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ORIGINAL CONTRIBUTION

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Developing residents' feedback literacy in emergency medicine: Lessons from design-based research

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Abstract

Objectives: Residents in emergency medicine have reported dissatisfaction with feedback. One strategy to improve feedback is to enhance learners' feedback literacy—i.e., capabilities as seekers, processors, and users of performance information. To do this, however, the context in which feedback occurs needs to be understood. We investigated how residents typically engage with feedback in an emergency department, along with the potential opportunities to improve feedback engagement in this context. We used this information to develop a program to improve learners' feedback literacy in context and traced the reported translation to practice.

Methods: We conducted a year-long design-based research study informed by agentic feedback principles. Over five cycles in 2019, we interviewed residents and iteratively developed a feedback literacy program. Sixty-six residents participated and data collected included qualitative evaluation surveys ($n = 55$), educator-written reflections ($n = 5$), and semistructured interviews with residents ($n = 21$). Qualitative data were analyzed using framework analysis.

Results: When adopting an agentic stance, residents reported changes to the frequency and tenor of their feedback conversations, rendering the interactions more helpful. Despite reporting overall shifts in their conceptions of feedback, they needed to adjust their feedback engagement depending on changing contextual factors such as workload. These microsocial adjustments suggest their feedback literacy develops through an interdependent process of individual intention for feedback engagement—informed by an agentic stance—and dynamic adjustment in response to the environment.

Conclusions: Resident feedback literacy is profoundly contextualized, so developing feedback literacy in emergency contexts is more nuanced than previously reported. While feedback literacy can be supported through targeted education, our findings raise questions for understanding how emergency medicine environments afford and constrain learner feedback engagement. Our findings also challenge the extent to

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which this contextual feedback know-how can be "developed" purposefully outside of the everyday work.

KEYWORDS
emergency medicine, feedback, feedback literacy, residents

INTRODUCTION

Feedback paradigms are shifting from educator-centered to learner-centered processes.[1] Despite this conceptual shift, practice norms suggest that medical educators and supervisors often engage in unidirectional feedback conversations, i.e., transmitting information to the learner. This leaves the learner with little room to engage in the dialogue.[2] In higher education, developing feedback literacy has been proposed as a solution to enhancing learner engagement in feedback processes. While health professions education studies exploring feedback literacy are emerging, they tend to focus on health care (including medical) students.[3,4] What it means to be feedback literate in the workplace has received less attention, let alone how feedback literacy "looks" in particular practice cultures such as emergency medicine. Thus, it is unclear what effective feedback literacy looks like or how emergency medicine educators might go about developing these feedback knowledges, dispositions, and skills. With residents in emergency medicine reporting dissatisfaction with feedback in their workplaces,[5,6] we wanted to understand: (1) what constitutes effective feedback in emergency medicine and (2) how to develop residents' feedback literacy in emergency settings.

Learners play a key role in feedback processes, and their role is increasingly recognized as pivotal for improved feedback outcomes and learning.[7–9] Yet uncertainty remains; we lack granular guidance on *how* to effectively engage learners in feedback in specific contexts such as emergency medicine. For example, high-stakes clinical settings may not contain as many invitations for performance-based discussions as seen in more controlled settings like classrooms.[10] For emergency medicine residents, these feedback challenges are further exacerbated as they often work with new colleagues each shift.[5] For these reasons, residents have reported that feedback practices in emergency contexts could be improved.[5,6,11] However, recommendations to improve feedback practice in emergency settings tend to focus on supporting supervisors' delivery of feedback.[6,11]

Evidence from higher education literature suggests learner engagement in feedback can be promoted by developing their feedback literacy.[12,13] Feedback literacy has been defined as "the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies" (p. 1315).[12] While developing health care students' feedback literacy can alert learners to feedback opportunities in clinical settings, engagement or lack of engagement depends on the context in which students find themselves in. These findings suggested that different contexts likely require different forms of skills and engagement. In other words, being feedback literate in emergency medicine may not mean you are feedback savvy in a surgical setting as the very nature of the work, the expectations for collegial engagement and the physical setting (co-location vs distributed) are so different. This piqued our curiosity about how to develop residents' feedback literacy in emergency medicine, which was previously reported as demanding for learners, and how they engaged in feedback.[5,6,11]

In this study, we investigated how residents engaged with feedback in an emergency department (ED) and used these data to inform the development of an intervention to help build their feedback literacy within that setting. Through interviewing stakeholders, we traced any perceived changes in feedback approaches resulting from the intervention in the emergency medicine setting.

METHODS

Our research questions were as follows:

1. How do residents engage with feedback in an ED?
2. How can we develop emergency medicine residents' feedback literacy?

To address these research questions, we conducted a design-based research (DBR) study.[14] DBR methodology aims to solve real-world problems related to learning (e.g., improving feedback processes in clinical settings) while contributing to theoretical understandings. For these reasons it is well suited to exploring the theoretical concept—feedback literacy—while investigating how it is enacted in a particular context (i.e., emergency medicine).[14,15]

Study design

The study was conducted over five cycles where, in each cycle, we:

1. Developed (Cycle 1 and then refined from Cycle 2 to Cycle 5) and implemented a feedback literacy program (described below).
2. Evaluated the literacy program using reflective qualitative evaluation (RQE).
3. Conducted interviews with residents to better understand how they engage in feedback and how to support their engagement in feedback. Their responses, also, further enabled refinement of subsequent program elements.

The cycle sequence is presented in Figure 1. Overall, the longitudinal study design enabled an exploration into residents' experiences

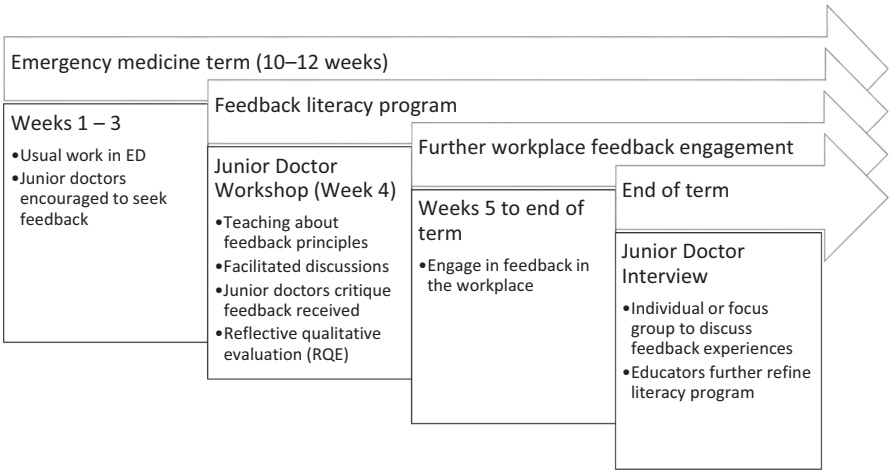

FIGURE 1 Overview of a research cycle.

of engaging in feedback and opportunities to refine the literacy program. While, from a theoretical development perspective, focusing on the *"development"* of feedback capabilities enabled us to understand *what it means to be feedback capable in emergency medicine*.

Setting

We conducted this study in the ED at Gold Coast Health, Australia's busiest ED. The ED operates out of two campuses—Gold Coast University Hospital and Robina Hospital. Approximately 18–20 residents rotate into ED each term for 10 to 12 weeks. There are five terms per year.

All residents in Australia undertake an emergency medicine term. For this study, our residents were Postgraduate Year 1 doctors. They were completing their intern training year, which includes rotations in other specialties (e.g., internal medicine and surgery). They will have had some experience in emergency medicine as medical students.

At Gold Coast Health, the residents engage in shift-based work between the two campuses and tend to work with different supervisors (e.g., registrars or consultants) each shift. (Registrars are completing their specialty training while consultants have completed their specialty training.) Residents had 1 education day per week out of the clinical area. As part of the Australian Medical Council accreditation requirement, residents need to complete a midterm and end-of-term intern training assessment. To inform these assessments our residents are required to complete six learning encounter cards (LECs) over the term. These LECs are designed to elicit specific feedback about a patient encounter or shift performance with a registrar or consultant supervisor (Appendix S1).

Participants

Over the course of 2019, we recruited residents to the study at the start of their ED term. All residents ($n = 90$) were eligible to participate in this study.

Feedback literacy program design

Our feedback literacy program design was informed by the principle that learner agency within feedback processes (i.e., feedback literacy) can be purposefully supported or developed. In other words, learner feedback literacy development cannot simply be left to chance.[16] This principle is important because traditional feedback models tend to overlook learner agency by "ignoring what they [learners] think is important, what they want to achieve, what they are able to achieve" (p. 18).[1] Viewing learners as "being capable of soliciting and using feedback rather than being recipients of the 'inputs' of others"[1] (p. 22) improves the effects of feedback. Conceptually this has been presented as the Feedback Mark 2 (FBM2) model.[17] FBM2 provides a framework for learners to actively engage in feedback conversations by stating what information they need to better understand their performance, declaring their own views of how they think they are performing, and cogenerating a plan for improvement. The learner then takes that plan to the next activity. Thus, a key goal for our program was to nurture residents' proactivity as they engaged in workplace feedback processes.

The program's aims—also informed by our previous literacy program[13] – were as follows:

- Support residents' knowledge development of key concepts and principles of effective feedback.
- Challenge the conceptualization of "feedback as information" and support the shift to feedback as a process where there is entanglement of the physical environment, the work itself, and expressions of departmental culture (including role expectations, hierarchy, power to act, etc.).
- Promote active resident engagement in feedback processes while in the emergency setting and integrate this feedback into their practices.
- Reflect on their own and others' experiences of feedback.

To address these aims, we integrated evidence-based learning activities[16] and these included: (1) face-to-face *workshops* to support residents to engage with and use feedback in the ED context;

(2) effective utilization of *feedback resources* within the workplace learning context, including LECs; and (3) *reflect* on workshop discussion and feedback experiences using the RQE.[16]

Workshops

We used several pedagogical approaches—outlined in Table 1—to address the key components of feedback literacy.[12] These approaches were revised in response to our reflections, the residents' evaluation (from the RQE), and research interviews with residents (described below).

Data collection and analysis

To answer our research questions, we collected data from each cycle. These data included: (1) RQE (Appendix S2) where residents shared their key learnings and identified strategies to enhance their feedback experiences in ED; (2) researcher reflective discussions where, following the workshop, two researchers (JY and CN) engaged in a reflective discussion, and this reflection was captured by JY; and (3) semistructured interview or focus group: before the end of term, residents were invited to engage in an interview (interview schedule in Appendix S3). These interviews (audio-recorded and transcribed verbatim), conducted by one researcher (JY), explored their self-reported experiences of feedback engagement in ED.

These data were analyzed using the framework method.[18] We followed the five stages of framework analysis: (1) familiarization, (2) identifying a thematic framework, (3) indexing, (4) charting and mapping, and (5) interpretation of key themes. Firstly, the researchers (CN and JY) familiarized themselves with data by reading through the transcripts, evaluations, and reflections. Secondly, a thematic framework was identified through coding the debriefing sessions. This framework, informed by our design principle, was agreed upon by the team through a series of analysis meetings. Thirdly, all data were indexed in Nvivo 1.6.2(Lumivero), i.e., coded by one researcher, CN, and to ensure research credibility, JY also indexed them independently. Fourthly, coded data were mapped and charted in Nvivo, and the team identified patterns and associations through regular meetings. Finally, findings from each term (key examples shown in Figure 2 for each cycle) were compared, contrasted, and synthesized to determine key themes relating to developing residents' feedback literacy and engagement in feedback, again, through team meetings.

Ethical approval

Ethical approval was obtained from the Gold Coast Health Human Research Ethics Committee (HREC/16/QGC/158).

Research team and reflexivity

The research team included a medical educator (JY), two clinician-medical educators (KK and VB), and two medical education researchers (CN and EM). The initial project concept was developed by CN and EM, who have expertise in feedback (including feedback literacy) and workplace learning combined with experience in DBR. Together the team designed the feedback program (including allowing for its iterations) and the implementation was led by JY (supported by KK, VB, and CN). The whole team engaged in data interpretation and analysis. We began this process by adopting "solutionism" approach[15] (i.e., "the common tendency to jump to solutions prior to fully understanding the nature of the problem we were trying to address"; p. 82)[15] in that we assumed that we simply needed provide residents with theoretical information about feedback and feedback literacy. Yet, our initial residents indicated that the learning program was too theoretical and lacked detail on how they could productively engage in feedback processes in this context. Through this process, we realized we needed to meaningfully wrestle with the ongoing challenges experienced by residents engaging in feedback processes. In particular, we realized that developing an effective feedback literacy program requires an intimate understanding of the feedback practice context, including the nature of the work itself and departmental culture. These variables were seen to

TABLE 1 Integration of design principles into the literacy program.

Component of feedback literacy	Workshop pedagogical approaches
Appreciating feedback processes	*Discussion*: Engage with the model FM2 and explore strategies for residents to engage in feedback processes in emergency medicine. *Activity*: Residents review their own LEC feedback.
Taking action	*Discussion*: Generate strategies for acting on feedback information through discussion and using the RQE. *Reflection activity*: Residents reflected on their own LEC and then strategized ways to act on feedback (if actionable and, if not actionable, how to elicit actionable feedback).
Making judgments	*Discussion*: Emphasizing the importance of seeking clarity on what is expected standard, e.g., an effective handover, to judge own performance.
Managing affect	*Discussion*: Share feedback stories that elicited strong emotions (either from own practice) and discussed strategies to recognize and regulate their own affective responses to feedback.

Abbreviations: FM2, Feedback Mark 2; LEC, learning encounter card; RQE, reflective qualitative evaluation.

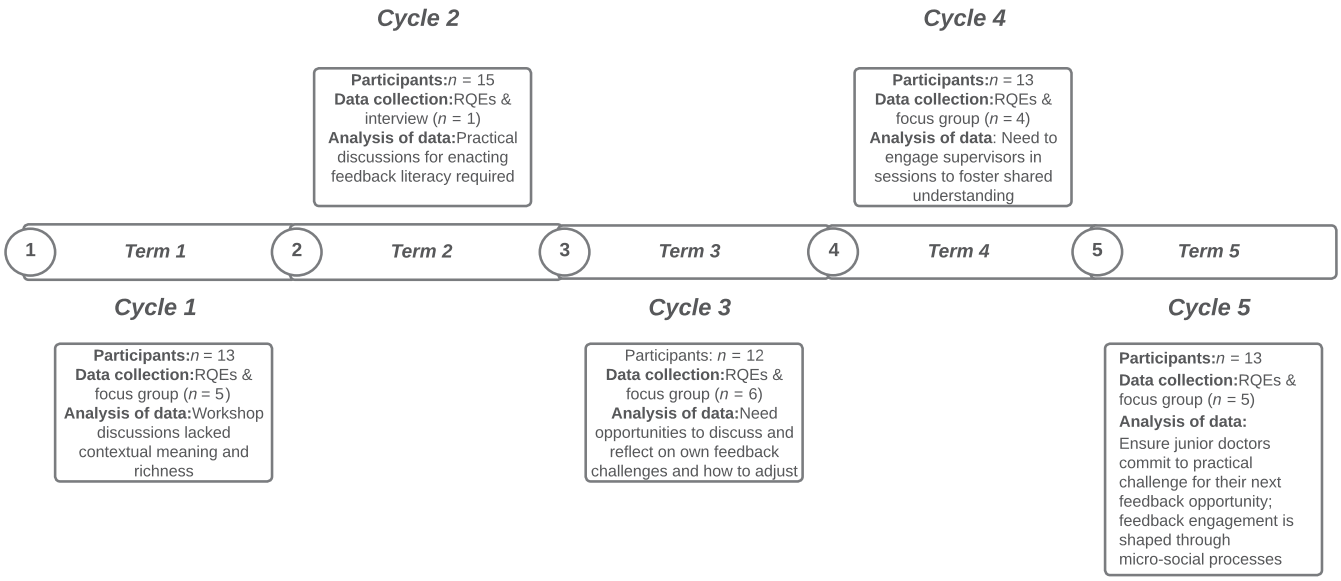

FIGURE 2 Overview of data collection and analysis. RQE, reflective qualitative evaluation.

enable and constrain learner feedback engagement across different circumstances. This new understanding forms the foundation for the design of future feedback literacy learning programs (in this case, in situ workshops and practice-based activities within cycles of practice/experimentation).

RESULTS

Sixty-six residents (out of 90 eligible residents) engaged in the study. Fifty-five (83%) RQEs were completed. We conducted five interviews (four focus groups with 21 residents [range 4–6] and one individual). The results are presented in two sections. Firstly, we share our overall findings where we identified two key themes that furthered our understanding about how residents engage with feedback and what is theoretically known about feedback literacy development and enactment in high-stakes clinical settings. The two overarching themes included: (1) Bolstering residents' agency in feedback conversations and (2) Contextual factors influencing residents' feedback engagement. Notably, the two themes intersected, as learner agency was enabled through an intimate understanding of contextually bound opportunities for observation of performance and dialogues between team members. Of note was the interdigitation of how the environment, and less tangible expressions of departmental hierarchy, influenced what residents can do and feel they are allowed to do, when it comes to feedback in their workplace. Secondly, we describe how the feedback literacy program evolved over the cycles and present the design principles for the program. Together, these findings enabled further theorization on feedback literacy in clinical settings where acknowledging the workings of power can help players negotiate feedback interactions (including the decision to avoid conversations).

Bolstering residents' agency in feedback conversations

Residents all reported engaging in feedback conversations in the ED but largely believed their role was passive. Through exposure to the literacy program where they conceptually registered that feedback could be a two-way process, they realized their role could be significantly different, and much more active, in the setting. They could have a more active role. They shared ways they flexed their agency in feedback conversations and responded to environmental cues following the literacy program. These included:

- Initiating feedback conversations.
- Working with others to engineer forward-facing feedback conversations.
- Recognizing the importance of shared understanding.

Initiating feedback conversations

To initiate feedback conversations, residents identified feedback providers—namely, consultants and registrars and sometimes nurses—and asked for feedback using new strategies discussed in the workshop. For example, at the start of a shift residents primed the consultant or registrar about the feedback they wanted. One resident described the benefits of priming:

> I think for me it was regardless, if you flagged it [wanting feedback] at the start [of the shift] … like even [with] some of the consultants, if you were like, I know you're busy, but can we do it at some point in the next two hours and even like the big bosses were fine with that, if you flagged it. (Term 1 Focus Group).

While many experienced success with this approach, residents described being mindful of supervisors' workloads. When discussing the challenges of initiating feedback conversations, one resident acknowledged:

> ... it's really kind of unfair to blame it on the supervisors that they don't provide the significant [long] extended feedback because of time pressures. We've seen the emergency department here. It's rarely under 250, 300 people [patients] in there in 24 h ... I can't see how a consultant can have time or find time during a busy clinical shift. (Term 4 Focus Group)

Despite their best intentions, the act of initiating feedback conversations was often a delicate balancing act where residents considered their own energy and emotional state, their supervisors' workloads, and the overall departmental workload. Feedback literacy was as much about holding back as it was initiating conversations based on *reading the play*, i.e., reading the ED work environment to identify feedback opportunities and/or predict future opportunities.

Working with others to engineer forward-facing feedback conversations

The residents reported finding ways to enhance the conversations' learning value, e.g., from not having an action plan to ensuring a plan was generated. Several residents noted these acts transformed their feedback conversations and they were "... different in a sense that it was more detailed and probably a bit more helpful. Whereas the previous feedback was more 'this is what you're doing' ... [after engaging in the learning program, I can help guide the conversation to]...' this is how you can improve on it." (Term 4 Focus Group)

These reported experiences suggested residents were becoming more feedback literate. However, the approaches to elicit supervisors' thoughts about how to improve were not always successful in practice. In the following example—a resident asked what they needed to be doing to work at a higher level (e.g., as a senior house officer), something discussed in the workshops as a way to generate a clear action plan, and the response was: "'just get more experience,' but it's also hard because they [supervisor] have the experience to get stuff going, whereas I don't ..." (Term 2 interview). So, while the residents might be equipped with knowledge about the value of forward-facing conversations with clear strategies for improvement, the supervisors' responses sometimes left them unsure about what to do next beyond "get more experience." Residents seemed to lack ways to further elicit pointy (or specific) strategies from supervisors.

As well as noticing their own increased engagement with feedback conversations, several residents noted they were actively listening to and interrogating their workplace conversations with supervisors and fellow workers for feedback information. They highlighted that they recognized that feedback information could be "disguised" as advice. In the quote below, the resident describes the ways feedback information could be garnered through active listening and being sensitive to nonverbal cues:

> I think, take every opportunity you have as feedback because sometimes feedback is not going to be—won't jump out and you say "it's feedback!" It's like actively listening to what other people are saying because if they are receptive to what you've done, they often give you feedback through verbal cues and nonverbal cues. Their attitude as well. (Term 1 Focus Group)

Indeed, some residents preferred this approach to feedback conversations as it was less stilted and did not disrupt the workflow while offering ways to improve their performance:

> I think there are a couple of really specific pieces of almost more "clinical pearls" rather than feedback specifically from consultants and things, just like, oh, this is probably a better way to deal with this sort of presentation; rather than, this is a thing that you could improve on, and this is how you could do it. Because usually I found when I tried to get feedback about performance there was; you need to work on it, you just need experience. Which is true but not wholly helpful. (Term 5 Focus Group)

In sum, being an active participant in feedback processes catalyzed residents' interrogation of usual workplace conversations to harness and make sense of feedback information, including discussions about standards of practice which enabled learners to join the dots and think about how their own clinical approach deviated from these standards or "pearls."

Recognizing the importance of shared understandings

The residents consistently emphasized the importance of supervisors being on the same page in terms of their newfound feedback literacy. They considered this important because of hierarchy challenges and being perceived as a burden by the supervisors in a busy workplace. The following quote illustrates this point:

> ... the consultants and registrars [should] be educated about this too, so it doesn't feel like we're wasting their valuable time. (Term 2 Qualitative Reflective Evaluation)

To redress these concerns, we invited an ED consultant to contribute to the workshop (in our final cycle—Term 5), and our reflection is as follows:

> One of the consultants, [name] came to share his insights and experience as a consultant having feedback conversations and this added a certain amount of authentic gravitas … it worked well having a consultant perspective in the room explaining how hard it is to provide feedback when a resident comes to them on a busy shift without warning and without their own self-appraisal to give them guidance. (Researcher Reflection)

Contextual factors influencing residents' feedback engagement

While the residents seemed to value being agentic in feedback conversations, consistent across the data sets, they recounted that their engagement in feedback was dependent on contextual factors. These contextual factors within the ED afforded different feedback opportunities. The key contextual factors influencing resident feedback engagement related to: (1) time (i.e., night/day) and (2) space (i.e., different campuses or clinical areas). These contextual factors influenced feedback processes as they shaped supervision models and influenced direct observation opportunities.

Firstly, different times of day afforded different feedback opportunities. Participants reported that night shifts offered more opportunities for meaningful feedback conversations compared to day shifts. In contrast, despite their best efforts and understandings of effective feedback processes, residents noted they were unlikely to overcome some contextual challenges of "day shifts." One resident describes these sentiments:

> Whereas during the day, when it's so busy, you have probably three or four bosses that you can hand over to. So, I feel like they don't really watch what you're doing as much, and you don't feel as confident bugging the same person. So often it's—you don't get such—I don't know—thorough feedback during the day. Whereas during the night shift, people are more willing to take out the time to tell you what you are doing well and what you're not doing well then. (Term 1 Focus Group)

Secondly, the residents noted that space, i.e., different campuses and different clinical areas, afforded different feedback experiences. For instance, one resident recounted that the smaller ED campus afforded opportunities to work consistently with senior staff, as illustrated below:

> I think, as a general rule, I found the feedback in [smaller campus name] a bit more useful because the registrars and bosses that are in [smaller campus name] are usually there more often … the team is significantly smaller so you get more exposure to the same senior staff … [I knew] what they wanted me to do, what their general expectations were, how they wanted to do things and then sort of the same in reverse, they knew what I was good at, they knew what I sort of was struggling with. (Term 5 Focus Group)

At the larger campus, however, supervision access varied, and it was sometimes challenging to be observed by a senior colleague. The residents needed to be savvy about where the feedback rich areas were within the department. This is described below by one intern:

> I think short stay [clinical area] is also quite helpful as well … I think anything but resus [resuscitation area]. Not to say that you can't on resus because you can, but it's less frequent because everyone is so busy and yourself, you don't have a minute to stop. (Term 1 Focus Group)

The residents also needed to be aware of the type of feedback information they could garner from whom and that trade-offs exists:

> I thought consultants gave better feedback, but the consultants are less accessible. There are consultants who I never worked a shift with over my ten weeks in ED. Whereas, I felt like I worked a lot with certain registrars. There is no consultant who I felt like I worked with more than two or three times, who can give you feedback. Whereas you can do a run of nights with the reg and get feedback from them. (Term 2 FG)

Overall, the variation and fragmentation in their supervision made it challenging for the residents to make decisions about the quality of their work. They received feedback information from several supervisors and often struggled to make sense of diverse perspectives and generate meaningful strategies to improve their performance. Yet feedback literacy was demonstrated by critiquing the quality of the feedback information based on whether the supervisor had seen them (or the patient) in action.

In summary, despite their enhanced knowledge of feedback (a shift in conceptualization) and residents' best efforts to engage in feedback conversations, the diverse contextual factors meant that it was not enough to be "proactive." Rather learners' feedback literacy was being developed as they adjusted their feedback engagement in response to the workplace context and its nuances. This included knowing when to be silent or when to delay approaches to colleagues for a feedback conversation.

Evolution of the ED feedback literacy program

Throughout the five cycles and as illustrated in Figure 2, the feedback literacy program evolved as we analyzed our data. While the analysis was iterative, each cycle afforded fresh insights for developing

residents' feedback literacy. In Cycle 1, we identified our approach was overly theoretical (e.g., what is feedback) and with few practical examples. In Cycle 2, we spent less time describing feedback theory and more time was spent facilitating discussions where residents identified practical strategies to enhance feedback conversations in ED context. In Cycle 3, we identified that residents also need time to reflect on the feedback challenges they have encountered and, collectively, find ways to overcomes these challenges. In Cycle 4, the importance of including the supervisors in the residents' feedback literacy program discussions was identified. Finally, in Cycle 5, the importance of encouraging residents to adopt a dynamic (i.e., microsocial) approach to feedback engagement was identified. Based on the five cycles the following design principles for the feedback literacy program in ED were developed:

Targeted yet timely learning programs: Ensure feedback literacy session conducted is 3 or more weeks into term to ensure learners understand the ED context and can "hang" their learning on this.

Clinician presence: Ensure a clinician/supervisor co-facilitates the session and shares their feedback experiences.

Critical reflection: Including activities asking learners to reflect, i.e., unpack their feedback experiences and discuss ways to move forward.

Uncovering context: Explicit discussions about workplace context including cues, obstacles, tips, and tricks from previous learners and between current learners.

Provide a challenge: Ask learners to commit to a specific question(s) they will use in the workplace to gain feedback from a supervisor on their next shift.

DISCUSSION

We aimed to better understand how residents engage with feedback in the ED and how to develop their feedback literacy. Our findings suggest that the development of feedback literacy through a dedicated program contributes to residents' conceptual understandings of what productive feedback could look like in this setting. It went some way in improving their ability to initiate and engage more effectively in feedback conversations, e.g., to be better at asking for information to improve future performances rather than waiting for the delivery of a summary of what the supervisor observed. However, developing feedback literacy for high-stakes and fast-paced environments was more nuanced than initially anticipated. The residents, despite their best efforts, found that there were contextual factors that made it challenging to advance feedback processes, e.g., exhaustion or hectic work schedules, workplace busyness, and respecting the competing priorities observed in supervisors. In response to these factors, residents adjusted their approach to feedback engagement from moment to moment. This dynamic decision-making about when to interrupt, and who to interrupt for what information, gave us a better understanding of what it means to be a feedback literate resident in the ED.

These findings suggest that residents' feedback literacy develops through an interdependent process of individual intention for feedback engagement (informed by conceptual understandings of feedback) and a dynamic adjustment in response to contextual factors. The kinds of feedback experiences residents were able to access shaped their feedback engagement and literacy. We have illuminated the importance of accounting for contextual factors when developing feedback literacy. Interdependence between individual engagement and context must be acknowledged and can be a means to further develop feedback literacy. Based on our experience in this study, providing learners with enough space to critically discuss these "stories of workplace engagement or lack of engagement" would seem to be a key condition for any targeted feedback literacy intervention.

Our initial mantra was to "*get active in feedback*." However, the cycle iterations suggest that feedback literacy is not just about "getting active" (or proactive for that matter) but also to read the environment moment to moment and make decisions about what to ask, what to reveal, to whom, and for what purpose. In other words, we have learned that being feedback literate is more about learning to "*pick your moment and pick your person*." Hence, learners develop a more sensitive radar for anticipating the possibilities for what a feedback exchange may produce under different circumstances. For example, some residents reported that they started to develop the skills to reorientate a conversation so that there was a focus on what's next—beyond "work harder" or "get more experience."

Implications for feedback literacy for clinical environments and lessons for educators

Develop a formal feedback literacy program for learners

Our findings, combined with studies from higher education,[19,20] offer important clues for developing learner feedback literacy (or literacies) for workplace contexts. Firstly, different contexts require different feedback literacies. This means helping to develop learners' understanding of how to navigate feedback processes in certain work settings with unique working rhythms, material configurations, and even local institutional expectations of how to get the work done. Practically, feedback literacy sessions, orientating residents to how "feedback is done around here and how can you engage" are likely to be initially helpful for trainees as they transition to new terms/contexts. These sessions should ideally be co-constructed by educators, clinicians, and learners. We also advocate for enough space for storytelling and role play/skills enactment within these sessions.

Ensure feedback literacy programs are congruent with clinical practice context

Our findings emphasized that feedback literacy, like other workplace capabilities, cannot be fully developed through education sessions

divorced from practice.[21] Rather, we found that the activities and interactions residents engaged in were creating moment-by-moment opportunities for feedback engagement and, in turn, developing their feedback literacy. Sometimes interactions were tricky and required trade-offs where residents needed to push against the feedback norms and hierarchies, or they were at a loss in terms of advancing their feedback conversation. These findings related to developing feedback literacy resonate with microsocial learning processes whereby "learning is shaped through moment-by-moment interactions and engagement in activities" and "engagement in routine work activities reinforces and refines existing knowledge, whereas engagement in new activities and interactions generates new knowledge"[22] (p. 234–235). Drawing on this theoretical perspective offers new ways to understand the development of feedback literacy in the workplace. For instance, when residents succeeded in enhancing their feedback conversations, their conceptual understandings of being agentic in feedback processes were likely to be reinforced. Yet if unsuccessful, as was evident in some of our findings, the residents were at a loss as to how to progress, risking reverting to old practices. Again, drawing on the parallels of microsocial learning processes because "engagement in [feedback processes] can be more than just completing a task; it can induce lasting cognitive legacies, as individuals' knowledge will be changed in some way through engagement [in these activities]"[22] (p. 234). This perspective serves as a poignant reminder not to oversell "getting active" in feedback to individual learners. We need to account for the contextual features our learners will likely encounter in the workplace and how they can exercise judgment about when and how to elicit information and for what purpose.

Don't swing the pendulum too far—engage clinical leaders and supervisors in feedback literacy

There are considerations for feedback literacy development beyond the individual learner and how workplace practices can be shaped to support feedback interactions and processes. Developing shared understandings between learners and supervisors reinforces Carless and Winstone's conceptualizations of the importance of understanding the interplay between teacher and student feedback literacy.[23] They suggested that developing teacher feedback literacy include designing for uptake and relational sensitivities. For clinical environments, *designing for uptake* might mean scrutinizing rosters and shift structures to promote consistent supervision. In terms of *relational sensitivities*, supervisors could be guided to engage in feedback as a partnership with residents and encouraged to share their feedback experiences (and challenges).

Continue work on systems and processes that encourage feedback conversations

More broadly, this study suggests that advancing learner feedback literacy requires that the workplace invitational qualities for feedback engagement are scrutinized and, where possible, enhanced.[24] For instance, a workplace setting may be examined to determine what it offers, in terms of feedback engagement, including the stakes of the work itself, whether the players are colocated, and whether teams are dynamic or static and what this might mean for the development of trust between people. Conceptually, feedback literacy development could be understood as an interdependent process that occurs through practice, is developed over time and is shaped by context.

STRENGTHS AND LIMITATIONS

This DBR study explored resident feedback engagement and feedback literacy development in emergency medicine. A key strength of the study design—longitudinal and DBR—is that we were able to refine our approaches to the learning program as we increasingly understood what might constitute resident feedback literacy.[15] In these ways, we have generated practical solutions for improving feedback engagement while contributing new theoretical insights about feedback literacy in context.[15] In terms of limitations, this study was conducted in a single study setting and, while theory informed, may limit generalizability. While our team included supervisors in the ED, there would have been value in exploring supervisors' perspectives for enhancing resident feedback engagement. Finally, while some may question using interviews to illuminate the effects of the learning program, self-report is a legitimate mechanism for measuring sense-making.[25]

Suggestions for future research

Our research has opened several new lines of inquiry. Firstly, to further account for the contextual nature of feedback literacy, it would be valuable to replicate this work in different settings and with learners across different levels of experience. Secondly, given our findings that highlight the social and material influences on feedback engagement over time, there would be value in examining the trajectory of feedback engagement in clinical settings using methods such as longitudinal audio diaries using a microsocial process analysis.[22] This approach would likely offer further understanding of what a "feedback literacy" curriculum looks like and the workplace pedagogic practices affording productive engagement in feedback processes. Finally, learners in emergency medicine are not feedback naïve and instead will have had diverse feedback experiences before coming to the ED and that these experiences may hamper or hinder their feedback engagement. There would be merit in researching how to attune feedback literacy programs to learners' feedback legacies.

CONCLUSIONS

This design-based research study has advanced the understanding of resident feedback engagement and feedback literacy development

in emergency medicine. We found that residents attempt to enhance feedback conversations by initiating and engineering forward-facing discussions with supervisors, while highlighting the need for a shared understanding of feedback processes. Yet, this process is challenging for residents. Despite their good intentions, they could not always access conversations and often did not know when to ask for input or were not able to ask the difficult reorientating question. They also expressed agency by *not initiating feedback* conversations that they thought would distract the team from important patient-facing work or would compromise their own comfort or development. Developing feedback literacy in the workplace is likely an interdependent and nuanced process and further work is needed to understand how this know-how is developed over time in context and even across contexts. Building learner feedback literacy in workplaces requires supporting our learners to engage and requires work with multiple stakeholders in the setting (e.g., heads of department, learners, supervisors). Our work also suggests that focused development of learner feedback literacy in situ demands cycles of application and sanctioned space for debriefing to trace the impact of the feedback approaches.

AUTHOR CONTRIBUTIONS

Christy Noble and Elizabeth Molloy conceived the project. All authors were involved in design and ethics. Jessica Young, Kristian Krogh, Victoria Brazil, and Christy Noble contributed to the learning program. Jessica Young collected the data, and Christy Noble led the data coding. All authors were involved in data analysis. All authors contributed to writing the paper and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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