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A qualitative study on barriers and facilitators of quality improvement engagement by frontline nurses and leaders

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Abstract

Aim: This study aimed to understand the facilitators and barriers of quality improvement (QI) from the perspective of nurses and leaders at the frontline.

Background: Nurse engagement in QI has been associated with quality care and improved patient outcomes, yet nurse reported participation is low.

Methods: A descriptive qualitative design and purposive sampling was used to examine barriers and facilitators of nurse engagement.

Results: Facilitators (1) A leader's influence on a QI culture. Subthemes: creating buy-in, support of a just culture and working in partnership with nurses. Barriers (1) Barriers in organizational culture for nurses to lead QI. Subthemes: organizational hierarchy, absence of a just culture, nurses' role not valued, lack of accountability for QI in nursing role and resistance to change. (2) Barriers in organisational structure for nurses to lead QI. Subthemes: manager disengagement, time pressures, lack of access to timely data, lack of QI knowledge, siloed departments and lack of QI experts.

Conclusion: Barriers to QI engagement prevent nurses from fully engaging in QI. Creating a just culture and building the infrastructure to support nurse engagement is critical for success.

Implications for Nursing Management: Specific facilitators and barriers were identified that nurse leaders can assess in their practice setting and use relevant strategies to support engagement in QI.

KEYWORDS
barriers, facilitators, leaders, nurse engagement, quality improvement

1 | BACKGROUND

Nurses, as the largest provider of health care, have been identified as playing an essential role in improving quality (Institute of Medicine, 2011) and thus must participate in strategies aimed at improving health care outcomes and sustaining practice change (Needleman & Hassmiller, 2009). Programmes aimed at increasing engagement of frontline nurses in quality improvement (QI), such as the Transforming Care at the Bedside (TCAB) programme, have resulted in improved care processes and outcomes. Specifically, reductions in pressure

injuries (Pearson et al., 2016), falls (Needleman & Hassmiller, 2009; Robinson & Gelling, 2019), central line blood stream infections (Barnes et al., 2016; Goetz et al., 2011) and improvements in patient satisfaction (Pearson et al., 2016) have been reported when frontline nurses are engaged in the QI initiative. In a recent literature review exploring the evidence for nurse involvement in QI, several outcomes were identified: improved quality of care, increased operational efficiencies, cost savings, job satisfaction and nurse retention (Robinson & Gelling, 2019). Goetz et al. (2011) reported over a $10 million savings and up to a 23%–79% reduction in adverse outcomes over a 4-year period (e.g., pressure injuries, central line blood stream infections and falls) through engaged leadership and frontline staff initiatives.

Despite evidence to support the positive impact nurse engagement in QI has had in improving processes and outcomes, nurses remain one of the most underutilized assets for leading QI initiatives (Lavoie-Tremblay et al., 2014). Kovner et al. (2010) reported that 46% of new nurses ($n = 436$) had never participated in the QI process. Two more recent studies noted similar results with 46.4% ($n = 682$) and 47.8% ($n = 511$) of nurses reporting never having participated in QI, respectively (Djukic et al., 2021; Tschannen et al., 2021). Barriers to nurse participation in QI have included workload, time constraints, unit cultures, resistance to change and leadership support (Djukic et al., 2013; Jeffs et al., 2013). Limited knowledge of the QI process among staff nurses and nurse leaders has also been identified as a barrier to nurse engagement in QI initiatives. Nurses reported not being prepared at all to use QI techniques (Kovner et al., 2010), and nurse leaders report limitations in knowledge associated with QI tools and processes (Djukic et al., 2015). A recent integrative review on the barriers and facilitators to nurse QI engagement recognized the significant role of leadership support, QI centred organisational cultures, education/training, adequate resources and data access on engaging frontline nurses in QI (Alexander et al., 2022). However, previous studies lack direct input from frontline nurses. The purpose of this study was to understand the barriers and facilitators to QI engagement from staff nurses and nurse leaders who work at the frontline of care.

2 | METHODS

2.1 | Design

A descriptive qualitative design using purposive sampling was selected for this study. This design was well suited for answering the research question: *What are the barriers and facilitators to QI engagement experienced by frontline clinical nurses and nurse leaders?* This design allows researchers to compare similarities and differences for understanding barriers and facilitators of QI engagement between the two groups.

2.2 | Sampling and recruitment

Nurses who participated in a pilot study to test the Nursing Quality Improvement (N-QuIP) survey measuring QI competence and engagement (Tschannen et al., 2020) were approached for this study. The final question on the pilot N-QuIP survey asked nurses if they would be willing to participate in a focus group to understand the barriers and facilitators of QI engagement. Those who checked yes were sent an email invitation to participate ($n = 268$) with a link to select one of the six prescheduled dates (five dates for frontline nurses and one date for nurse leaders) to sign up for a focus group interview. A total of 43 nurses were scheduled with a final sample of 32 nurses participating (24 nurses and 8 nurse leaders). Focus groups ranged from two to eight participants and included nurses from the inpatient and outpatient setting.

2.3 | Setting and participants

A purposive sample was drawn from a magnet designated academic medical centre in the Midwest. Eligibility criteria included frontline nurse and nurse leaders (e.g., managers, educators, nurse practitioners and supervisors) employed in a unit/department where direct care was provided.

2.4 | Data collection

Data were collected using a semistructured open-ended interview protocol (Table 1). Each focus group began with introductions and an explanation of the purpose of the study. Researchers used the same interview protocol guide (Table 1) for all six focus groups. Participants were asked to share their perspectives on the barriers and facilitators of frontline engagement in QI on their clinical units. Author (DT) with training in QI interview methods asked the participants about how they defined QI, the barriers and facilitators of QI, and the future state

TABLE 1 Focus group interview guide

Focus group questions (staff RN)
1. How do you define quality improvement (QI)?
2. Describe some of the QI projects you have participated in within your unit or clinical setting (e.g., role you played, how topic was identified, impact of the work).
3. What facilitates your involvement in QI projects on your unit or clinical setting?
4. What barriers do you see for your participation in QI projects on your unit or clinical setting?
5. What resources do you believe you would need in order to participate in a QI project on your unit or clinical setting?
Focus group questions (RN leadership)
1. How do you define QI?
2. Describe some of the QI projects that have been conducted within your unit or clinical setting (e.g., role you played, how topic was identified, impact of the work).
3. What facilitates QI initiatives on your unit or clinical setting?
4. What barriers inhibit QI initiatives on your unit or clinical setting?
5. What resources do you believe are needed to encourage nursing staff engagement in QI initiatives on your unit or clinical setting?

of QI. The focus groups averaged 60 min in length. Saturation was reached when no new themes emerged.

2.5 | Data analysis

The interview audio files were transcribed verbatim and analysed using an inductive content analysis approach that includes coding, categorization and abstraction (Elo & Kyngäs, 2008). Six interview transcripts were entered into the NVivo qualitative data analysis software Version 12, 2020; QSR International Pty Ltd, Melbourne, Australia. First, two researchers independently (CA and DA) listened to the audio tapes and recorded their impressions. Then, each researcher read the transcripts to familiarize themselves with the data and took an initial set of notes to highlight key experiences of the participants. Next, codes were generated across the data set and the collected data were assigned to each code. Then, the collected data were grouped into categories to describe the content. Three major themes were identified with multiple subthemes for each. Two researchers (CA and DA) collaborated to ensure the themes adequately reflected both the individual codes and the overall experiences of the participants. Any areas of discrepancy were evaluated and revised until consensus was achieved. Final results were then evaluated by another researcher (HH) who read the transcripts to determine plausibility and validity. Trustworthiness was established by data analysis based on answering the research question. The categories reflected the full range of data included in the analysis. The study was reviewed and deemed exempt by the study site institutional review board (HUM00148492).

3 | RESULTS

Frontline nurse and nurse leader characteristics are described in Table 2. In total, 32 nurses (24 staff nurses and 8 leaders) participated in one of the six focus groups. Most nurses had a master's degree or higher ($n = 18$, 56.3%) and more than 10 years of experience ($n = 23$, 71.9%). Nurses were more likely employed in an outpatient setting ($n = 18$, 56.3%) than in the inpatient setting ($n = 14$, 43.7%).

TABLE 2 Frontline nurse and nurse leader characteristics

Characteristic	Frontline nurse *n* (%)	Nurse leader *n* (%)
Total	24 (75)	8 (25)
Education		
Associate	1 (4.17)	0
Bachelor	11 (45.83)	2 (25)
Master	11 (45.83)	6 (75)
Doctorate	1 (4.17)	0
Years in practice		
1–5	2 (8.33)	1 (12.5)
6–10	4 (16.67)	2 (25)
>10–20	8 (33.33)	0
>20	10 (41.67)	5 (62.5)

Based on the thematic analysis of the focus group content, three major themes emerged. The first, *A Leaders Influence on QI Culture*, was a facilitator for nurse participation in QI. The second and third, *Organisational Culture* and *Organisational Structure*, were barriers to nurse participation in QI. Unique subthemes emerged during the data analysis for both facilitator and barrier themes to frontline nurse engagement in QI: A *Leaders Influence* theme included three subthemes, *Organisational Culture* included five subthemes and *Organisational Structure* included six subthemes (Table 3).

3.1 | Facilitator

3.1.1 | A leaders influence on QI culture

Participants believed leaders were highly influential in developing a culture that encouraged nurse engagement in QI. This culture was described as creating buy-in, building a just culture and leader as a partner.

Creating buy-in

Nurses described buy-in as an essential skill for leaders. Nurses valued leaders who encourage diverse voices and involve nurses in the decision-making process, which was described this way, 'A great leader values input from all, holds people accountable and is a positive role model.' Another nurse reported, 'QI is not going to happen unless everyone is onboard.' One participant described buy-in this way, 'I get really upset when management says you will be changing your practice. No one has consulted us and the change makes no sense. Leaders have to involve us in the process.'

Support of a just culture

A just culture was described as a nonpunitive environment where it is safe to speak up, where nurses are listened to and have a voice. For a QI culture to thrive, leaders have a responsibility to build trust and accountability. A frontline nurse explained it this way, 'Bring everyone to the table to do this work. We all have something to contribute.' A nurse leader highlighted, 'The best work really comes from staff, the best ideas, so really keep them involved. Ask a lot of questions when they come to you.'

Working in partnership with nurses

Nurses viewed themselves as professionals who solve complex clinical issues. Rather than a top-down relationship, nurses want to partner with their leaders on QI projects and this was reflected by, 'we do not want to be told what to do-we know what needs to be done.' Nurses who want to do this work are looking for leaders to guide them when they lack the knowledge about QI. 'There is a desire to do this [QI] and what the next steps are.' Another nurse described the desire to partner with their leader this way, 'we cannot do this alone,' and believed leadership support was critical. Leaders agreed, 'the job of

TABLE 3 Facilitator and barrier themes and subthemes reported by frontline nurses and leaders

Facilitator	Barriers	
Leaders influence on QI culture	***Organisational culture***	***Organisational structure***
• Creating buy-in • Support of just culture • Working in partnership with nurses	• Organisational hierarchy • Absence of a just culture • Nurses' role not valued • Lack of accountability for QI in nursing role • Resistance to change	• Manager disengagement • Time pressures • Lack of access to timely data • Lack of QI knowledge • Siloed departments • Lack of QI experts

Abbreviation: QI, quality improvement.

the leader is to encourage, be a coach, a sounding board and invite participation to help solve the complex issues before them.'

3.2 | Barriers

3.2.1 | Barriers in organisational culture for nurses to lead QI

The influence of organisational culture was echoed by both staff nurses and nurse leaders. Nurses believed they possessed the expertise to improve the delivery of high-quality care. One nurse described it as, 'There is no role the nurses couldn't play in QI. I mean if we want to solve a problem, want to take ownership and lead we could do any part of the role.' Several issues stood in the way of nurse engagement in QI, including organisational hierarchy, lack of just culture, nurses' role not valued, lack of accountability and resistance to change.

Organisational hierarchy

One nurse described hierarchy as follows: 'When you identify issues you are viewed as the problem instead of the person who is trying to champion change. There is a demeanor that is really hard to get through—hierarchy in the organization is an issue.' Another nurse reported, 'Hierarchy intimidates people. In order to improve care, the organization needs everyone's voice to be heard.' Leaders described hierarchy differently: a class system or top-down mentality, disproportional funding for QI projects between disciplines and lack of physician buy-in, especially when nurses bring projects forward. A leader defined hierarchy this way, 'it took six months for physicians to agree [to a project idea]. It took going back every month and begging.'

Absence of a just culture

Nurses described lack of a just culture as fear of reporting and feeling vulnerable and powerless. Several nurses reported that the system for reporting issues felt punitive: 'There is fear of reporting because nurses are afraid of losing their jobs.' Vulnerability and powerlessness were described by a participant this way, 'people who speak up are seen as troublemakers.' Another nurse said, 'as nurses it is hard to say to a surgeon, we are supposed to be doing it like this without it becoming a defensive situation.'

Nurses' role not valued

Nurses felt their expertise was not valued by the organisation and that their contribution was not taken seriously. 'Organizations do not always have the right people at the table and the voice of the nurse is lost. When our voices are brought to the table, we are not listened to.' Another nurse said, 'When nurses bring ideas forward, they are told there are no resources or time to engage in QI projects.' Several nurses defined the value of their role this way, 'Respect every piece of the process, every voice. Every voice adds value.'

Lack of accountability for QI in nursing

Nurses and leaders agreed that accountability plays an important role in QI engagement. Nurses believed everyone must participate in providing quality care. Some frontline nurses do not see it as their responsibility or are not held accountable for their actions. One nurse stated, 'Every nurse should be part of QI and be held accountable for the work,' and, 'If you want to improve care, QI should be mandatory for all staff.' Leaders agreed: 'As a nurse leader if you don't hold people accountable you can't move forward.'

Resistance to change

Nurses described resistance to QI as 'People are stuck in their own ways of doing things and reluctant to think of new ways of solving problems.' A leader described resistance as a lack of understanding of what QI is: 'Too many of them [nurses] still think it's research and that its randomized control trials and so there is some difficulty with them understanding that their expertise may be the only level of evidence [to improve care} and that is ok.'

3.2.2 | Barriers in organisational structure for nurses to lead QI

Nurses and leaders believed organisational structures create barriers for QI engagement at the frontline and at a higher level in the organisation: 'I would like to be a project leader on a larger scale but there is nowhere to go to do that [in the organization].' Subthemes included manager disengagement, time, data, lack of QI knowledge, siloed departments and lack of QI experts.

Manager disengagement

While nurses agreed that manager support was critical to QI engagement, some described manager disengagement from the unit as problematic: 'Whether they accept it or not, management is the biggest barrier to QI engagement.' This was described as lack of engagement with staff (to far removed from the units they supervise), lack of feedback to staff and lack of QI knowledge to help nurses with QI projects.

Time pressure

Nurses and leaders identified time as a barrier to engagement but described it differently, 'We are putting out fires all day leaving no time for QI.' Although time was given for nurses to attend unit committees to address QI issues, one nurse described these meetings as a waste of time: 'Unit committees are not in a hurry to get anything done-so nothing does. It is a waste of time.' Leaders discussed time as a fiscal challenge but agreed the issue needed to be addressed: 'There are fiscal constraints in giving nurses time to do this work.'

Lack of access to timely data

Leaders and nurses agreed that data were critical for QI work. Nurses wanted to know how data impact patient outcomes: 'It is important to explain why we are doing this, show us the data, why it is important for us and our patients.' For leaders, data issues were related to access, utilization and timeliness, which was described by two leaders this way, 'When you call for data it is almost impossible to get;' and 'we need real time data, tie it to the best evidence and then have a discussion of what is going on.' Leaders do not always trust the reports they receive and are cumbersome to use: 'The data reports are large and take time to "clean" making it difficult to use in the practice setting.'

Lack of QI knowledge

Nurses described lack of QI knowledge this way, 'It's hard to conceptualize exactly what the QI problem is, how to define it and what is actually measurable.' Another nurse stated, 'People get to the point that they don't know what the next step is and instead of pursuing it they just give up.' Leaders said, 'Nurses bow out [of quality improvement] because they worry that they are going to be asked to go beyond their level of knowledge.' Leaders suggested the expansion of integrated learning experiences (e.g., nurses and leaders learn together), workshops and drop-in seminars.

Siloed departments

Nurses described the silo mentality as lack of collaboration and communication within and between departments: 'Everyone is working on their own projects and doing something different.' This wastes time and resources. Another nurse summed up siloed work environments this way, 'It's our fierce individualism that allows us to be an organization that has come up with some of the most significant breakthroughs in health care ever. It is the same fierce individualism that stands in our way every time.'

Lack of QI experts

Nurses wanted QI experts who could help guide their QI projects when they needed resources or faced barriers summarizing the issue this way, 'We need support with project completion, data analysis and access to library resources.'

4 | DISCUSSION

This study provides important insights into the barriers and facilitators to QI engagement, presenting unique interpretations across groups. In this section, we review the findings as they relate to prior studies and offer strategies to support the identified facilitators and mitigate barriers.

4.1 | A leaders influence on QI culture

Nurses described their leaders as 'influencers' who understand, promote and support their engagement in QI. Buy-in was described as encouraging staff participation in decision-making, and just culture was defined as a safe environment where nurses can speak up and share ideas for improving care. Leaders as a partner was defined in two ways: improving communication between departments and partnering with leaders when engaging in QI initiatives. Leaders acknowledged that engaging nurses in improvement initiatives is critical as the best ideas come from frontline nurses. A leader's job is to encourage, coach and foster partnerships so nurses can address the complex issues of health care delivery. Similarly, in our integrative review, leadership was the most often cited facilitator (Alexander et al., 2022), but to what degree a leader's QI knowledge and skills influence nurse engagement is currently unknown.

4.2 | Strategies

Table 4 describes strategies to support the identified facilitators. Building partnerships with leaders and having a voice in the decisions that affect nurses' work were important findings in this study. A recent study by Djukic et al. (2021) found procedural justice was the strongest variable linked to QI participation. Researchers concluded that leaders play a key role in fostering strong procedural justice by building a communication mechanism that gives nurses a say in decisions that affect their daily work (Djukic et al., 2021). This finding aligns with the results of our integrative review and may be a critical variable for expanding nurses' engagement (Alexander et al., 2022). Another strategy is the adoption of *The American Association for Critical-Care Nurse Standards for Establishing and Sustaining a Healthy Work Environment* as a pathway for improving staff engagement, psychological safety, organisational performance and patient outcomes (American Association of Critical-Care Nurses [AACN], 2005). A free HWE assessment tool is available on the AACN website (https://www.aacn.org).

4.3 | Barriers in organisational culture for nurses to lead QI

Organisational culture was a significant barrier to nurse engagement. Although described differently by nurses and leaders, both agreed that *hierarchy* discourages engagement in QI. *Just culture* was described by nurses as feeling vulnerable and powerless. Fear of being labelled a troublemaker or losing their job if they spoke up was a concerning finding. Nurses and leaders both agreed that *lack of accountability* and *resistance to change* made it difficult to move QI initiatives forward. Similarly, our integrative review also identified hierarchy, lack of accountability and resistance to change as significant barriers to engagement (Alexander et al., 2022).

4.4 | Strategies

Table 4 displays strategies to mitigate barriers. Building a just culture where it is safe to speak up about practice issues and address system failures emerged as a strategy for nurse engagement. In a just culture, leaders ensure good communication as well as effective management of resources and processes for patient and employee safety across the organisation. As a first step, organisations can use the just cultural assessment tool to assess staff perceptions of a just culture (Petschonek et al., 2013). Other strategies for building a QI culture include the adoption of a structured communication strategy like TeamSTEPPS (Beiler et al., 2019), utilizing daily staff-led QI huddles. Huddles serve to enhance engagement, coordinate work and strengthen QI skills (Djukic et al., 2021; Hartmann et al., 2019). Hartmann et al. (2019) found that using a solutions-oriented approach like huddles improves the chance that QI initiatives 'stick' and are integrated in the daily workflow of staff.

TABLE 4 Strategies to support facilitators and mitigate barriers

Facilitator *Leaders influence on QI culture*	**Barriers** *Organisational culture*	**Barriers** *Organisational structure*
Foster procedural justice in the work environment that encourages nurses to speak up on issues that affect their daily work (Djukic et al., 2021). Adoption of *The American Association for Critical-Care Nurse Standards for Establishing and Sustaining a Healthy Work Environment*. HWE assessment tool is available on the AACN website (https://www.aacn.org).	Just cultural assessment tool (Petschonek et al., 2013). Adoption of a structured communication strategy TeamSTEPPS (Beiler et al., 2019). Daily staff-led QI huddles (Hartmann et al., 2019).	Create ongoing, integrated QI learning experiences, workshops and drop-in seminars (Lucas & Nacer, 2015).

Abbreviations: AACN, American Association of Critical-Care Nurses; QI, quality improvement.

4.5 | Barriers in organisational structure for nurses to lead QI

Significant barriers in organisational structure to engage in QI were identified. The role of the manager was critical to QI engagement, but at times nurses believed managers were a significant barrier to QI work. This is an important finding as it aligns with previous studies identified in our integrative review that identified lack of ongoing feedback, QI knowledge, guidance and mentorship as a barrier to QI engagement (Alexander et al., 2022; Mery et al., 2017). A promising finding was that both leaders and nurses agreed that *data* were critical for QI work but described the issues differently. Nurses wanted to connect the data to patient outcomes, while leaders identified lack of access, delays in receiving data reports and the ability to use the data for clinical application as problematic, aligning with our integrative review. Nurses acknowledged a gap in their *QI knowledge* and leaders discussed educational strategies to address the gap.

4.6 | Strategies

To what degree organisational structures impact engagement and patient outcomes is currently unknown, as there is a lack of large-scale research studies on factors associated with nurse's participation in QI (Djukic et al., 2021). In our study, nurses wanted to work on QI initiatives in partnership with their leaders, but strategies that address this collaborative role in QI are limited (Dainty & Sinclair, 2017). A study by Jeffs et al. (2016) identified the importance of leaders who can balance being present while empowering nurses to lead QI initiatives, but more research is needed.

Leaders in our study identified several strategies to promote data integration and QI knowledge, suggesting the development of ongoing integrated learning experiences, workshops and drop in seminars. The Quality and Safety Education for Nurses (QSEN) QI competency is a valuable resource for strategies and skills related to data collection, evaluation and improvement in patient outcomes of care (Cronenwett et al., 2007; Cronenwett et al., 2009). However, more studies are needed to test and expand nurses' QI capacity at the frontline (Bevan, 2010; Giannitrapani et al., 2021).

4.7 | Limitations and strengths

Two limitations were identified. Sampling and recruitment methods used for the study may have favoured nurses who were interested in QI. The response rate was 12% and it is possible that the nurses who participated have a different perspective on QI. Second, the study was conducted in a single setting and the perspectives shared by participants may be unique to this setting. Researchers identified two strengths. This was the first qualitative study to include both leaders' and nurses' perspective on QI engagement, and the two researchers who completed the analysis were not affiliated with the organisation.

4.8 | Implications

Leaders and nurses shared similar views about barriers and facilitators of QI engagement, which is an important finding for future research. The major themes from this study align with extensive research that has identified leadership and culture as critical drivers for QI engagement (Alexander et al., 2022; Flynn & Hatfield, 2016; Mery et al., 2017). Flynn and Hatfield (2016) suggest a blended approach of top-down, bottom-up collaborative leadership model for QI engagement and implementation. Participants in this study offered several suggestions for overcoming barriers to their engagement in QI. These included QI coaches, integrative learning experiences and ongoing professional development opportunities. While education and training are essential components of QI initiatives, it is a habitual application of QI knowledge and skills that is critical for success (Flynn & Hatfield, 2016; Lucas & Nacer, 2015; Mery et al., 2017). This is where nurse leaders have an opportunity to play a significant role at the frontline.

Critical to this effort are leaders who can build a just culture that encourages nurses to identify quality issues without fear, while creating an environment where curiosity for making things better is the norm and not the exception.

Structural barriers remain major obstacles for frontline nurse engagement in QI. Leaders must design and test innovative strategies that bring teams together to address daily clinical challenges. Use of daily huddles that encourages diversity of ideas to improve care is one strategy for nurses to work in partnership with their leaders. In addition, strategies should complement current evidence-based practice, research and innovation activities that serve to improve safety and quality of care.

5 | CONCLUSION

This is the first qualitative study to interview both frontline nurses and nurse leaders about the facilitators and barriers of QI engagement at the frontline of care. Both leaders and nurses agreed that leaders were highly influential in developing and promoting a QI culture that facilitated nurse engagement. However, several barriers were identified that prevented nurses from fully engaging in QI including a just culture and an infrastructure that advances QI capacity for achieving safe, high-quality patient care. Findings from this study make it clear, without leadership and organisational support, expansion of nurse engagement in QI will be difficult to achieve.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

Ethical approval was granted by the University of Michigan IRB (HUM00148492).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the supporting information of this article.

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