps outlined in structured QI guidance to better help define problems, identify solutions, and implement interventions. Collectively, my findings highlight how QI work is a balancing act of weighing incentives and beliefs of multiple stakeholders into an integrated change through employing relationship-based strategies at every step. QI practitioners are using relationship-based strategies to obtain buy-in from a variety of stakeholders.

6.1.3 Summary of Chapter 5

Chapter 5 (manuscript 3) provides insight into how skills are gained and used in projects. As discussed in the QI literature, QI practitioners use multiple skills to complete QI work. There

is limited literature on which skills are used in QI work and how QI practitioners gain skills and knowledge. A better understanding of skills in QI work will inform how QI practitioners are trained and supported at work. From the analysis of the same transcripts from Chapter 4, I sought to understand how experienced QI practitioners gain and use QI skills and use skills in projects. I found that QI practitioners use interpersonal, intrapersonal, project, and technical skills. Further, QI practitioners learn their skills and knowledge through formal training, from peers and mentors, through teaching, through doing, and through self-reflection. These findings show that QI practitioners use skills beyond QI technical skills and are using skills that comprise leadership capabilities. Further, QI practitioners are continuously learning and improving their practice. Collectively, these findings can be used to inform the curriculum for training QI practitioners and continuous education.

6.2 CONNECTION BETWEEN MANUSCRIPTS

Each manuscript answers a specific research question, but the findings across all 3 papers provide insights into how the term context is used, how frameworks are applied in practice, and the conceptualization of QI practitioners as a profession. All 3 papers show that these terms need to be addressed in the literature regarding definitions, operationalization, and deep exploration.

6.2.1 Context in QI

Context is a concept discussed in both improvement and implementation science literature, as evidenced by the prominence of both MUSIQ and CFIR as frameworks. Looking at these fields' literature together, there is disagreement amongst scholars as to precisely what the concept of context is. Collectively the 3 papers in this dissertation contribute to a better

understanding of the connection between QI practitioners and context. Context is a broad concept composed of groups of factors. The QI practitioner must navigate and interact with context to complete QI work: the QI process is constantly shaped by contextual factors that serve as facilitators or barriers.

A large part of the QI process is about the alignment of the project and context. Even though it is possible to change certain aspects of the context, practitioners often alter their approaches and strategies to maneuver the context. To carry out tasks that compose strategies and approaches, QI practitioners apply skills. The QI practitioner utilizes multiple skills to carry out strategies throughout the QI process. These skills and knowledge of strategies develop over time from a variety of experiences and training.

6.2.2 Role of Frameworks in QI

Frameworks provide guidance for QI Practitioners and a structure for studying and reporting QI projects. In Chapter 3, one insight I gained from the scoping review is that context is often explained through frameworks. Frameworks help scholars and practitioners use the same language and lay the foundation for QI work. A single framework, however, cannot depict all aspects of QI work. In Chapter 3, I examined multiple reviews that look at context frameworks and reviews that were underpinned by context frameworks. As part of some of these frameworks, stakeholders, strategies, and skills are discussed. In Chapter 4, I identify additional buy-in strategies to add to QI strategy frameworks. In Chapter 5, I provide a high-level framework of skills in QI work and suggest that future research should continue to develop a QI skills framework. All these frameworks complement QI process frameworks and tie together key

constructs within QI work; specifically, context frameworks provide an overview of factors, while strategy and skills frameworks outline granular aspects of QI work that all are the additional steps taken within the high-level QI process. So, a single framework alone cannot guide a QI practitioner, and frameworks can be used for different aspects of planning QI work, evaluating QI work, and writing up QI work.

Frameworks, skills, and knowledge are part of the toolbox for QI work. The IHI describes the QI Essentials Toolkit as the tools and templates that support QI methods such as the Model for Improvement, Lean, or Six Sigma.[205] The idea of the toolbox shows how the QI process and the tools differ for each project, and it is up to the QI practitioners' judgment on what to use and how to use it. My findings support that the toolbox is also composed of frameworks, skills, and knowledge. QI practitioners have frameworks and a variety of skills such as leadership skills to draw on to complete their work. There are many moving parts in QI work and QI practitioners learn about the different parts over time, and eventually develop a toolkit to address different aspects of QI work and different situations that may arise within a project. The idea of the toolbox needs to be expanded beyond traditional tools to include the range of ideas and concepts that are drawn upon to do QI work.

6.2.3 Quality Improvement Practitioner is a Profession

Context is complex and as a result, QI work is complex. QI practitioners need to continuously learn and develop not only technical QI skills but also skills that allow them to navigate context in projects. Batalden et al. [198] introduced the idea that QI work is a profession in itself and argued "a profession is defined by what it does, not just what it knows, and by doing

what it does better all the time, not just doing it well." By applying the lens of a profession to QI work, leaders and scholars will see that QI expertise is developed through time; is not fully learned from a single project, training, or framework; and is an ongoing process.

My findings shed light on experienced QI practitioners' tasks in QI work. Scholarship within nursing reveals that experts work differently than beginners, and scholars can learn from experts to inform theory. One contribution of Benner's novice to expert theory in nursing is that this theory changed the profession's understanding of what it means to be an expert, placing this designation not on the nurse with the most highly paid or most prestigious position but on the nurse who provided "the most exquisite nursing care."[22] The parallel idea may apply to QI.[55,64] Therefore, QI scholarship can learn from work on expertise and consider the skill level when using empirical work to inform theory development.

6.3 UPDATE TO CONCEPTUAL MODEL

In Chapter 2, I presented Donabedian's Structure-Process-Outcome quality of care Model. According to Donabedian's health care quality model, improvements in the structure of care should lead to improvements in clinical processes that should in turn improve patient outcomes.

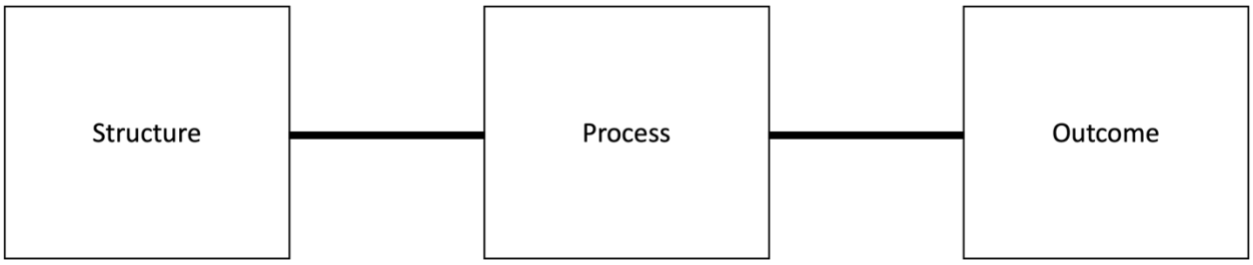


Figure 6: Donabedian Model as Dissertation Conceptual Model

Within QI projects, the Donabedian framework provides 3 areas for measurement that a project team can use. For example, in a project aiming to reduce catheter-associated urinary infections (CAUTIs), the QI team implements a checklist that asks about the need for catheters in daily patient rounds. The team may measure the number of CAUTIs hospital-wide (outcome), the number of hospital wards with the checklist (structure), and the frequency the checklist is used in a week on each unit (process). Measurement helps the QI team be objective in the success of their project.

Using this model as a starting point, I build on Donabedian's model to create a conceptual model of what leads to QI project outcomes. I use this model as a starting point because healthcare organizations have teams (structures) that utilize QI methods to complete projects (process) to improve care delivery and patient outcomes (outcomes). The key parts of a QI project map onto the structure, process, and outcomes.

6.3.1 Contributions to Conceptual Model From Scoping Review of Reviews

Before building on Donabedian's model, I will first discuss the key concepts from each dissertation study that I will use to develop a conceptual model. In Chapter 3, I explore how context is operationalized. In pursuing this aim, I differentiated between context and factors. Factors are the individual reasons or variables that influence a QI project's success or failure. As

depicted in Figure 7, factor categories include context, QI process, QI team, and intervention. Context is composed of factors related to the environment and organization. Factors related to context are traditionally within the QI literature grouped into macro (related to the environment outside the organization), meso (related to the organization), and micro (related to individuals within the organization) factors. Figure 8 depicts the macro, meso, and micro-level context framework. Within this framework, the organization is split into meso and micro factors. The meso-level factors relate to the organization as a whole, such as the type of organization or communication structure. The organization can be broken into subunits called microsystems—small, interdependent groups of people who work together regularly. The micro-level factors relate to either individual staff members or patients and their families.

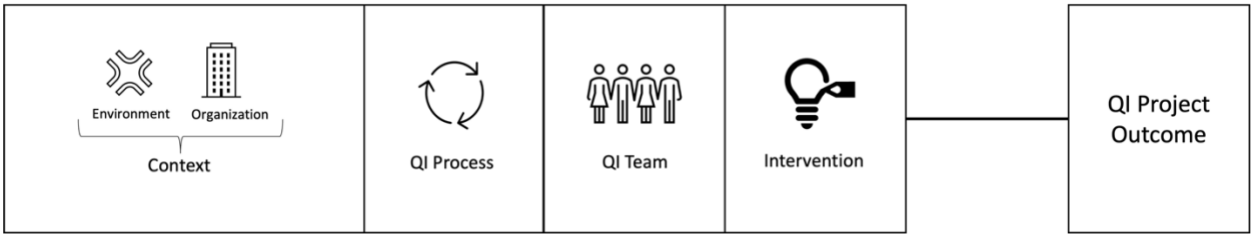


Figure 7: Categories of Factors That Influence QI Project Outcomes

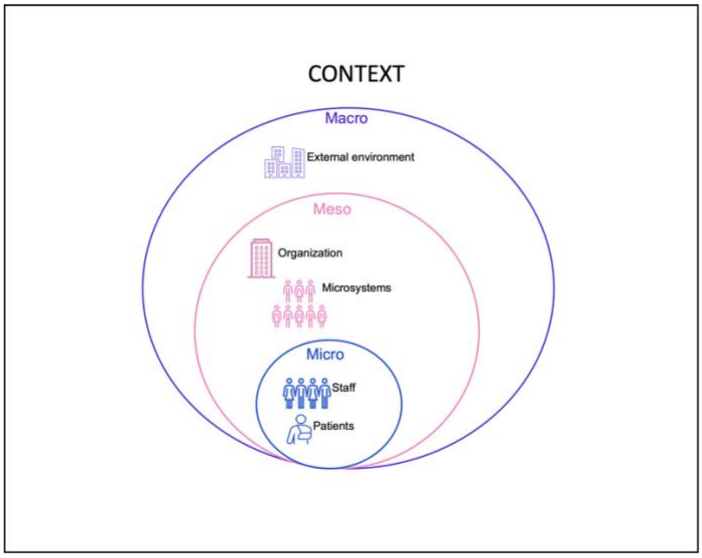


Figure 8: Context

6.3.2 Contributions to Conceptual Model From Qualitative Interview Study

In Chapters 4 and 5, I present my findings from study 2, the qualitative interview study, which explores QI practitioners' tasks during the QI process. By examining tasks, I identified strategies used to obtain stakeholder buy-in and skills QI practitioners use in QI work to navigate context. When QI practitioners follow a high-level QI method, such as Six Sigma, Lean, or the Model for Improvement, they identify an opportunity, analyze data, and implement solutions. However, there are smaller steps as well, such as obtaining stakeholder buy-in. These smaller tasks that QI practitioners complete can be grouped to identify implementation strategies. Figure 9 depicts the processes QI practitioners use to complete projects. Underpinning the process that QI practitioners use is knowledge and skills

Figure 9: The QI Process

6.3.3 Updated Model

Study 1 identifies categories of structures that QI practitioners must consider, navigate, and sometimes change in QI projects. These categories are context (external environment, organization, and individuals), the QI team, and the intervention. Study two explores the QI process of navigating these structures in QI projects. The QI process in real-world practice aligns with QI methods, so steps such as defining the problem or choosing an intervention occur. However, the QI process, on a granular level, is composed of a series of tasks. These tasks comprise strategies for advancing a project forward. Knowledge and skills underpin how QI practitioners progress in a project and achieve success. Figure 10 shows the updated conceptual model.

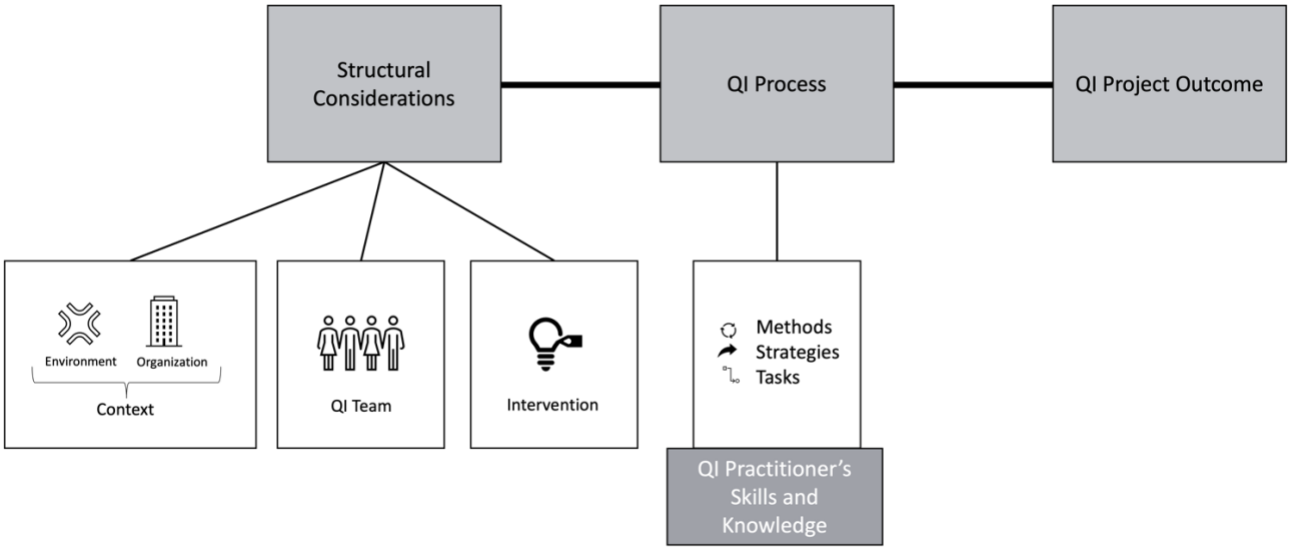


Figure 10: Updated Conceptual Model

6.4 IMPLICATIONS

This dissertation informs QI training, provides insight into structures that support QI practitioners in hospitals, and helps scholars advance QI theory.

6.4.1 QI Training

A focus on skills is essential for at least two reasons. First, a focus on skills emphasizes that practitioners can become better at their work, partly because skills represent capabilities that can be developed. Second, by focusing on skills, the focus is shifted from the person holding the job (i.e., the QI practitioner) to the job itself. Thus, instead of attempting to identify the characteristics of the QI practitioner (which has had a checkered history of success), the focus is squarely on the job of the QI practitioner and the skills it requires.[203] QI training should address all the skills required to do QI work.

Within QI training, traditionally, the focus has been on technical QI skills. In 2007, Boonyasai et al. [189] published the first systematic review of QI curricula for health professionals;

the authors concluded that QI knowledge, attitudes, and involvement in QI activities improved when various teaching strategies were used. Further, the authors found that curricula with positive clinical outcomes included QI tools and coaching on QI methods, access to clinical performance data, and implementing interventions via small tests of change. Since scholars have conducted multiple studies and reviews on QI training programs that focus on identifying teaching or QI methods.[190,193] Brown et al. [191] found that experiential learning as part of the QI curriculum can help develop QI leadership skills. However, most reviews do not focus on the details of the content taught. Pohl et al. [206] developed a program that combines QI training, leadership coaching, and QI research training, but no evaluation was completed on leadership skills. Within the QI training, there is an acknowledgment that skills such as leadership matter. However, there seems to be an assumption that students leading a project and receiving QI coaching are the best ways to develop leadership skills.

Day et al. [204] in a review of leadership development, found that the use of 360-degree feedback as a developmental process to foster self-awareness and leadership development has become a major area of research. 360-degree feedback can help people understand systematically the impact of their behavior on others. In general, the approach gathers and reports on ratings of leader behavior and/or effectiveness from multiple sources, such as peers, bosses, and possibly even external stakeholders, in addition to self-ratings. A significant part of the feedback process is understanding where the perceptions across different sources overlap and differ in their perceptions of a manager.[207] The research evidence on 360-feedback is an example that challenges the assumption that the current model for training healthcare professionals in QI

leadership is sufficient. A more robust approach like 360-feedback may be needed to complement other training methods for leadership development.

6.4.2 Hospitals and Leaders

Understanding the skills and tasks that QI practitioners perform helps inform how healthcare organizations can support QI work. Organizational factors affect project success in the scholarship on training frontline physicians, nurses, and staff to carry out QI projects. Wong et al. [190] found that a supportive institutional culture, financial resources to support the program, and the availability of information systems that could facilitate QI projects helped QI trainees succeed. The same factors apply to QI work that is not part of a training program, as reflected in my discussion of organizational contextual factors within this dissertation. As a result, healthcare organizations must invest in resources such as analytical support and dedicated time for QI work. My findings reveal that organizations can establish norms, such as always having a senior project sponsor, to facilitate QI project success. Many organizational factors have been identified within the literature and frameworks, like the factor of the project sponsor. Healthcare organizations need to consider how known structural factors like the participation of project sponsors or data infrastructure can be made into advantages or facilitators for projects consistently within the organization.

6.4.3 Scholars

QI efforts should be based as much on evidence as the practices they seek to implement.[208] The role and value of theory in improvement work in healthcare has been underrecognized,[209] but tremendous progress has been made, as evidenced by the development

of numerous frameworks for context and an extensive list of implementation strategies. This dissertation contributes to the continued development of QI theory by advancing scholars' understanding of context, contributing to the list of implementation strategies, and connecting the concept of QI skills to the broader skills literature. This dissertation reinforces the need for findings across disciplines to be integrated to inform and advance a field. In Chapter 3, I examined the concept of context as described in multiple fields within health services research, such as implementation science, quality improvement, and knowledge translation. In Chapter 4, I identified strategies from QI practitioners to inform implementation science strategy lists. In Chapter 5, I utilize categories of skills identified in other literature, such as management, teamwork, and surgical literature, to inform the language we use for discussing QI skills.

6.4.4 QI Practitioners

This dissertation demonstrates the expansive knowledge base used in QI by exploring context, strategies, and skills. QI practitioners must consider and navigate many aspects of context and employ a range of strategies throughout a project using their technical and non-technical skills. Even though improvement and implementation research has made tremendous progress in unpacking context and building improvement and implementation theory, this knowledge has yet to disseminate into all QI projects. Again and again, the underlying lessons and principles of QI frameworks are not consistently applied within projects.[210] This may partially be explained by the sheer complexity of QI work and a large amount of knowledge needed to navigate context. This dissertation informs theory about processes that help QI practitioners navigate context. For practitioners to learn the complexity of QI and expand their

knowledge base, they need to learn continuously. QI practitioners are never a master but always a student of the QI profession.

6.5 CONCLUSION

In my first study, I operationalized context by examining reviews within multiple fields. The results of my review of 24 reviews show considerable variation regarding how context is operationalized and defined; the consensus within the reviews is that context is composed of factors that influence project success. Most reviews viewed context as everything but the interventions. Thus, context and factors as concepts overlap, but there are factors (i.e., factors related to the intervention) that are not part of the context. To help prevent the conflation of the terms, 'context' and 'factors,' authors should define the terms and clarify the type of factors they are referring to (e.g., organizational factors).

Building from the finding from the first study that little is known about the connection between process and context, in my second study and manuscript, I conducted semi-structured interviews with QI practitioners to understand *how practitioners are navigating context to obtain stakeholder buy-in.* Throughout the interviews, QI practitioners told me how they employ strategies in response to the context to obtain buy-in. I identified ways in which practitioners navigate context to manage the complexity of interrelationships with stakeholders in QI projects. The participants described 5 strategies: (1) involve multiple levels of stakeholders, (2) reframe problems for different stakeholders, (3) utilize information from quantitative and qualitative data to tell stories, (4) make trade-offs to match priorities, and (5) defer to expertise. The identified

strategies demonstrate that QI practitioners are trying to obtain buy-in across multiple levels of the context by using multiple data sources, making trade-offs, and reframing problems.

In my third manuscript, using the same data as in manuscript two from the qualitative interview study to explore the skills of QI practitioners, I aimed to explore the skills used in QI work and how practitioners learned these skills. QI practitioners use interpersonal, intrapersonal, project, and technical skills. Further, QI practitioners learn their skills and knowledge through formal training, from others, teaching, doing, and self-reflection. These findings show that QI practitioners use skills beyond QI technical skills and are using skills that comprise leadership capabilities. Further, QI practitioners are continuously learning and improving their practice. These findings can inform the curriculum for training QI practitioners and continuous education.

In this dissertation, I operationalize context, identify strategies for obtaining stakeholder buy-in, and examine how skills are applied and learned within QI. In my first study exploring the concept of context, I identify the categories of factors that affect a QI project's success. Further, my second study identifies strategies not currently on shared implementation strategy lists. Also, my second study showed that QI practitioners must develop technical and non-technical skills, such as intrapersonal, interpersonal, and project skills, to complete QI work. I create a conceptual model of how QI practitioners obtain project success using the Donabedian model as a starting point. To complete projects, QI practitioners use QI processes—including formal methods, strategies, and tasks—to navigate and adapt the structures within and outside the organization. This dissertation contributes to the QI field's understanding of how QI practitioners approach QI projects.

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CHAPTER 8: APPENDICES

8.1 APPENDIX A: SCOPING REVIEW PROTOCOL

Contextual Factors in Quality Improvement and Implementation Initiatives: A Scoping Review Protocol

Scoping review question or topic

Topic: Contextual Factors in Quality Improvement and Implementation (QI&I) initiatives

The objective of this scoping review is to map the large body of literature and to describe the range of contextual factors identified. By focusing on existing reviews of contextual factors, this review aims to synthesize the ways in which context has been conceptualized and its components described.

My overall research question is: How are contextual factors conceptualized within the literature?

My sub-questions are:

- How have authors of the reviews that will be included in this paper (hereafter referred to as 'review authors') chosen papers to review? (RQs, terms, methods, outcomes)
- How have review authors defined context?
- How have review authors grouped or categorized contextual factors?
- How have review authors described their reasoning for categorizing factors in the format used?
- Are there any similarities or differences in the terms used to categorize factors across the reviews?
- What gaps in the literature have review authors identified?

Searches

Searches will not be limited to a language and will have no time restrictions. We will search the following databases:

Electronic searches

- PubMed
- CINAHL
- Embase
- Cochrane Library

Search Strategies (include one, if available)

Search strategy in PubMed MEDLINE:

(((“Quality Improvement”[Mesh] OR “quality improvement”[tiab] OR “Implementation Science”[Mesh] OR “implementation science”[tiab] OR “implementation research”[tiab] OR “Organizational Innovation”[Mesh] OR “organizational innovation”[tiab] OR “Change Management”[Mesh] OR “Organizational Culture”[Mesh] OR “organizational culture”[tiab] OR “organization change”[tiab] OR “organisation change”[tiab] OR “organizational change”[tiab] OR “organisational change”[tiab] OR “Diffusion of Innovation”[Mesh] OR “diffusion of innovation”[tiab] OR ”innovation diffusion”[tiab] OR “improvement science*”[tiab] OR “Translational Medical Research”[Mesh] OR “Translational Medical Science*”[tiab] OR “Translational Medicine”[tiab] OR “Knowledge Translation*”[tiab] OR “Translational Research”[tiab] OR “Implement Sci”[Journal] OR “Implement Res Pract”[Journal])
AND (context*[tiab] OR environment*[tiab] OR setting[tiab]))
AND ((Factor*[tiab] OR driver*[tiab] OR determinant*[tiab] OR variable*[tiab] OR barrier*[tiab] OR facilitator*[tiab])))

AND (“Meta-Analysis as Topic”[Mesh] OR “Meta-Analysis” [Publication Type] OR “Review Literature as Topic”[Mesh] OR “Review” [Publication Type] OR Meta-analys*[ti] OR meta-synthes*[ti] OR “scoping review*”[ti] OR “scoping stud*”[ti] OR review*[ti])

=1769 (Sep 7, 2021)

Other searches

- We will scan the reference lists of identified publications for additional studies.
- We will search google scholar as the final search
- We will search gray literature through searching the following websites:
    - Institute for Healthcare Improvement (IHI): http://www.ihi.org/
    - Agency for Healthcare Research and Quality (AHRQ): https://www.ahrq.gov/
    - National Academy of Sciences (NAS): http://www.nasonline.org/

Inclusion & Exclusion Criteria

Types of study to be included

- All types of Reviews

Domain being studied

- Focus of review is context
- Discusses contextual factors or related terms such as drivers, facilitators, barriers, variables, or determinants

Participants/population:

- All countries

Concept:

- Quality improvement (QI)
- Implementation science

- Improvement science
- Diffusion of innovation
- Knowledge translation
- Translational research
- Organizational Change

Context:

- In the context of healthcare

Exclusion criteria

- Non-review papers (ex: commentaries, editorials, etc.)
- A review without a stated methodology or is not systematic
- Review protocols
- The application of a single framework to interpret review results
- The focus of the review is an intervention or program
- The focus of the review is implementation strategies

Data extraction (selection and coding)

Selection of studies

At least two authors (IAT, CD, AG, and KF) will independently screen the titles and abstracts of the papers found by the searches against the criteria for inclusion using Rayyan. At least two authors will then retrieve and independently review the full text of the potentially eligible papers. Conflicts will be resolved through discussion and consensus.

Data extraction and management

The research team will use deductive and inductive coding using MAXQDA 2020 to identify relevant data from eligible studies. The deductive codes will capture how contextual factors are defined and conceptualized, the study characteristics, and the key findings of the articles.

At least two authors (IAT, CD, AG, and KF) will independently code 5 articles that were a priori identified as important works on contextual factors and will subsequently refine the codes based on their ability to capture the important results from these papers. This pilot approach is favored by other authors on the conduct of scoping reviews [73] .

One author (IAT) will code the papers. All coding will be reviewed and validated by at least one other author (IAT, CD, AG, and KF). Any disagreements will be resolved through discussion between at least two reviewers. The research team will discuss the results and continuously update the data-charting form in an iterative process.

The following information will be coded for each eligible paper:

1. Author
2. Year
3. Source (journal, book, etc.)
4. Aims and objectives of review
5. Healthcare context
6. Type of review
7. inclusion criteria used in the review (where appropriate)
8. search terms
9. eligibility criteria
10. number of primary studies included in the review (where appropriate)
11. number of factors reviewed (where appropriate)
12. categories used by the review authors,

13. any explanation given by the authors in regard to the categorization of factors
14. Definition of contextual factors
15. Tools or instruments used to assess factors
16. Strategies used to leverage or address factors
17. Processes used to identify factors
18. Other Major conclusions [inductive approach]

Metadata

Contact details for further information

Iva Terwilliger

Email: iva.terwilliger@northwestern.edu

Organizational affiliation of the review

Northwestern University Feinberg School of Medicine

Review team members and their organizational affiliations

Iva Terwilliger RN, BSN—Center for Education in Health Sciences, Northwestern University Feinberg School of Medicine

Carmen Diaz, MPP—Department of Management and Organizations, Kellogg School of Management at Northwestern University

Abhijit Grewal, MHA —Center for Education in Health Sciences, Northwestern University Feinberg School of Medicine

Kendall Fancher, MD, MS—Department of Medicine, Division of Hospital Medicine Northwestern University Feinberg School of Medicine

Linda C. O'Dwyer, MA, MS—Galter Health Sciences Library & Learning Center – Northwestern University Feinberg School of Medicine

Madhu Reddy, PhD—Donald Bren School of Information and Computer Sciences, University of California, Irvine

Julie Johnson, PhD—Surgical Outcomes and Quality Improvement Center, Northwestern University Feinberg School of Medicine

Kevin O'Leary, MD—Department of Medicine, Division of Hospital Medicine Northwestern University Feinberg School of Medicine

Type and method of review

Scoping review of reviews

Anticipated or actual start date

September 2021

Anticipated completion date

June 2022

Funding sources/sponsors

This research is supported by AHRQ R18 HS25649.

Conflicts of interest

None

Language

English

Country

United States

Subject index terms

Contextual factors, Quality improvement, Scoping Review

Published protocol Y/N? N

Review Progress

Stage of review

Review ongoing

Date of registration and where

09.22.2021 in Northwestern DigitalHub

Stage of review at time of this submission	Started	Completed
Preliminary searches	YES	YES
Piloting of the study selection process	YES	YES
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

8.2 APPENDIX B: SEARCH STRINGS

Database	Number of results	Date searched	Search Update	Updated Results	Duplicates Removed	Unique Results
PubMed	1769	9/7/21	8/3/22	2086	1773	313
Embase	590	9/7/21	8/3/22	851	761	90
CINAHL	867	9/7/21	8/3/22	1075	945	130
Cochrane Database of Systematic Reviews	2	9/9/21	8/3/22	2	2	0
Google Scholar			8/3/22	200	80	120
Total	**3228**			**4214**	**3561**	
Total after deduplication in EndNote	2451					**653**
Total after deduplication in Rayyan	**2444**				2	**651**

September Search Strategies

PubMed

(((“Quality Improvement”[Mesh] OR “quality improvement”[tiab] OR “Implementation Science”[Mesh] OR “implementation science”[tiab] OR “implementation research”[tiab] OR “Organizational Innovation”[Mesh] OR “organizational innovation”[tiab] OR “Change Management”[Mesh] OR “Organizational Culture”[Mesh] OR “organizational culture”[tiab] OR “organization change”[tiab] OR “organisation change”[tiab] OR “organizational change”[tiab] OR “organisational change”[tiab] OR “Diffusion of Innovation”[Mesh] OR “diffusion of innovation”[tiab] OR “innovation diffusion”[tiab] OR “improvement science*”[tiab] OR “Translational Medical Research”[Mesh] OR “Translational Medical Science*”[tiab] OR

“Translational Medicine”[tiab] OR “Knowledge Translation*”[tiab] OR “Translational Research”[tiab] OR “Implement Sci”[Journal] OR “Implement Res Pract”[Journal])
AND (context*[tiab] OR environment*[tiab] OR setting[tiab]))
AND ((Factor*[tiab] OR driver*[tiab] OR determinant*[tiab] OR variable*[tiab] OR barrier*[tiab] OR facilitator*[tiab])))
AND (“Meta-Analysis as Topic”[Mesh] OR “Meta-Analysis” [Publication Type] OR “Review Literature as Topic”[Mesh] OR “Review” [Publication Type] OR Meta-analys*[ti] OR meta-synthes*[ti] OR “scoping review*”[ti] OR “scoping stud*”[ti] OR review*[ti])
=1769 (Sep 7, 2021)

Embase

'total quality management'/exp OR “quality improvement”:ti,ab OR “total quality management”:ti,ab OR 'implementation science'/exp OR “implementation science”:ti,ab OR “implementation research”:ti,ab OR 'organizational culture'/exp OR 'organizational decision making'/exp OR 'organizational efficiency'/exp OR 'organizational resilience'/exp OR 'change management'/exp OR “organizational culture”:ti,ab OR “organisational culture”:ti,ab OR “organization change”:ti,ab OR “organisation change”:ti,ab OR “organizational change”:ti,ab OR “organisational change”:ti,ab OR “diffusion of innovation”:ti,ab OR “innovation diffusion”:ti,ab OR “improvement science*”:ti,ab OR 'translational research'/exp OR

“Translational Medical Science*”:ti,ab OR “Translational Medicine”:ti,ab OR “Knowledge Translation*”:ti,ab OR “Translational Research”:ti,ab OR 'implementation science':jt

AND (context*:ti,ab OR environment*:ti,ab OR setting:ti,ab))

AND ((Factor*:ti,ab OR driver*:ti,ab OR determinant*:ti,ab OR variable*:ti,ab OR barrier*:ti,ab OR facilitator*:ti,ab)))

AND ('meta analysis'/exp OR 'meta analysis (topic)'/exp OR 'network meta-analysis'/exp OR 'systematic review'/exp OR 'systematic review (topic)'/exp OR 'scoping review'/exp OR 'narrative review'/exp OR Meta-analys*:ti OR meta-synthes*:ti OR “scoping review*”:ti OR “scoping stud*”:ti OR review*:ti)

Limited to articles, reviews, articles in press

=590 (Sep 7, 2021)

_____

CINAHL

((MH “Quality Improvement+”) OR (MH “Implementation Science”) OR (MH “Quality Management, Organizational”) OR (MH “Organizational Efficiency+”) OR (MH “Organizational Culture+”) OR (MH “Organizational Change”) OR (MH “Change Management”) OR (MH “Translational Medical Research”)) OR SO implementation science OR TI (“quality improvement” OR “implementation science” OR “implementation research” OR “organizational culture” OR “organizational culture” OR “organizational innovation” OR “organization change” OR “organisation change” OR “organizational change” OR

“organisational change” OR “innovation diffusion” OR “diffusion of innovation” OR “improvement science*” OR “Translational Medical Science*” OR “Translational Medicine” OR “Knowledge Translation*” OR “Translational Research”) OR AB (“quality improvement” OR “implementation science” OR “implementation research” OR “organizational culture” OR “organizational culture” OR “organizational innovation” OR “organization change” OR “organisation change” OR “organizational change” OR “organisational change” OR “innovation diffusion” OR “diffusion of innovation” OR “improvement science*” OR “Translational Medical Science*” OR “Translational Medicine” OR “Knowledge Translation*” OR “Translational Research”)

AND

TI (context* OR environment* OR setting) OR AB (context* OR environment* OR setting)

AND

TI (Factor* OR driver* OR determinant* OR variable* OR barrier* OR facilitator*) OR AB (Factor* OR driver* OR determinant* OR variable* OR barrier* OR facilitator*)

AND

((MH “Meta Analysis”) OR (MH “Meta Synthesis”) OR (MH “Multivariate Analysis+”) OR (MH “Systematic Review”) OR (MH “Scoping Review”) OR (MH “Literature Review+”)) OR TI (Meta-analys* OR meta-synthes* OR “scoping review*” OR “scoping stud*” OR review*) =867 (Sep 7, 2021)

Cochrane SR (do not include CENTRAL which only contains trials)

Date Run: 09/09/2021 16:15:42

ID	Search Hits
#1	MeSH descriptor: [Quality Improvement] explode all trees 772
#2	MeSH descriptor: [Implementation Science] explode all trees 46
#3	MeSH descriptor: [undefined] explode all trees 0
#4	MeSH descriptor: [Change Management] explode all trees 2
#5	MeSH descriptor: [Organizational Culture] explode all trees 103
#6	MeSH descriptor: [Diffusion of Innovation] explode all trees 191
#7	MeSH descriptor: [Translational Medical Research] explode all trees 124
#8	(“quality improvement” OR “implementation science” OR “implementation research” OR “organizational culture” OR “organizational culture” OR “organizational innovation” OR “organization change” OR “organisation change” OR “organizational change” OR “organisational change” OR “innovation diffusion” OR “diffusion of innovation” OR “improvement science*” OR “Translational Medical Science*” OR “Translational Medicine” OR “Knowledge Translation*” OR “Translational Research”):ti,ab 4475
#9	“Implementation Science”:so OR “Implementation Research and Practice”:so 444
#10	(OR #1-#9) 5498
#11	(context* OR environment* OR setting):ti,ab 135383
#12	(Factor* OR driver* OR determinant* OR variable* OR barrier* OR facilitator*):ti,ab 258264

#13 #10 AND #11 AND #12 677

#14 (Meta-analys* OR meta-synthes* OR “scoping review*” OR “scoping stud*” OR review*):ti 11818

#15 #13 AND #14 4

Cochrane reviews = 2 (Sep 9, 2021)

8.3 APPENDIX C: INTERVIEW GUIDE

Interview guide
Topics-to-learn about:
Topic 1: Experience
Topic 2: Detailed QI project
Topic 3: Lessons learned

Introduction

[Introduce myself]

Before I start the interview, I just want to go over the study and get consent. First, is it okay if I record the audio? I need a record of the consent and would like to record the interview because that makes it easier for me to focus on our conversation instead of taking notes.

I emailed you the consent information sheet for your records, and I just want to go over some key points. As part of the study, we want to better understand how QI practitioners are approaching the context in their projects. You will be asked to answer questions that are about QI projects and context. There are no right or wrong answers. I am just genuinely interested in your perspective and hearing your thoughts. The interview will take about 60 minutes. As part of the consent, I must tell you the primary risk of participation is a breach of confidentiality, but we will take extensive measures to protect your information. The recordings will be securely stored and will not be shared with anyone outside of our research group. So, no one at your organization will know you participated in the study. There are no direct benefits from participating. If you were to want to withdraw from the study, please reach out to me or Julie (the PI). Our contact information is listed on the consent sheet at the end.

Do you wish to participate in this study? (Y/N)

Do you have any questions for us before we start?

Start: Thank you. To begin, I just have a few demographic questions that I ask everyone.
Demographic questions

1. **How many years have you worked at your hospital?**
2. **What is your current role?**
   a. **How many years have you been in this role?**
3. **What is your age?**

Start: Thank you. Let's start the interview part. First off, I want to better understand your experience with QI.

Topic 1: QI experience

1. How did you start working in QI?
a. what training did you receive?
b. How many projects have you been part of?

Explicit transition: I am interested in learning about the role of context in QI. I want to hear about your most recent QI project. I am interested in learning about the role of context in your project. Context can be viewed broadly as anything not directly part of the QI process. In the pre-interview email, I included a definition of context. Per the authors of a systematic review, context is defined "as a multi-dimensional construct encompassing micro, meso and macro level determinants that are pre-existing, dynamic and emergent throughout the implementation process. These factors are inextricably intertwined, incorporating multi-level concepts such as culture, leadership and the availability of resources" (Rogers et al., 2020). With this is mind, I want to hear about a recent QI project you have been part of.

[have option to show via Zoom if have not seen the definition]

Topic 2: Detailed QI project

1. Walk me through a recent QI project you led.
    a. What is the aim of your project?
    b. What was the starting point of your project?
    c. Tell me about the guidance or feedback you received in your project.
    d. What support from the organization was used to complete the QI project?
    e. How was _____ (barrier) addressed?
        i. What strategies did you use?
        ii. How was the strategy of _____ developed or chosen?
    f. What were some of the challenges you faced when completing the project?

2.What tools, frameworks, or methodologies did you use?
    a. How did you decide to use ___?
    b. What is your experience with ___?

3. Did your project achieve your aims?
    a. Why do you think you did or didn't?

4. If you did the same project again, what would you do differently?

***Explicit transition*: Thank you for explaining a project you have completed in detail.**

<u>Topic 3: Lessons learned</u>

1. What have you learned over the years about doing QI work?

2. Over time, how has your view of context changed?

3. How has your use of methods, tools, and frameworks in QI projects changed?

***Explicit transition*: We are getting close to the top of the hour. I want to ask:**

Conclusion

1. Is there anything about QI projects or context that we did not talk about today that you think I should know?

***Ending transition*: I really appreciate you taking the time to talk with me today.**

8.4 APPENDIX D: SENSITIZING READINGS

Area	Readings for sensitizing to skill related concepts
Readings on skills in QI and Biomedical literature	1. Brydges R, Stroud L, Wong BM, et al. Core Competencies or a Competent Core? A Scoping Review and Realist Synthesis of Invasive Bedside Procedural Skills Training in Internal Medicine. *Acad Med* 2017;92(11):1632-43. doi: 10.1097/acm.0000000000001726 [published Online First: 2017/05/11] 2. D'Eramo A, Puckett JB. Quality and Safety Education for Nurses: Is It Time to Rethink Quality Improvement Knowledge, Skills, and Attitudes? *Journal of Nursing Education* 2014;53(11):604-05. doi: 10.3928/01484834-20141022-10 3. Ferguson S, Howell T, Batalden P. Knowledge and skills needed for collaborative work. *Quality Management in Health Care* 1993;1(2):1-11. 4. Gabbay J, le May A, Connell C, et al. Balancing the skills: the need for an improvement pyramid. *BMJ Qual Saf* 2018;27(1):85-89. doi: 10.1136/bmjqs-2017-006773 [published Online First: 20171021] 5. Gamble J, Vaux E. Learning leadership skills in practice through quality improvement. *Clin Med (Lond)* 2014;14(1):12-5. doi: 10.7861/clinmedicine.14-1-12 [published Online First: 2014/02/18] 6. Gjeraa K, Spanager L, Konge L, et al. Non-technical skills in minimally invasive surgery teams: a systematic review. *Surg Endosc* 2016;30(12):5185-99. doi: 10.1007/s00464-016-4890-1 [published Online First: 2016/04/14] 7. Goldman J, Wong BM. Nothing soft about 'soft skills': core competencies in quality improvement and patient safety education and practice: BMJ Publishing Group Ltd, 2020:619-22. 8. Gordon M, Darbyshire D, Baker P. Non-technical skills training to enhance patient safety: a systematic review. *Med Educ* 2012;46(11):1042-54. doi: 10.1111/j.1365-2923.2012.04343.x [published Online First: 2012/10/20] 9. Riess H, Kelley JM, Bailey R, et al. Improving empathy and relational skills in otolaryngology residents: A pilot study. *Otolaryngology - Head and Neck Surgery* 2011;144(1):120-22. doi: 10.1177/0194599810390897 10. Ross S, Poth CN, Donoff M, et al. Competency-based achievement system: Using formative feedback to teach and assess family medicine residents' skills. *Canadian Family Physician* 2011;57(9):e232-e330. 11. Scott J, Revera Morales D, McRitchie A, et al. Non-technical skills and health care provision in low- and middle-income countries: a systematic review. *Med Educ* 2016;50(4):441-55. doi: 10.1111/medu.12939 [published Online First: 2016/03/21] 12. Wright D, Gabbay J, Le May A. Determining the skills needed by frontline NHS staff to deliver quality improvement: findings from six case studies. *BMJ Quality & Safety* 2021:bmjqs-2021-013065. doi: 10.1136/bmjqs-2021-013065
Readings on skills in broader literature	1. Flin R, O'Connor P. Safety at the sharp end: a guide to non-technical skills: CRC Press 2017. 2. Klein C, DeRouin RE, Salas E. Uncovering Workplace Interpersonal Skills: A Review, Framework, and Research Agenda. West Sussex, England: John Wiley & Sons, Ltd 2006:79-126. 3. Laker DR, Powell JL. The differences between hard and soft skills and their relative impact on training transfer. *Human resource development quarterly* 2011;22(1):111-22.

	4. Levant Y, Coulmont M, Sandu R. Business simulation as an active learning activity for developing soft skills. *Accounting Education* 2016;25(4):368-95. 5. Marin-Zapata SI, Román-Calderón JP, Robledo-Ardila C, et al. Soft skills, do we know what we are talking about? *Review of Managerial Science* 2021:1-32. 6. Matteson ML, Anderson L, Boyden C. " Soft skills": A phrase in search of meaning. *portal: Libraries and the Academy* 2016;16(1):71-88.
Readings on Learning	1.Ambrose SA, Bridges MW, DiPietro M, et al. How learning works: Seven research-based principles for smart teaching: John Wiley & Sons 2010. 2. Etheridge SA. Learning to think like a nurse: stories from new nurse graduates. *Journal of Continuing Education in Nursing* 2007;38(1):24-30. 3. Greysen SR, Schiliro D, Curry L, et al. "Learning by doing" - Resident perspectives on developing competency in high-quality discharge care. *Journal of General Internal Medicine* 2012;27(9):1188-94. doi: 10.1007/s11606-012-2094-5 4. Hunter CL, Spence K, McKenna K, et al. Learning how we learn: an ethnographic study in a neonatal intensive care unit. Journal of Advanced Nursing 2008;62(6):657-64. doi: 10.1111/j.1365-2648.2008.04632.x 5. Zigmont JJ, Wade A, Edwards T, et al. Utilization of Experiential Learning, and the Learning Outcomes Model Reduces RN Orientation Time by More Than 35%. *Clinical Simulation in Nursing* 2015;11(2):79-94. doi: 10.1016/j.ecns.2014.11.001

CHAPTER 9: Vita

Iva Alyse Terwilliger RN, BSN

Work & Research

Feinberg School of Medicine at Northwestern University—Chicago, IL

Sept 2017 – Dec 2022 *Research Assistant in Implementation & Improvement Science*
- Published first-author article entitled "Reframing the COVID-19 Crisis as a Problem" in *International Journal of Social Quality*
- Presented abstracts at two national conferences
- See complete list of publications via https://orcid.org/0000-0002-7792-3706

Dec 2018 – Nov 2020 *NRSA Pre-doctoral Trainee*
- Selected by institution to be AHRQ National Research Service Award (NRSA) T32 Program Trainee grant recipient
- Presented abstracts at two national conferences

July 2019 – Nov 2022 *Graduate Teaching Assistant*
- Recipient of the 2021 Teaching Assistant Excellence Award

Oct 2019 – Dec 2020 **Kellogg School of Management at Northwestern University**—Chicago, IL
Grad Teaching Assistant for online executive course *Strategic Change Management*

Sept 2016 – July 2017 **NYU Perlmutter Cancer Center**—New York, NY
Senior Staff Nurse, Breast Imaging and Diagnostics

Oct 2014 – May 2016 **West Palm Beach VA Medical Center**—West Palm Beach, FL
Staff Nurse, Medical/Surgical Oncology Unit

Education

2017 – 2022 **Northwestern University**, The Graduate School—Chicago, IL
PhD in Health Sciences, Concentration in Healthcare Quality and Patient Safety
- Completed the Summer Institute in Computational Social Science program in 2018
- A Northwestern Searle Center for Advancing Learning & Teaching CIRTL Associate

Summer 2021 **Kellogg School of Management at Northwestern University**—Chicago, IL
*Certificate in Management for Scientists and Engineers (*mini-MBA)

2011 – 2014 **Georgetown University**, School of Nursing and Health Studies—Washington, DC
Bachelor of Science in Nursing, Graduated Cum Laude