Resident and Attending Physician Perceptions of a Quality and Safety Curriculum

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Abstract

This study sought to identify opportunities for improvement of an Internal Medicine (IM) resident quality improvement (QI)/patient safety (PS) program at an academic teaching hospital. The authors conducted semi-structured interviews with 15 residents and 6 attending physicians, which were analyzed from an inductive and thematic lens using NVivo software. Ethics was approved by the institution’s Research Ethics Board (File #: 6026140). Four themes emerged from this analysis. Residents and attending physicians agreed on (i) integrating QI/PS knowledge and skills into practice using active learning approaches. However, there was concern that requiring QI project completion through (ii) standardization of QI/PS education could create a barrier to clinical research required for sub-specialization. There was agreement that the (iii) QI/PS culture within the IM program was supportive and that a lack of safe reporting efficiency within the hospital, along with interprofessional discord, could cause (iv) external barriers to QI/PS training. By integrating these findings, evidence-informed and low-resource solutions could be incorporated into the QI/PS curriculum that uses minimal preparation requirements, and fulsome conversation-based exploration of QI/PS techniques within real-world clinical cases.

Résumé

Cette étude visait à trouver des possibilités d’améliorer un programme d’amélioration de la qualité (AQ)/sécurité des patients (SP) pour les résidents en médecine interne (MI) à un hôpital universitaire. Les auteurs ont mené des entrevues semi-structurées auprès de 15 résidents et de 6 médecins traitants, lesquelles ont été analysées à l’aide du logiciel NVivo. Quatre thèmes sont ressortis de cette analyse. Les résidents et les médecins traitants sont d’accord sur les éléments suivants : i) l’intégration dans la pratique des connaissances et des compétences en AQ/SP au moyen d’approches d’apprentissage actif. Toutefois, on craint que l’obligation de mener à bien le projet d’AQ par
Introduction

Healthcare quality improvement (QI) and patient safety (PS) are increasingly seen as critical to enhancing the effectiveness of patient care and the resiliency of healthcare systems.1-3 The emphasis on QI/PS in healthcare systems, and specifically within competency-based residency education, has resulted in a growing need to engage residents in effective QI/PS training.3,5 Despite rapid growth in QI/PS and emergence of competency-based medical education (CBME), there is little evidence of the extent, effectiveness, and quality of QI/PS training in Canadian Internal Medicine (IM) residency programs.6 This QI/PS review provides insights as to how to effectively integrate QI/PS into our university’s local assessments, aligned with the Royal College of Physicians and Surgeons of Canada’s (RCPSC) Competence by Design (CBD) system.4,7-10

Residency programs in Canada and internationally have begun to implement QI/PS training within their curricula.10-12 However, residents experience challenges to participating in QI learning, including clinical obligations, lack of perceived value, and distribution across various sites.10 Additionally, varying interest and knowledge, poor or ill-defined curriculum, challenges of interprofessional team collaboration, lack of attending QI experience, and limited institutional support and financial resources impact effective implementation.10-11 Novel QI training approaches have been studied in various residency programs, including dedicated time for QI training,14 efforts to develop faculty with QI capacity,15,16 and, more commonly, multimodal experiential curricula,15,17 including longitudinal, team-based, and hands-on projects.3,6,9,18 In many cases, PS curricula focus on methods to structure and support open and honest discussions on interprofessional adverse events.19,20 Meanwhile, evaluations of QI/PS training have included assessments of perceived confidence and/or knowledge of QI,3,6,14,18 objective knowledge assessments,3,6,14 evaluation of trainees’ attitudes toward the importance of QI work,3,18 and, occasionally, performance-based assessments.6

The purpose of this qualitative exploratory study of an IM residency training program was to describe IM residents’ and attending physicians’ (i) current QI/PS experiences, (ii) perceived value and impact of different educational QI/PS curriculum strategies, (iii) attitudes and perceptions of QI/PS culture, and (iv) barriers and opportunities to support residents’ QI/PS education within the current clinical environment.

Methods

Settings and context

This study occurred at a mid-sized academic teaching hospital in Ontario, Canada, that serves >500,000 population. The affiliated university, a leader in CBME, championed the transition of postgraduate medical education (PGME) programs in accordance with the CBD framework of 2017. The timing of the transition to CBME coincided with the amalgamation of two academic hospital sites leading to revamped strategic priorities, which included an organizational focus on ensuring quality care in the experience of every patient.21,22

The IM residency program at this academic center has, for more than a decade, included monthly scheduled QI/PS-focused patient safety rounds (PSRs) in the curriculum. Historically, these rounds were minimally structured and comprised case-based resident presentations facilitated by a single-faculty physician with QI/PS expertise. A formal, structured PSR curriculum was developed 3 years ago, comprising key learning objectives (see Appendix A), online modules developed by the Institute for Healthcare Improvement (IHI),21 and strong encouragement to participate in thematic case discussions co-led by IM residents and physicians with QI/PS expertise (rotating between two physicians initially, and up to six physicians presently). IM residents also have the option to participate in QI/PS research projects to fulfill the requirements of a mandatory research project.

Participants

Participants included postgraduate residents of 1st, 2nd, and 3rd year (PGY) within the core IM residency training program, and IM attending physicians from the Department of Medicine (approximately 120 physicians). Of the 69 enrolled IM residents, 56% were females. All IM residents were invited via email and at an in-person teaching sessions to participate in interviews. The PSR working group (comprising two physicians with QI/PS expertise, an IM associate program director, and two IM residents) identified a list of 13 IM attending physicians that regularly work with residents, and from that list identified six physicians...
to be invited to participate in interviews. All participants were offered a CAD$25 Starbucks gift card for their participation.

Instrument Development

Our instrument development process followed the processes suggested by DeJonkheere and Vaughn (2019). First, we identified that our goal was to establish the IM context (i.e., past, current, and perceived future) related to QI training. Next, we created high-level questions regarding residents’ prior experience (self-reported and perceived by attending physicians). Finally, prompts associated with aspects of the main questions were developed. All team members reviewed the questions together and sent items for feedback from the PSR working group. Revisions were made and questions finalized.

Data Collection

QI/PS experiences and perspectives of IM residents and attending physicians were explored through semi-structured interviews (Appendices B and C). The research team comprised members of the PSR working group, two nonclinical experts in qualitative research and medical education, and two research assistants. The two resident members of the working group conducted the resident interviews and the two nonclinical experts interviewed the attending physicians. Resident interviews were completed by authors MM and AW, who neither had formal or informal power over participants nor provided peer-to-peer assessment. Attending interviews were completed by authors RE and ND. All interviews took 35–60 minutes and were audio-recorded, and transcribed verbatim. Pseudonyms replaced any identifying information. Ethics was approved by the institution’s Research Ethics Board (File #: 6026140).

Data Analysis

Data were analyzed from an inductive and thematic lens using NVivo (v12). This approach, along with arms-length and resident-to-resident interviewers, promoted an open and honest dialogue. As is common with this inductive and iterative approach, we began with multiple readings, open coding, and assigned categories to code groupings (separately between transcripts of residents and attending physicians). Using an axial coding approach, we integrated resident and attending physician categories to create overlying themes. In order to ensure inter-rater reliability (authors RE and JB), we independently coded four interviews and compared the codes. The initial proportion of agreement was 73%. The researchers collaborated on two additional interviews until the average code agreement was over 80%. On three occasions, the codes and transcripts were discussed with the research team to establish shared meaning through consensus. A codebook was developed and used by JB to code the remaining transcripts. The research team then met to discuss the codes and identify emergent themes and subthemes. This process of analysis addressed reflexivity and mitigated bias. Pseudonyms were created using a participant group code and number—attending physicians identified by A1–A6, and residents identified by R1–R15.

Results

Description of participants

Fifteen residents from the IM residency program volunteered; three PGY1, seven PGY2, and five PGY3. Five of the 15 residents had minimal QI experience and/or training through their undergraduate medicine program prior to residency. Of the 15 residents interviewed, 46% were females. Six attending physicians, with various medical subspecialties, administrative responsibilities, and years of practice were interviewed. Of these, 33% were females. All physicians attended the inpatient Internal Medicine units (IMU) with residents. Most of the attending physicians had an interest in QI/PS; three of these were members of the department’s Patient Safety and Quality Committee but collectively had very limited formal training in QI/PS. Only one physician had completed formal courses in QI/PS.

Themes

Four themes aligned with the areas of inquiry were identified and chosen to describe the nine subthemes and 312 codes that emerged from the data. The four themes included: (1) integration of QI/PS knowledge and skills into practice, (2) standardization of QI/PS education, (3) QI/PS culture within the IM program, and (4) external barriers to QI/PS training. Across themes, we report perceptions on the effectiveness of IM program, and also factors external to the program that impact the program’s functioning and structure. This was essential as hospital-based IM residents are also influenced by QI-related systems and factors implicit to the institution. Additional quotes for each theme could be found in Appendix D.

Theme 1: Integration of QI and PS knowledge and skills into practice

Participants identified preference toward learning QI through practical cases, hands-on experiences, and integrating QI learning into day-to-day clinical practice and teaching.

Preferred modalities for learning QI and PS

The importance of hands-on learning as the best way to learn QI/PS in residency emerged from both participant groups. As one resident indicated: “I feel that hands on is always more meaningful ... versus theoretically going through topics” (R11). An attending physician mirrored this perception by indicating
the following: “That is how I am becoming a better clinician, seeing, doing and then learning from an experience” (A5). One resident indicated that it would be valuable to “incorporate QI into daily practice” (R7), while another resident favored “quick resources and something to guide us should we ever want to do [QI]” (R9). Most residents and attendees suggested that it was important for training to “… be targeted at the kind of on the ground level while they are doing their actual clinical work” (A2).

Residents and attendees were asked to provide recommendations on how to integrate QI/PS in residency training. Although there were limited suggestions, a theme emerged that it would be important to integrated QI/PS into the pre-existing CBME curriculum (R13). “Competing interests and priorities” in residency (R3 and R5) made formalized QI teaching challenging and it is important to ensure that it is not simply “busy work” (R3). Attending physicians suggested using QI/PS simulations and integrating QI into clinical teaching (A3).

Morbidity & mortality rounds promote QI and PS

The Department of Medicine's (DOM) weekly Morbidity & Mortality (M&M) rounds emerged as an important model that could be used for QI/PS. These rounds are led by a DOM faculty, and all IM residents were invited and encouraged to attend it. Using the M&M format for PS training was identified by participants as a possibility for experiential QI/PS training. One resident indicated: “… getting residents to present cases regarding the different topics within QI is beneficial. The ones that I have presented stand out the most to me” (R12). Speaking personally, one attending physician noted that presenting clinical experience could be difficult but beneficial: “What they worry about and have angst about is often stuff that has happened to all of us,” but “You put it out there and you feel better about it because it is [your] personal experience and you get a lot of support” (A1).

Theme 2: Standardization of QI and PS education

Standardization refers to ensuring a shared baseline of QI/PS skills and knowledge, and a standard process for those who want to acquire advanced skills in QI/PS. Participants discussed the need for mandatory QI/PS activities, additional training for those interested in careers in QI/PS as well as the barriers that residents face in participating in QI/PS training.

Mandatory versus optional QI and PS activities

There were varied opinions from both residents and attendees regarding the idea of making QI/PS activities mandatory. Residents expressed concerns about mandatory QI projects consuming available research time and overwhelming resources and capacity. For example, one resident noted that a required QI project would be “hard because that would maybe take up someone's research block” (R8). Another resident believed, this would create stress on the hospital and that “if all 60 residents try to do QI on [a single unit], I think the nurses would murder us” (R9). One attending physician acknowledged the importance of participating in QI/PS project but was “afraid of making it mandatory […] with their very short training program[and] not everyone is interested in it” (A5).

Additional training required for future career in QI and PS

A clear sentiment from both groups was that the program was designed to provide a modest introduction to QI/PS. There was a diversity of perspectives on the effectiveness of modest baseline training; for example, one attending physician noted that “... like anything in life, a little bit of knowledge can be a dangerous thing” (A4). Residents also recognized this concern, with one resident stating that I don't think without other training or buy-in, I would feel comfortable collecting a team and starting a project on my own” (R7). However, some felt that IM QI/PS training should focus on “... basic principles and then [residents] doing more detailed projects I think comes in their fellowship years” (S1).

Barriers to QI and PS education

Residents identified barriers to conducting QI projects, including time, conflicting priorities, and inability to access data. For example, one resident explained: “I do other research and I study, and I have a personal life. You can't do everything” (R3). Another resident identified that they did not command administrative priority and that if they asked for data support “I would never hear back from them [i.e., data support]” (R15).

Theme 3: QI–PS culture within the IM program

QI–PS culture was defined by social behaviors, perspectives, and cultural norms of the IM residency program. There was overwhelming consensus that QI–PS culture within the IM residency program was positive, supportive, and conducive to QI–PS work, and that “… from a leadership point of view, [I think] the academic staff are very supportive and I never fear repercussions” (R13). One attending physician identified that balance between constructive critique and criticism is achieved by explaining areas “… where [residents] need to improve, without them actually feeling ashamed, humiliated, or embarrassed…” (A4). However, there was also the perception that support was informal and that it does “… not seem as though there is a formal emphasis on QI or PS learning globally throughout the program” (R4).
Theme 4: External barriers to QI and PS training

QI/PS efforts within the IM program were conducted within the context of two large regional hospitals providing tertiary care. There was a clear sentiment that the hospital culture and incident reporting systems were important barriers to QI/PS training.

Hospital’s QI–PS culture

Interprofessional interactions were identified as a key driver of discord. For example, one resident noted that:

I find the just culture falls apart in between care teams. [...] I find in-between [interdisciplinary practice] groups there is a lot of blame ... I find Safe Reports are never used in a way that is productive. They are used in a very shameful way. (R7)

In some cases, participants indicated that Safe Reports were used as “retribution from nursing staff regarding trying to raise questions or concerns. And some residents have received significant consequences” (A4). Residents also identified additional repercussions to disclosing PS events, including emotional consequences (e.g., feelings of guilt [R13] and negative impact on self-confidence [R7]), professional consequences (e.g., a “blotch” on their record [R13]), and social consequences (e.g., being viewed as someone involved in conflicts [R6]). Generally speaking, participants felt that the focus on QI/PS was somewhat disingenuous as:

…we certainly get a lot of emails talking about the importance of patient safety and Safe Reporting... [There is an] idea of [hospital] leadership support, but I am not sure how much that is seen in day to day. (R6)

Variability in safe reporting

Generally, residents and attending physicians identified that the formal safe report system was difficult and time-consuming to use. For example, one resident stated:

To be honest the only reason that I didn’t do it at that point was that I heard it is a lengthy process and there was never a night where I felt that I could cognitively sit and write out my thoughts on what had happened in a way that was cohesive and coherent. (R15)

Generally, residents indicated that they reported errors to the program, but formal safe reporting was more variable with some residents.

Residents also reported variability in which attending physician they would speak to when there was a PS event as, “[T]here are certain attendings who we know well and are known to be supportive of residents in their personal and professional life” (R6).

In general, residents felt that it would be helpful if they had “…some examples of what they are expecting to be reporting” (R8).

Value of safe report feedback

Both residents and attending physicians identified a lack of feedback regarding the receipt of a safe report, including next steps and/or changes resulting from the safe report. One resident stated: “I don’t know what happens to the Safe Reports. I know that someone looks at them as near misses or whatever else” (R10). Similarly, an attending physician stated:

It is difficult and frustrating to [report through the hospital system]. I don’t know who it goes to? I don’t have any experience of ever having stuff come back to me. (A1)

Residents identified that receiving feedback would be beneficial:

[E]ven if we can’t create a solution right off the bat from the data that is presented, if someone can sit down and make sense of the data. (R5)

Discussion

Previous literature has demonstrated interventions to increase residents’ QI/PS participation and engagement such as providing incentives (e.g., gift cards, grants, and refreshments), initiating mandatory presentations and participation, requiring project completion to graduate, and altering schedules to facilitate attendance. Further, we knew that residents experienced barriers to participate in QI (e.g., clinical obligations, lack of perceived value, and distribution across various sites).10 Our work was designed to contextualize these findings within our settings to evaluate and improve our IM QI/PS training program. By triangulating the experiences of our key informants, we positioned ourselves to develop more feasible training strategies. We chose to present and interpret our results through the Consolidated Framework for Implementation Research (CFIR).27 The CFIR was designed through a meta-synthesis of implementation frameworks. It specifies five dimensions that should be considered when implementing or revising a program, including (1) intervention
characteristics, (2) outer settings, (3) implementation processes, (4) inner settings, and (5) individuals involved.27

**Intervention characteristics**
Our findings suggest that QI/PS *per se* is valued throughout the IM residency program; however, there are inconsistent perspectives as to the required extensiveness of QI/PS training. Most participants preferred an experiential approach and agreed that the scope and depth of training must be focused on the fundamentals, with optional opportunities to engage in QI/PS project as desired. This could pose an inherent contradiction, as experiential learning required both depth and breadth of the content, and an extensive time commitment. Participants also emphasized the value of M&M rounds, which allowed for a contextualized discussion of strategy based on clinical narrative. As such, our team focused on developing a baseline QI/PS training program that was structured on clinically relevant and experiential applications across a narrow range of fundamental QI/PS principles.

**Outer settings**
The mutual dependency between hospitals and residency programs, especially with regard to patient safety and quality care, revealed that the affiliated teaching hospital had an important influence on both residents and attending physicians interviewed in this study. Our findings indicated that residents and attending physicians believed that the hospital’s QI/PS goals, intentions, and statements were proactive; however, there was a lack of demonstrable action and tangible outcomes. On the floor, participants indicated a lack of interdisciplinary cooperation. In some cases, this manifested by using submission of safe report as a threat when disagreements took place. Moreover, there was uncertainty as to the process, response, and outcomes of submitted Safe Reports. Revisions of the QI/PS program would include strategies for effectively coordinating with hospital QI/PS processes, and training on interprofessional collaboration. Specifically, clear expectations for reporting a PS incident would be provided to residents and attending physicians at the program level. As the program developed, findings regarding limitations to the relationship with our hospital affiliates must be investigated further.

**Implementation process**
The effectiveness of the IM QI/PS training program is indelibly linked to satisfying key and/or enabling CBD competencies across roles of CanMEDS physicians.4 CBD is based on assessed behavior such that students must be deemed competent through observable QI/PS activities. The implication was that implementation of the revised program must extend beyond traditional memory-based learning and develop experiential learning by integrating QI/PS into clinically based rounds and simulation activities aligned with currently scheduled half-days.

**Inner Settings**
The IM residency program is an essential point of entry to 11 subspecialty programs. As such, residents have a diversity of interests, and are focused on matching to subspecialty programs. Participants identified the difficulty of integrating QI/PS requirements to an already full program and were hesitant to use blocks dedicated to scholarly activity to focus on QI/PS. As the new QI/PS program evolves, it would have a baseline experiential curriculum as well as an optional extended program for residents who want to specialize in this area.

**Individuals Involved**
Currently, there is varying expertise and interest in the QI/PS training program among both residents and attending physicians. Some attending physicians were unclear of reporting requirements and systems. Given the advent of CBD, it would be important to build a shared vision of QI/PS training between IM program leadership and the QI/PS program and seamlessly integrate learning activities and assessment within the CBD framework.

**Limitations**
Our interviews were limited to residents and attending physicians, and as such did not consider the beliefs and experiences of their interdisciplinary colleagues nor hospital administrators. As the participant group was small, we did not specify the roles of attending physicians, which could limit the reader’s interpretation of our findings.

**Conclusion**
The findings of our evaluation suggest a general willingness and potential to implement changes to the current IM residency QI/PS curriculum, such as adopting experiential learning and integrating with the CBME approach. Based on these findings, QI/PS leaders would develop baseline experiential training and an extended focus option. Further, they would formulate clear guidelines and training for residents and attending physicians to work within the reporting and QI/PS systems at our local hospital, develop experiential learning through clinically based rounds and simulation, and build a shared vision of QI/PS training with administrators. We identified strengths and weaknesses associated with multiple dimensions of program implementation as framed by the CFIR framework. By integrating these results, evidence-informed and low resource solutions could be integrated into the IM residency QI/PS curriculum. Standardizing the curriculum, setting policies and guidelines...
for interaction with hospital QI/PS systems, and defining new experiential learning opportunities would guide QI/PS CBD assessment tool development and guide faculty toward CBD assessment opportunities.

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References
Appendix A: Key Learning Objectives and Preparation for Patient Safety Rounds

The patient safety (PS) rounds consist of seven sessions, with 3–5 learning objectives each and pre-course work requirements. For details of each session, please see below:

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<th>Patient safety round session</th>
<th>Learning objectives</th>
<th>Pre-course work</th>
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| **Session 1: Medical error/disclosure/patient safety incident** | 1. Describe the impact of medical errors on patients, families, and providers.  
2. Identify how to successfully disclose medical errors to patients and their families.  
3. Explain why blaming/punishing individuals for errors rarely improves patient safety. | IHI PS 101: Introduction to patient safety  
Lesson 2: Responding to errors and harm                                                                 |
| **Session 2: Handover/teamwork**                    | 1. Explain why good teamwork is necessary to ensure patient safety.  
2. Identify examples of effective and ineffective teamwork and communication in day-to-day life and in a healthcare setting.  
3. Explain the concept of “critical language.”  
4. Use structured communication techniques to improve handover. | IHI PS 104: Teamwork and communication in a culture of safety  
Lesson 3: Basic tools and techniques for effective communication |
| **Session 3: Human factors**                        | 1. Describe how human factors engineering concepts apply to healthcare.  
2. Give examples of human factors that contribute to medical error.  
3. Define the concepts of simplification, standardization, constraints/forcing functions, and redundancies, and explain how these strategies help to improve patient safety. | IHI PS 103: Human factors and safety  
Lesson 1: Understanding the science of human factors                                                                 |
| **Session 4: Systems thinking/systems analysis/root cause** | 1. Explain how adverse events can be used as learning opportunities/opportunities for change.  
2. Determine which adverse events are appropriate for a root cause analysis.  
3. Describe the steps in a root cause analysis and be able to construct a fishbone diagram.  
4. Identify several types of factors that may contribute to medical error. | IHI PS 201: Root cause and systems analysis  
Lesson 2: How a root cause analysis works                                                                 |
| **Session 5: Aims + measures/Plan-do-study-act (PDSA)** | 1. Identify the key elements of an effective aim statement.  
2. Identify three kinds of measures: process measures, outcome measures, and balancing measures.  
3. State and use the five approaches to coming up with a change.  
4. Explain how to use change concepts to come up with good ideas to test.  
5. Test changes on a small scale using the PDSA cycle. | QI 102: How to improve with the model for improvement  
Lesson 3: Choosing measures                                                                                   |
### Session 6: QI data—control charts/run charts

1. Explain the basics of displaying data for improvement.
2. Explain the value of tracking and plotting data over time.
3. List the basic elements of an effective run chart.
4. Draw a run chart that includes a baseline median, a goal line, and annotations.
5. Describe the difference between common and special cause variation.

### Session 7: Leadership in QI (option A or B)

**Option A:**
1. Describe different characteristics of leaders.
2. Describe different techniques for persuading different types of people.
3. Explain why achieving a workable level of unity among teammates is essential for effective team functioning.

**Option B:**
1. Assess your own tolerance for change.
2. List common barriers to change according to Herbert Kaufman.
3. Describe tactics for overcoming common barriers to change within healthcare.

### QI 104: Interpreting data: run charts, control charts, and other measurement tools

Lesson 1: How to display data on a run chart

### QI 105. Leading QI lesson 2: Change psychology and the human side of QI

Lesson L101: Introduction to healthcare leadership
Lesson 2: Practical skills for leading teams

Lesson (B) Leadership in quality improvement (QI)
Appendix B: Resident Interview Questions

1. Where did you receive your undergraduate medical education?
2. What residency year were you in?
3. Describe any exposure you have had to quality improvement (QI) and patient safety (PS) training prior to Internal Medicine (IM) residency.
4. Since starting IM Residency, have you:
   a. completed any of the institute for healthcare quality modules?
   b. attended PS rounds?
   c. participated in any informal QI/PS learning activities (e.g., QI projects, formal courses, conferences, etc.)?
   d. If you have attended the morbidity and mortality rounds, have you learned anything about PS of QI from them?
5. Thinking of your time in IM residency:
   a. What opportunities have you had to be involved in QI initiatives?
   b. Are there any obstacles to participating in QI initiatives as a resident?
   c. Are there any risks or repercussions to being involved in QI initiatives as a resident?
6. We are interested in your perception of PS culture of the IM residency training program in addition to that of Kingston Health Sciences Centre (KHSC) as a whole. In your day-to-day work, describe your experience of the following dimensions of PS culture both within the IM training program and across KHSC:
   a. leadership support for safety
   b. judgment-free environment
   c. incident follow-up
   d. repercussions of error
   e. learning culture
   f. Are there any other elements of PS culture would you like to discuss?
7. Describe the steps you have taken when you have experienced a PS incident in the past.
8. Describe your most transformative QI and PS experiences.
9. In what ways do you think that your exposure and training in PS/QI during your IM residency training is sufficient for your future career?
   a. To what extent do you think this training is important to your future practice?
10. What QI/PS learning activities do you think should be included in the IM residency training program, if any?
11. Is there anything else you would like to mention about your education in QI/PS that we have not yet discussed?
Appendix C: Attending Physician Interview Questions

1. In working with Internal Medicine (IM) residents, what types of exposure to quality improvement (QI) and patient safety (PS) training do you think they’ve had prior to IM residency? Please describe.

2. Please describe any training in QI and PS that you have had.

3. In your experience as an attending physician who supervises IM residents, describe your impression of PS rounds:
   a. (a) What is your impression of their impact on residency education?
   b. What barriers do you think prevent residents from attending these rounds? Please describe.
   c. What barriers prevented you from attending these rounds, if any? Please describe.
   d. (d) How do you think PS rounds could be improved, if at all?
   e. What types of QI/PS learning activities do residents participate in outside PS rounds?

4. In thinking about IM residents:
   a. What opportunities do they have to be involved in QI initiatives?
   b. What do you think are the barriers to participating in QI initiatives as a resident?
   c. What do you think are the risks or repercussions to being involved in QI initiatives as a resident?

5. We are interested in your perception of the PS culture of the IM Residency Training Program in addition to that of Kingston Health Sciences Centre (KHSC) as a whole.
   In your day-to-day work, describe your experience of the following dimensions of PS culture both within the IM training program and across KHSC:
   a. Leadership support for safety
   b. Judgment-free environment
   c. Incident follow-up
   d. Repercussions of error
   e. Learning culture
   f. Are there any other elements of PS culture you’d like to discuss?

6. Describe the steps you have taken when you have experienced a PS incident in the past.
   a. Explain how you decided to report or not report the incident.
   b. Explain how you decided, whether or not to use official reporting channels? For example, safe reporting.
   c. To what extent do you think the KHSC response to PS incidents is effective?
   d. What is your impression of how residents respond to PS incidents?

7. In what ways do you think resident exposure and training in PS/QI is sufficient for their future career?

8. In relation to PS and QI, what educational experiences do you feel are the most beneficial for residents?

9. What QI/PS learning activities do you think should be included in the IM residency training program, if any?

10. Is there anything else you would like to mention about resident education in QI/PS that we have not yet discussed?
## Appendix D: Additional Non-Curated Quotations Supporting Each Theme

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<th>Theme</th>
<th>Selected quotations</th>
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| 1. Integration of QI/PS knowledge and skills into practice | • “I don’t think [modules] are the most effective way for someone to learn effectively. You can make them mandatory and people will do them, but how much attention they will pay to them? I am not sure.” (R14)  
• “We were asking the residents to [present at PS] rounds but yet they don’t have training in it. That would be like asking me to give rounds on surgery, I don’t do surgery.” (A3) |
| 2. Standardization of QI/PS education,              | • “I do think [QI] is important; however, I question in some ways whether the process components of QI or QI research will be applicable either to myself or other members who may be not working in academic medicine or pursuing research goals.” (R4)  
• “I don’t think the patient safety stuff is going away, I think it will be front and center for many years going forward. So, I would say that it is probably not sufficient. But I would also say that I don’t think what they get in core [IM residency] should be sufficient because it’s not like they are exiting core and going out into the big wide world.” (A1) |
| 3. QI/PS culture within the IM program             | • “[The department leaders are] open to listening of incidents that have happened… It is almost always related to patient safety and mistakes that have occurred and harm and how we can change the system to prevent it from happening. So, we do have good leadership from that perspective.” (A5)  
• “And my attending staff at the time took it very seriously. She did not do anything like brushing it under the rug or pretending it did not happen. She did not try to minimize it in any way. She took it very seriously. She said that if this is what happened then we need to call the lab. We need to fill out a Safe Report. And then, she brought me in the room when she disclosed the error to the patient and the family.” (R2) |
| 4. External barriers to QI/PS training              | • “But sometimes it [reporting incidents] does reflect negatively in that you don’t want to be seen as someone involved in conflicts or seen as someone who does not get along with other specialities or gets in fights with nurses.” (R6)  
• “[Lack of change] has been a big issue. A critical incident will get lots of follow-up but the day to day stuff that we want to see change… I feel there is a big meeting and discussion, but I can’t say that there is change that occurs.” (A3) |