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Learning from near misses: from quick fixes to closing off the Swiss-cheese holes

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Learning from near misses most often is manifested in practice by the individual clinician who *does a quick fix* or reports near misses that then *go into a black hole* with no organisational learning taking place. In some cases, reported near misses result in organisational learning and thereby corrective actions that *close off the Swiss-cheese holes*.

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ABSTRACT

Introduction: The extent to which individuals in healthcare use near misses as learning opportunities remains poorly understood. Thus, an exploratory study was conducted to gain insight into the nature of, and contributing factors to, organisational learning from near misses in clinical practice.

Methods: A constructivist grounded theory approach was employed which included semi-structured interviews with 24 participants (16 clinicians and 8 administrators) from a large teaching hospital in Canada.

Results: This study revealed three scenarios for the responses to near misses, the most common involved 'doing a quick fix' where clinicians recognised and corrected an error with no further action. The second scenario consisted of reporting near misses but not hearing back from management, which some participants characterised as 'going into a black hole'. The third scenario was 'closing off the Swiss-cheese holes', in which a reported near miss generated corrective action at an organisational level. Explanations for 'doing a quick fix' included the pervasiveness of near misses that cause no harm and fear associated with reporting the near miss. 'Going into a black hole' reflected managers' focus on operational duties and events that harmed patients. 'Closing off the Swiss-cheese holes' occurred when managers perceived substantial potential for harm and preventability. Where learning was perceived to occur, leaders played a pivotal role in encouraging near-miss reporting.

Conclusion: To optimise learning, organisations will need to determine which near misses are appropriate to be responded to as 'quick fixes' and which ones require further action at the unit and corporate levels.

BACKGROUND

Near misses in healthcare organisations provide opportunities to learn and improve performance. To date, research efforts have mainly focused on the learning opportunities afforded by adverse events or errors[1–6] or on the reporting of near misses[3 7–9] with less effort applied to the actual learning from these near misses.[10] Yet near misses occur more frequently and so afford more opportunities to learn than the rarer manifestations of sentinel and adverse events.[1–3] It has also been reported that they are infrequently documented and sometimes go unnoticed in daily clinical practice.[5 11] When near misses are not identified or reported, there are missed learning opportunities that may contribute to future risk in patient care as underlying causes of near misses are not being addressed. What remains poorly understood is how individuals in healthcare use near misses as learning opportunities and factors in their everyday work that may enable or impede this learning process.[12] To address this knowledge gap, we undertook an exploratory study to gain insight into the nature of, and contributing factors to organisational learning from near misses in daily practice on four units (two intensive care units, a general medicine unit and an emergency department) and three departments (blood transfusion, pharmacy, and quality and risk management) at one urban teaching hospital.

What we know about organisational learning and safety

Our knowledge related to learning from near misses is derived from key concepts in the safety science and management literature. Within the Safety Pyramid Model, near misses are situated between accidents that result in obvious injury or loss, and less obvious incidents that have the potential to but do not result in loss or harm and occur more frequently.[13 14] In the Eindhoven Model of Incident Causation, near misses refer to occurrences with potentially significant

safety-related consequences that were prevented from developing.[15] A near miss occurs when an initial failure (ie, organisational, technical) or deviation (ie, human) is detected and mitigated, resulting in no harm or negative outcome.[15] By contrast, an error occurs as a result of the initial failure not being detected and/or because of ineffective defence mechanisms.[15]

The nature of organisational learning—or how organisations learn—has been described as a cyclical process whereby individuals scan, interpret and take action to manage tasks and potential safety risks in their daily work environment.[16] Argyris and Schön theorise that organisational learning from errors and failures involves both single- and double-loop learning.[17 18] Single-loop learning describes situations where the individual identifies and corrects an error, but the learning does not extend beyond that individual. Double-loop learning occurs when an organisation learns from the error and changes underlying conditions that contributed to the error. This latter type of learning includes taking action to remove recurring problems that contribute to the organisation's ability to improve performance.[17 18] Tucker and Edmondson extended these concepts into the healthcare context through an observational study involving nurses in nine hospitals.[6 19] They suggest that nurses spend a large portion of their time on problems primarily using first-order problem solving techniques, similar to the concept of single-loop learning. In these 'quick fix' scenarios, nurses identify and fix the problem at hand without taking further action to prevent recurrence.[6] If attempts at solving the problem are not successful, nurses will then ask a nursing colleague for help, and connect with other clinicians as a last resort. Second-order problem solving, or double-loop learning, most commonly takes the form of reporting the problem to management; in Tucker and Edmonson's study, it occurred in only 7% of the observations.

In summary, the single-loop learning or the 'quick fix' approach to correcting failures mainly occurs at the individual human-operator level but it impedes double-loop learning and broader organisational responses. Further, because healthcare requires a high level of interdependence among processes, clinicians and support services, a view of learning that addresses the implications of such interdependence within organisations for learning would be helpful.[20–22] Thus efforts to address this gap in our understanding may provide greater insight into the conditions under which clinicians recognise, act upon and learn from near misses. In this context, the study described in this paper offers insights into the nature of and contributing factors to organisational learning from near misses from a variety of clinicians and administrators in daily clinical practice. Key questions that guide this inquiry are: (a) What are the learning processes associated with near misses? and (b) What are the factors influencing or impeding learning from near misses in healthcare?

METHODS

Study design

A qualitative design using Charmaz's[23] constructivist grounded theory approach was employed for this study. This approach was selected for this study to provide an interpretive understanding of how multiple subjects (a variety of healthcare professionals and administrators) construct their realities (associated with responding and learning from experienced near misses). Within this study, theory was used to guide the development of the research questions and data collection processes. Moreover, emergent themes were compared and contrasted with the sensitising concepts from safety science models (Safety Pyramid Model and Eindhoven Model of Causation) and organisational theory (single-loop and double-loop learning and first-and second-order problem solving).

Setting and sample description

The study was conducted at a large academic health sciences centre. Within the organisation's reporting system and the Institute of Safe Medication Practices (ISMP) Canada's definition, near misses are categorised as potential occurrences, defined as any event or situation that could have reached a person but did not because of chance or timely interception. Consistent with grounded theory methodology, purposive sampling was employed to capture the multiple perspectives of study participants.[23] Inclusion criteria included healthcare professionals who had experience with near miss occurrences and/or administrators who had safety and quality responsibilities within their portfolio/position. As part of a purposeful sampling approach, the principal investigator met with the hospital's Director, Quality and Risk Management to identify the initial round of study participants using the inclusion criteria. From this initial list, an email was sent out to the individuals who were identified as potential study recruits. For those individuals who indicated that they would participate, a meeting was set up at a convenient time at the participating hospital. A snowball technique of recruitment occurred with study participants being asked to identify other potential colleagues to recruit to participate in an interview. The average interview was 30 min in length, with a range from 16 to 55 min. All interviews were conducted, digitally recorded, transcribed and checked for accuracy by the principal investigator.

In total, 25 interviews were conducted with 24 consecutively recruited study participants from February

to November 2008. The 24 participants that were approached all agreed to participate. The healthcare professional group (n=16) consisted of 5 staff nurses, 3 physicians (1 interviewed twice with second interview occurring after a clinical service rotation), 3 pharmacists, 2 advanced practice nurses, 1 technician, 1 dietician and 1 occupational therapist. The administrator group (n=8) consisted of 4 managers, 1 director, 1 educator, 1 analyst and 1 patient safety officer from across different clinical units and departments of an academic health science centre in a large Canadian city.

Data collection and analysis description

An open-ended interview guide was developed that included questions general in nature to enable emergent theory to account for the processes, factors and conditions in the practice environment that are relevant to the study participants.[23] Key questions in the interview guide included: Tell me about a near miss that lead to organisational learning? Tell me about a near miss that occurred in practice but was not reported? What do you think contributes to your organisation's ability to respond to near miss occurrences? What do you think impedes your organisation's ability to respond to near miss occurrences? As part of the interview, the hospital's definition of near misses (derived from the ISMP definition) was provided. Over the course of the study, the interview questions remained the same; however, the principal investigator would use descriptions and examples provided by study participants in answer to the interview questions in subsequent interviews to compare and contrast emergent themes. As part of the theoretical sampling process, the semi-structured interviews occurred in a fluid manner between the two cohorts[23]; that is, the researcher cross-referenced the sample of administrators and clinicians to verify emergent theory for data accuracy and to achieve theoretical saturation.[23] The final sample size for this study was determined by theoretical saturation where no new insights were gained for analysis.[23]

Ethics approval was obtained from institutional research ethics boards at the hospital and the principal investigators' academic affiliation institute. Informed consent was obtained from study participants prior to the interview being conducted. Participants were assigned codes that were used throughout the analytical process. Interview data were analysed using an iterative approach involving four main stages: (a) line-by-line active coding of near misses descriptions; (b) selective and focused coding that elaborated these initial codes and established inter-relationships; (c) memo-writing that explored and elaborated on assumptions, processes and actions subsumed under codes; and (d) theoretical modelling of the relationships among codes, particularly areas of tension between near miss description and learning descriptions.[17–20] Through these phases, the principal researcher was the primary analyst, reviewing analyses with three other researchers in regular meetings. Methodological rigour was pursued through the member-checking process whereby the principal investigator (a) discussed, checked, and cross referenced with study participants key emergent themes and tensions and (b) conducted an audit trail of all analytical decisions, group discussion of tensions and discrepancies in the data.[23] Moreover, the final coding schemas were applied to all transcripts and the analytical memos were part of a larger audit trail included in the final analysis.

RESULTS

Three scenarios emerged around how near misses were experienced and responded to by study participants. The first scenario was characterised as *doing a quick fix* where clinicians would recognise an error and correct it with no further action. Two further, contrasting scenarios emerged—*going into a black hole* where clinicians would report or share the near miss event with administration but receive no feedback or follow-up; or *closing off the Swiss-cheese holes* where clinicians would receive feedback and changes were made from the reported near miss event. Each scenario is described in more detail below with triggers (factors contributing to the scenarios). Table 1 provides an overview of the key themes that emerged describing the three scenarios, triggers and illustrative narrative.

Doing a quick fix

Most of the study participants' examples of corrective action to address near misses involved clinicians *doing a quick fix* and moving on to the next task as part of their routine practice. The quick fix was initiated by the clinician who recognised that something is amiss and who then acted upon the error; for instance, by clarifying an order for medication or nutrition with another colleague. Participants described several examples where a pharmacist would detect and immediately correct a medication order and not report it in the safety reporting system or to the ordering clinician. As a result of such unreported quick-fix scenarios, learning remained local and confined to the individual level. Notably, learning is limited to the individual who initiated the fix, as opposed to the individual who initiated the error. Interestingly, study participants did not acknowledge quick fixes as a source of or an impediment to learning. Rather, these quick fixes to near misses were described as 'routine occurrences in daily practice'. Some participants described taking pride in their ability to implement quick fixes; as a physician noted, 'part of

Table 1 Triggers influencing action approaches

Approach & Defining Characteristics	Trigger(s)	Narrative examples
Doing a quick fix Clinicians recognise an error and correct it with no further action and move on to the next task as part of their routine daily practice.	Managing the pervasiveness of near misses as no harm events amidst competing priorities	'We are inundated with initiatives and expectations and pressures such that something has to give and this has probably fallen off the priority list; people kind of go—well you know what, we are going to manage the stuff that has some consequences first and then we will deal with near misses later.' (Advanced Practice Nurse) 'The number of near misses are potentially high and people just don't report every single thing because that's all they would be doing. Because of the harm factor to patients they see their role as protecting the patient and if something never reached the patient then there's no sense of needing to report it because it wasn't an actual occurrence. They [clinicians] function in a silo as they don't have that broader view of saying if this almost happened here it could happen again and elsewhere. They [clinicians] think in the immediate - this is my shift keep my patient safe.' (Administrator)
	Associating fear and stigma with near misses	'I think they don't want to admit that things can go wrong. I mean you feel bad when things happen, or when you think about the potentials that could happen, and you know you kind of wish that life was perfect and these didn't happen, I think that is a little part of it.' (Nurse) 'There's still a stigma attached to that whole error thing – right, you made a mistake. I wonder if sometimes when you bring stuff like this [near misses] to their attention, they kind of under value it, like it was no big deal or whatever because they don't want to own up to that.' (Dietician)
Going into the black hole Clinicians report or share the near miss event with administration but receive no feedback or follow-up.	Managing the competing priorities (administrators)	'There are certain areas that don't utilize the data so people feel that they go into a black hole and nothing happens. Or they'll have reported four or five times and nothing's done. I think that some managers have trouble managing all the reports and then utilizing the data. They're more focused on having enough staff, getting the patients out in a timely fashion, and they don't have enough time.' (Administrator) 'And it [near miss reported] gets filed away and nobody else knows.' (Pharmacist) 'If you don't get feedback, you don't learn anything. People get fed up bringing the issue to the attention of the manager or the unit director, and it's the same issue that has been going on for the last five years. If you don't close the loop; if you don't promote that awareness in your people, they are going to give up telling you.' (Physician)

Continued

what we pride ourselves in is to be able to get ourselves out of tricky situations.' Similarly, an occupational therapist described why near misses were not reported

> I think people just think 'oh well phew we caught that, let's go on' and you also think of it as 'good for me, you know I caught that' because we do catch quite a few things between allied health professionals and nursing.

Two triggers emerged in the *doing a quick fix* scenario. The first trigger was managing the pervasiveness of near misses as no harm events amidst competing priorities. Study participants referred to not feeling compelled to report near misses, despite their more frequent occurrence than adverse events, as their focus was managing other priorities to keep patients safe. For example, near misses were viewed by clinicians as 'non-harmful events' that 'fall off the priority list' to report amidst providing care to critically ill and complex patients. The second trigger was the stigma and fear associated with admitting involvement in an event that almost harmed a patient.

Table 1 Continued

Approach & Defining Characteristics	Trigger(s)	Narrative examples
Closing off the Swiss-cheese holes		
Clinicians receive feedback and changes are made from the reported near miss event.	Attributing potential for harm and preventability of near miss	'The more significant near misses event would be reported by the senior nurses but also front-line nurses. There is the potential adverse events, the ones that we see, collectively see, as having two properties, one is the greatest threat to a patient. Two, probably that we are able to address because of so an addressable lower-order, or lower severity potential adverse event will receive as much as a less addressable potential adverse event. But the things that we take most notice of and that influence our clinical practice are the single severe adverse events.' (Physician) 'I think that these near miss events that have potential to cause significant harm those are the ones as a group everybody would pay strong attention to.' (Pharmacist)
	Providing leadership and feedback	'It depends on who the staff person on that month. There is a different amount of importance placed on certain things that happened. So I think it depends on, you know at this level who, the staff person is putting you know putting the flavor on for the month on how important things are how they aren't. How that person perceives the event because if they don't, I find other people blow it off too.' (Dietician) 'Getting them [clinicians] engaged in making the improvements. I'm trying to make the connection for them into what happens and it's the daily follow-up, daily feedback, hard-slogging kind of work and I think that is my predominant role right now.' (Administrator)

For example, one nurse described that clinicians feel bad when they make a mistake and do not want to admit it as they might look bad to other colleagues. An advanced practice nurses described that near misses are not part of a safety culture, as noted:

> We don't have near miss in our culture yet. I don't think we do. I think that we need to, I believe it's important. I still don't think that we talk about those near misses as much as we should.

Going into a black hole

The second scenario involved reporting near misses but not hearing back from management; study participants referred to this lack of follow-up or feedback as *going into a black hole*. The absence of feedback from reported near misses was perceived as a major barrier for learning and deters clinicians from reporting further near misses. One administrator described clinicians as 'feeders of information' as they are not included in the formal review of the incident at the corporate level. This second scenario included examples of clinicians who reported the near misses but who were not involved in the review process. With this scenario, the perception of the frontline clinicians was that action related to the near miss event remains at the local level.

The key trigger for this scenario was the managers having to deal with competing priorities. Study participants described that managers had difficulty staying informed of the reported near misses amidst other priorities and they tended to focus instead on operational duties and on events that harmed patients. Study participants also recommended that organisational learning from near misses would be enhanced with more diligent follow-up from management on reported near misses including what actions and preventive steps are recommended or were put in place. As one pharmacist suggested,

> An immediate instruction [related to reported near misses] of those involved by management, a monthly summary for that area involved, trends and improvements, immediate changes if necessary for relocation of stock and provision of more staff during busy times.

Closing off the Swiss-cheese holes

Closing off the Swiss-cheese holes was language that a small number of participants used to describe the third scenario where feedback was received on the reported near miss event and corrective action (eg, change in practice or policy) was taken. The reference to Swiss-cheese holes in this context referred to James Reason's Accident Causation Model or so-called Swiss-cheese

model[24] that is the symbolic representation of how errors (ie, active failures) occur and are compounded by an alignment of latent conditions (ie, 'holes'). In the current study, many participants perceived near misses as valuable learning opportunities and offered suggestions to enhance organisational learning from near misses. This is noted by the following excerpt by a clinician:

> If we can identify [near misses], then we can anticipate some of the issues arising and then we can proactively start to strategize around how to minimize or eliminate those risks from our system. We have to close off the Swiss-cheese holes.

The learning opportunities reported included: increased awareness of near misses as important safety events that should be detected and reported; and more diligent follow-up from reported near misses. In the *closing off the Swiss-cheese hole* scenario, clinicians feel safe and share with colleagues or report to managers that a near miss had taken place. In turn, the colleagues (other clinician or resource nurse) or manager (clinical or risk) share feedback and make sense of the event with the clinician to facilitate learning. Learning also occurred when near misses were reviewed at committees or at staff meetings and when disseminated through communication channels (eg, email alerts and newsletters). Only a few examples were provided where clinicians and administrators perceived any change in organisational policy and practice; for instance, study participants described the development and implementation of safeguards (eg, corporate policy on flagging children on heparin to avoid or minimise complications from invasive procedures) and a double-check policy (or checklists) as a result of near misses reporting.

Triggers for *closing off the Swiss-cheese holes* included that, as part of the review process of reported near misses, administrators would weigh the potential for severe harm with the ability to prevent similar near misses from occurring again. These types of near misses were more likely to be reported in order to influence subsequent corrective action. In the examples where learning was perceived to occur, leaders played a pivotal role in encouraging near-miss reporting. Their role included acting as a liaison between different areas in the hospital and engaging staff by providing feedback and making the improvements associated with the reported or observed near miss.

Discussion

All study participants reported valuing near misses as key learning sources. However, in the examples provided, analysis reveals that the predominant scenario to responding to near misses was *doing a quick fix*. Similar to the Safety Pyramid Model explanation, near misses were reported to occur more than adverse events in this study; however, their frequency and non-harmful nature served as triggers to *doing a quick fix* and rendered them less likely to be reported than adverse events. In this scenario, clinicians opt for *doing a quick fix*, similar to recovering an initial failure in the Eindhoven Model of Incident Causation[15]; single-loop learning[17 18]; and first-order problem solving explanations, amidst the competing priorities inherent in daily clinical practice and work routines. As the focus within this scenario is on immediate problem-solving and individual vigilance to emergent issues, the potential for learning is limited to the individual who did the *quick fix*.[6 17–19] Thus, the *quick fix* scenario appears to be a type of ritualistic and patterned response to risk which favours short-term reactive responses on the part of the individual, as opposed to more systematic learning within organisations.[25]

There was a sense of taking pride in *doing a quick fix*, as it demonstrated competence, which is similar to how nurses described validation of competence associated with their ability to fix and correct problems.[6] In this study, although a *quick fix* is not ideal for creating an organisational learning opportunity, the *quick fix* may serve an important role in preventing an error from happening and mitigating the effects of a recovered error. This finding builds on previous work that suggests that the capability of clinicians to be vigilant and monitor for potential threats and errors underpins the prevention and mitigation of error.[26–28] Interestingly, study findings also showed that fear of being perceived as incompetent was a key reason why clinicians did not want to share near-miss events with colleagues or management. The fear of being viewed as incompetent and thus not reporting errors is consistent with how psychological safety can impede organisational learning.[20] In psychologically unsafe environments, people believe that if they make a mistake and/or ask for help, information or feedback, others will penalise or think less of them.

The lack of feedback or *going into the black hole* reported by study participants was not the anticipated outcome of the communication structures and processes that the organisation involved in the study had put in place to enhance reporting and learning from near misses. As outlined in the results, the competing priorities that health professionals encounter limits their ability to prioritise this reporting and learning over other daily tasks. This finding supports the safety-science literature that points towards the role of competing priorities that dictate what gets attention, or becomes salient, at both individual and organisational levels.[29 30] Recently, it has been posited that centralised organisational learning systems tend to reflect priorities of management and neglect those of clinicians to the detriment of substantial service improvements.[25] This disconnect between the

fear of being viewed as incompetent, and the competing priorities of management and clinicians all align to create an environment that is not conducive to organisational learning from near misses.

The *closing off the Swiss cheese hole* scenario is similar to the double-loop learning[17 18] and second-order problem solving[6 19] explanations whereby corrective action is taken as a result of the reported near miss. The key roles that the clinical and quality managers and resource nurses have in this scenario are consistent with the concepts of boundary spanners[31] and information brokers[32] in organisations. This is similar to the findings of a recent review of the literature that reported a primary role of middle management is to filter, frame and enrich interpretations of events to enable organisational learning[33] and a study exploring the important role of formal organisational leadership in learning from reported safety events, including near misses.[10]

IMPLICATIONS FOR PRACTICE

Study findings have important implications for organisations in their efforts to address the disconnect between the espoused view of near misses as learning opportunities at an organisational level and the practice reality view at the individual level of *doing a quick fix* or *going into a black hole*. When addressing this disconnect, organisations will need to pay closer attention to the different triggers associated with enabling and impeding learning from near misses. Moreover, the frequency of near misses in daily practice does make it impractical for clinicians to report every near miss, or for organisations to respond to every reported near miss. As well, hospital systems cannot gather exhaustive and detailed knowledge about all clinical risks that occur.[25] Thus, organisations will need to employ what Reason[34] described as 'error wisdom' and determine which near misses are appropriate to be responded to as *quick fixes* and which ones require further action at the unit and corporate levels. Hence, organisations need to develop processes to identify and focus on opportunities to positively impact high risk and preventable near misses in clinical practice. As part of this focus, healthcare leaders will have to be more active and selective in their pursuit of reporting and explore other mechanisms beyond formalised reporting to leverage near misses as learning and improvement opportunities.[21 22 34 35]

Collective attention must be present across the individual, unit or clinical microsystem and organisational levels: (a) at the individual level, learning most often occurs when near misses are perceived to be potentially harmful and preventable; (b) at the unit or clinical microsystem level, the clinician who detects the near miss shares it with a colleague (manager or resource nurse) and is then encouraged by the colleague(s) to report it through the hospital-wide reporting system; (c) at the organisational level, management engages the clinicians who report near misses in the review process to determine further corrective action and makes changes that inform organisational policy and practice. For example, organisations can introduce response mechanisms that enable managers to respond to and proactively manage near misses that clinicians report by optimising the use of electronic reporting systems to include automated reports on near misses.

Further learning from near misses can occur if administrators leverage existing structures or create new ones to communicate the potential for risk or harm to patients from a similar near miss occurring in the future at organisational and local levels.[25] For example, near misses could be included on the agenda for clinical unit-specific morbidity and mortality or corporate-wide patient safety rounds. A key part of the discussion could focus on how the near misses were detected and responded to and what potential risks near misses pose.

Limitations

The single-institution context for participant sampling in this study constrains the generalisability of the results. A second limitation is that a snowball technique was employed to yield a convenience sample of healthcare professionals and administrators from a single academic health sciences centre, therefore sampling bias may have occurred. A third limitation is that interview data confines the analysis to what people report or their perceptions associated with the phenomenon under inquiry and not by direct observation. Study participants may have offered a socially desirable response or forgotten details around the near misses in their daily practice.

CONCLUSIONS

Our study revealed that there are different learning scenarios and triggers associated with responding to and learning from near misses in daily clinical practice. This suggests that there are different approaches to enable learning from near misses for organisations to consider in their safety efforts. To mitigate the undesirability of 'going into a black hole' with no feedback provided, organisations will need to determine which near misses are appropriate to be responded to as 'quick fixes' with informal feedback provided to those involved and which ones require further action at the unit and corporate levels and employ multi-pronged approaches to leverage learning opportunities from near misses. Clearly, more empirical work is required to elucidate how to maximise learning from near misses in healthcare at the individual clinician, clinical unit and hospital wide levels.

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