

# Patient Safety Learning Pilot: Narratives from the Frontlines

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## Abstract

Although patient safety experts have focused on event reporting and on the role of sensemaking and human factors in learning from events, there has been little study of how these factors are received and used by frontline hospital workers. Consequently in 2003, the Centers for Medicare & Medicaid Services—in collaboration with patient safety experts and the Agency for Healthcare Research and Quality—designed and implemented a patient safety improvement prototype in four hospitals. The prototype included an event reporting system (the Medical Events Reporting System - Total HealthSystem [MERS-TH]); use of collective sensemaking to maximize learning from events; and a focus on the role of human factors engineering in understanding events and in finding remedies for the causes of system failures. Study findings showed that both the MERS-TH methods and tools and collective sensemaking were extremely useful to frontline hospital workers for increasing learning from events. In addition, although frontline workers came to understand the value of human factors engineering in reducing patient harm, they were faced with limited access to this expertise at the community hospital level.

## Introduction

The organization and delivery of health care is complex. This complexity includes the delivery of care in the organizational context<sup>1, 2</sup> of hospitals, as well as that associated with the increasingly complex clinical diagnostic and treatment practices involved in caring for patients.<sup>3</sup> Complexity magnifies the opportunity for inevitable human errors to cause harm to patients.<sup>4</sup> Therefore, a central theme in improving patient safety requires addressing this complexity.

To date, a number of approaches, methods, and tools have been developed to improve patient safety in hospitals. These include, but are not limited to, retrospective methods—such as the reporting and investigation of events and making sense of the findings of these investigations—and applying human factors engineering principles to understand human and system failures and using this information to design improvements. Although patient safety experts have paid considerable attention to designing and planning for the implementation of these methods, how these methods have been received, interpreted, and used by health care professionals working on the frontlines of care in hospitals has been less well-studied.<sup>5, 6, 7</sup>

In 2003, in order to further our understanding of this component of patient safety, the Centers for Medicare & Medicaid Services (CMS), in collaboration with experts from the Agency for Healthcare Research and Quality (AHRQ) and external patient safety experts, designed a patient

safety improvement prototype, the Medicare Patient Safety Learning Pilot (PSLP). The prototype was designed to include event reporting and principles from the sensemaking and human factors engineering disciplines.

Herein, we describe the components of an intervention, the patient safety improvement prototype, and its implementation in four hospitals. Our assessment of how the components of the prototype were received, interpreted, and used by health care professionals is presented in the form of narratives. These narratives were collected from health care professionals working on the frontlines of clinical microsystems within the hospitals.

## Methods

In designing and implementing the Patient Safety Improvement Prototype, our interest was in learning more about how three of the components of the intervention were interpreted and used by frontline workers in four selected hospitals. In this section, we describe the qualitative data collection and analysis methods<sup>8</sup> used to assess how the intervention was received, interpreted, and used by health care professionals working on the frontlines of clinical microsystems within the hospitals.

### The Patient Safety Improvement Prototype

The patient safety improvement prototype included the following components:

- The Medical Events Reporting System-Total HealthSystem (MERS-TH), a reporting system that facilitates process improvement through systematic collection, prioritization, investigation, classification, interpretation, and monitoring of information about near-miss and actual events.
- Methods designed to make sense of near misses or actual events.
- Methods designed to assure that knowledge gained from event investigations and recommendations for improvements are informed by principles from human factors engineering.
- A method for implementing organizational changes.
- Methods for engaging hospital leadership to support clinical microsystem staff.<sup>a</sup>

### Medical Events Reporting System: Total HealthSystem (MERS-TH)

MERS-TH is an expanded version of the Medical Events Reporting System for Transfusion Medicine (MERS-TM),<sup>9, 10, 11</sup> developed with funding by the National Heart, Lung, and Blood Institute for use in transfusion medicine. AHRQ funded expansion of MERS-TM to MERS-TH for use in all domains in health care. MERS-TH is a unique reporting system, since it is also a comprehensive error management system.

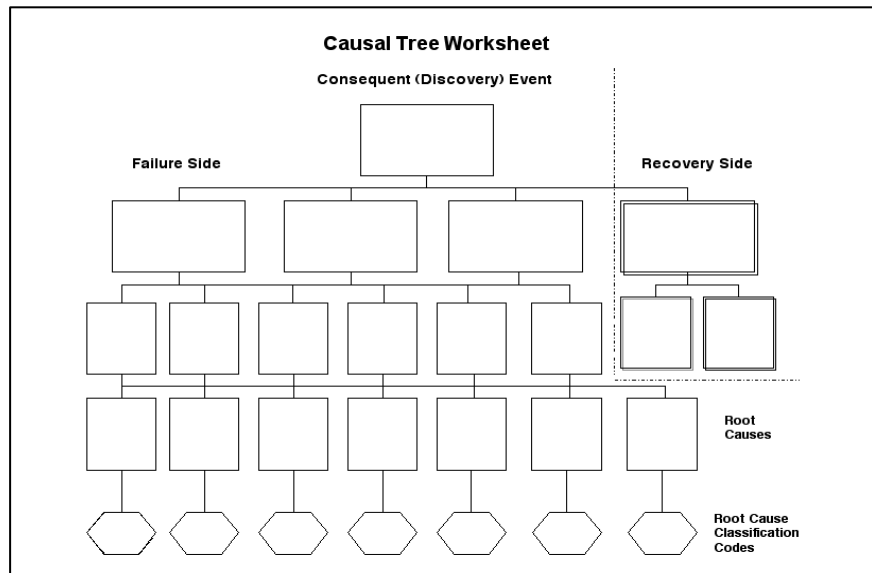
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<sup>a</sup> Although we describe the methods for implementing organizational changes and for engaging hospital leadership, we do not report findings on these two components in this report.

MERS-TH has several components. Initially, errors are detected by hospital staff who complete Event Registration and Event Discovery forms in a Web-based database. Appropriate managers and quality assurance or quality/performance improvement personnel are notified of the event via an email containing a link to the event. The manager completes a brief form, and the quality assurance (QA) specialist codes the event type and analyzes a software-generated risk assessment. The QA staff then queries the local database to see if there are similar events that have already been fully investigated.

If matching cases are identified, rather than repeating the causal analysis, the new event is linked to the prior event, and the causal codes are shared. If the new event has not been seen before or is unique, the QA staff carries out an expanded investigation. Based on permissions, events entered into the local database may be accessible for multi-institutional analysis. In this project, however, we used only a local, hospital-based electronic MERS-TH database.

The expanded investigation includes a root cause analysis, which is supported with a visual representation—the “causal tree” (Figure 1). On the failure side (Figure 1), the causal tree, which is constructed retrospectively, represents a map of how the antecedent activities and their root causes unfolded over time to contribute to the consequent or discoverable event. In cases in which there was recovery, as in a near miss, the antecedent activities and decisions provide significant information as to how the recovery occurred. Although it may appear that there is a single root cause, the most fruitful learning comes from a consideration of the combinations of the root causes.<sup>9</sup>



**Figure 1.** A blank causal tree worksheet, which is used to draw, chronologically, the critical antecedent activities and decisions that lead to an event and possible recovery. Available at: [www.mers-tm.net/support/codes\\_tools/form\\_CausalTree\\_blank.html](http://www.mers-tm.net/support/codes_tools/form_CausalTree_blank.html)

Next, root causes are coded using a medical version of the Eindhoven Classification Model.<sup>12</sup> The Eindhoven Classification Model—informed by principles from the human factors discipline and organizational sciences—focuses on three categories of causes of events: technical, organizational, and human.

## **Sensemaking**

“The concept of sensemaking is well named because, literally, it means making of sense,” notes Weick.<sup>13</sup> Several recent publications have highlighted the role of sensemaking in improving patient safety.<sup>14, 15, 16, 17</sup> Sensemaking has to do with the way we interrupt our day-to-day activities when we are confronted with an unexpected event and how we pay attention to the reasons for such an event. We want to know why the unexpected event happened so that we can resume our interrupted activity.<sup>17</sup> Insofar as mistakes or errors can be considered to be unexpected disruptions, those confronted with disruptions engage in sensemaking in order to continue their work. This “sensemaking” affords an opportunity for us to learn from mistakes, particularly when individuals share their sensemaking experiences. Sharing how we make sense of events helps reduce individual biases that come into play during our retrospective reconstruction of events. Hence, sensemaking enlarges and deepens our understanding of the underlying causes of the events. Although on the surface sensemaking seems like a simple process, we are just beginning to understand its significance in improving patient safety.

## **Human Factors Engineering**

Human factors engineering is the discipline focused on understanding how the limitations, characteristics, and capabilities of humans should be central considerations in the design of tools, machines, and systems.<sup>18</sup> Human factors engineering uses concepts from other domains such as anthropology, biomechanics, cognitive psychology, and organizational theory.<sup>18</sup> Understanding the causes of events and near misses and how to avoid the harm they cause to patients requires knowledge of human capabilities and limitations. This knowledge moves us from surface level understanding to the next level—i.e., the place where we need to be to make meaningful changes that could improve patient safety.

## **Implementing Recommended “System” Changes**

Although we do not report findings in this paper on how frontline workers received the component on implementing system changes, it is important to note that it was included in the prototype. Improving patient safety involves change, including how we view and organize our work in caring for patients. Although we included the Institute for Healthcare Improvement’s (IHI) rapid cycle improvement methodology<sup>18</sup> for implementing changes required during this project, it is important to note that those who work in patient safety are more conservative about change than has been the case in quality improvement. Patient safety experts are schooled in human factors engineering and organizational sciences, and thus they are acutely aware of the potential for unintended negative consequences of surface changes in complex systems. Because complex organizational systems are resistant to superficial changes, it is important to base system changes on a deep understanding of the causes of events.<sup>20</sup>

## **Engaging Hospital Administrative Leaders**

Although this paper does not report on how this component of the patient safety improvement prototype was received by health care workers, it is important to note that it is a component of the prototype. We viewed engaging hospital administrative leaders as essential to supporting and sustaining any improvements made in the clinical microsystems. In addition, double-loop learning, essential to developing a learning organization, requires engagement of organizational

leaders.<sup>19</sup> We intentionally cultivated participation by hospital administrative leaders in this project, including, but not limited to, use of the IHI's Executive WalkRounds.<sup>20, 21, 22</sup>

## **Patient Safety Improvement Prototype: Intervention Implementation**

Given our interest in frontline hospital staff, we chose to implement the prototype within clinical microsystems.<sup>23, 24, 25</sup> Although at one level of analysis we tend to think of health care workers as carrying out their work in large and complex organizational settings, most of their work is done in small clinical microsystems. These microsystems include small groups of health care professionals providing care on a day-to-day basis for defined patient populations.<sup>25</sup> In addition, the patient safety improvement prototype was implemented using the IHI's collaborative model, with three learning sessions and action periods between the learning sessions.<sup>26</sup> The action periods were supported with biweekly calls to participating hospitals.

The Medicare Quality Improvement Organizations (QIOs) in Indiana and Wisconsin solicited participation of the four hospitals included in this report. A third QIO in Utah, provided additional support for the project. As a component of their selection for participation, administrators at each of the four hospitals were asked to read and concur with the principles included in the "just culture."<sup>27</sup> In addition, they were asked to support their clinical microsystem staff throughout their participation in the project, to attend the three learning sessions, and to install the local MERS-TH electronic database.

## **Qualitative Methods**

Because our primary interest involved learning more about the way hospital frontline staff thought about and used the reporting system, sensemaking, and human factors, we used qualitative methods to collect narrative data throughout the project. Data sources included:

- Hospital presentations at the three learning sessions.
- Notes from biweekly telephone calls with hospitals during the action periods.
- Notes from sensemaking and human factors consultation visits to hospitals.
- Written responses to open-ended items (included in a data collection template) that were discussed during telephone calls with hospitals at the conclusion of the project.

## **Narratives from the Frontlines**

Characteristics of the hospitals, their participating clinical microsystems, and their project aims and goals are summarized in Table 1. In the process of implementing the prototype, each participating hospital formed a project team with members from administration, the patient safety and quality improvement staff, and the clinical microsystem. In addition, the teams included the pilot project lead from the QIO, who played a largely educational role with regard to the components of the patient safety improvement prototype.

The MERS-TH local software was installed within the context of the hospitals' existing reporting systems, which are described in Table 2. Two characteristics common to the existing reporting systems in the four hospitals are of note: limited involvement of frontline staff (i.e., those who may have been the first to discover the event) in active discussions of the findings of

the event investigation, and the absence of a systematic classification system for the causes of events.

The extent to which the existing reporting systems captured near misses on a regular basis was unclear. Each participating hospital entered events in the MERS-TH database for their respective clinical focus areas. The number of events entered and the number of full investigations carried out over a 6-month period for each clinical focus area, respectively, were: anticoagulant management, 55 and 3; pain medication management, 42 and 4; medication management in the pharmacy, 240 and 3; and fall prevention, 55 and 2.

## **Noticing, Reporting, and Learning from Near Misses**

We had considerable focus on near misses throughout the project, which was somewhat new for the participating hospitals. As noted in the two narratives below, although microsystem staff noticed near misses, they expressed hesitancy in reporting them.

“At Hospital C, a major challenge in implementing the patient safety pilot program was nurses’ explicit identification of near misses. Nursing has historically found the role of patient advocate to be at the core of care. Coordinating patient care in a manner that promotes patient safety is an intuitive component of this advocacy role. As such, nurses continuously monitor past, current, and upcoming aspects of their patients’ care and automatically address the issues they recognize to be placing their patients’ safety at risk. When asked to identify recovery steps involved in near misses, our nurses struggled to do so. To address this problem, the pilot team revisited the definition of a near miss. Based on this definition, they then asked staff to report any pain medication-related activities that did not result in an adverse outcome, but left them with an ‘Oh my goodness!’ feeling. Even with this new advice, the volume of near-misses remained low. Another factor leading to the low numbers of identified near misses was that team members acknowledged their difficulty in taking time away from patient care to complete their near-miss reports. This became evident when staff were asked for examples of near misses, and they readily recalled recent near misses. As a consequence, our team began to look for opportunities to encourage dialogue with staff so that near misses could be captured in verbal reports. Our future plans include a focus on verbal reporting of near misses during our safety rounds.”

“At Hospital A, pharmacy staff knew that near misses were more frequent than actual events, but they rarely reported them because they felt that the recoveries that occurred in near misses were evidence of an effective drug distribution system.”

**Table 1. Characteristics of hospitals and their clinical microsystems participating in the Patient Safety Learning Pilot Project, 2003-2004**

Hospital	Description	Clinical microsystem	Clinical focus	Aim
A	Community hospital with 250 operating beds	<p><b>Hospital pharmacy</b></p> <ul style="list-style-type: none"> <li>• Open 6:00 AM-12:00 AM, 7 days/week.</li> <li>• Between 12:00 AM-6:00 AM, shift director is available; a pharmacist is available by pager.</li> <li>• Staffed by 19 full-time equivalents.</li> <li>• Dispenses 2,800 medication doses/day on average.</li> </ul>	Reduced medication errors originating in the pharmacy	<ul style="list-style-type: none"> <li>• To improve medication safety through increased reporting of near-miss events.</li> <li>• To reduce patient harm by analyzing near-miss events and implementing system changes based on the results of these analyses.</li> </ul>
B	Community hospital with 451 operating beds	<p><b>Orthopedic and neuroscience unit</b></p> <ul style="list-style-type: none"> <li>• 42-bed unit with 24 private and 18 semi-private beds.</li> <li>• Utilizes a total care model evenings and nights and a care partner model during day shift.</li> <li>• Computerized charting system.</li> </ul>	Reduced patient falls	<ul style="list-style-type: none"> <li>• To promote a culture of safety by encouraging reporting of near-miss falls.</li> <li>• To identify and implement interventions and strategies to reduce patient falls and harm.</li> </ul>
C	Teaching, tertiary care hospital with 504 operating beds	<p><b>Acute surgical care unit</b></p> <ul style="list-style-type: none"> <li>• 48-bed acute surgical care unit providing postoperative care for thoracic, abdominal, and general surgical patients.</li> <li>• Experienced a higher than usual rate of managerial and clinical staff turnover than in previous years.</li> </ul>	Pain medication management (primary problem cited by unit staff)	<ul style="list-style-type: none"> <li>• To promote effective, efficient medication utilization in pain management to assure that patient-centered care is provided in a safe and timely manner.</li> </ul>
D	Community hospital with 181 operating beds	<p><b>Medical-surgical floor</b></p> <ul style="list-style-type: none"> <li>• 21-bed unit with a mix of patients with a diverse group of surgical and medical diagnoses.</li> </ul>	Managing anticoagulant therapy	<ul style="list-style-type: none"> <li>• To improve anticoagulation therapy using rapid cycle improvement based on findings of root cause analyses and sensemaking sessions, enhanced by fostering a just culture.</li> </ul>

**Table 2. Description of existing reporting systems and practices in hospitals participating in the Patient Safety Learning Pilot Project, 2003-2004**

Hospital	Existing reporting system description
A	<p>“The staff member who first becomes aware of an event completes a written report, which is sent to the Risk Management Department where reports are entered into a database (Midas) for trending and investigation. Trending and investigation reports are produced through the Midas system. Medication errors are voluntarily reported by the health care provider who discovers the event using the Medication Error Report Form. Reporting of both near miss medication events and events that reach the patient are encouraged. Reports are forwarded to the Director of Pharmacy for investigation as well as for entry into an Access® database for trending and reporting. Reports are taken to the Medication Safety Committee and the Pharmacy &amp; Therapeutics Committee for review. System changes are made as issues are identified.”</p>
B	<p>“The staff member who witnessed the event usually completes a handwritten report outlining the details. This report is given to the Manager of the department/unit for immediate investigation and resolution. A copy of the report, along with information from the investigation and actions taken are sent to the Safety Office, where information is entered into a database. The managers and administrators of departments/units receive quarterly reports.”</p>
C	<p>“A diverse incident reporting structure has been developed in an effort to optimize the reporting of actual and near-miss events. The main method used to report incidents consists of a paper incident report, which is completed by the involved staff members at the time that the event is recognized to have occurred. This report is then sent to the supervisor of the areas to complete a more in-depth review of the events surrounding the incident. Finally, the report is sent to the hospital’s risk manager. Additional methods include a telephone hotline for the reporting of adverse drug events and retrospective review of the clinical record for documentation of evidence of an adverse event.”</p>
D	<p>“The reporting system is computer-based and uses both direct online reporting and paper reports; the paper reports also generate information for online data entry. Most clinical units have access and are trained to do online reporting. The online entry is response-defined: responses are requested based on the type of incident initially selected in a table of incident types. Incident types include medication errors, falls, procedure-related incidents, patient care-related incidents, treatment-related incidents, equipment-related incidents, lost/broken patient articles, and other. The response requests are triggered by the initial type selection. Control charts are utilized to monitor trends and processes in using the incident reporting system to channel quality improvement initiatives.”</p>

Note: Hospital A = 250-bed community hospital; Hospital B = 451-bed community hospital; Hospital C = 504-bed teaching, tertiary care hospital; Hospital D = 181-bed community hospital.

Narrative descriptions provided by \_\_\_\_\_ .



The value of noticing and reporting near misses is two-fold: one, it helps us to understand the causes of the failures to the point of recovery; and two, we can better understand the recovery process itself.<sup>20, 28, 29</sup> However, it would appear that focusing more on the recovery side of near misses than on their potential for patient harm may have the unintended consequence of reducing staff motivation to report near misses. As Sutcliffe has noted, “The capacity for learning and the accumulation of knowledge is directly affected by how potentially dangerous events are interpreted and categorized.”<sup>5</sup>

Noticing, reporting, and investigating near misses in the pharmacy are of particular interest. The pharmacy is responsible for transcribing and dispensing drugs in a complex medication process that originates with prescribing by the physician prior to the pharmacy work and ends with administration after the pharmacy steps. That is, recovery from near misses in the pharmacy may uncover system vulnerabilities outside the pharmacy, as well as in the pharmacy.

Tamuz et al<sup>6</sup> reported that, although labeling near misses in the pharmacy as “interventions” rather than as reportable incidents increased learning in the pharmacy, when the error was made by a physician during the prescribing process and was intercepted by the pharmacist, the incident was not entered into the hospital reporting system. Hence, an opportunity to learn from the event was limited. One limitation of implementing the patient safety improvement prototype within individual microsystems is that our narrow focus caused us to omit significant “interdependencies” within the hospital context.<sup>30</sup>

As noted in the narrative from Hospital C, nurses were hesitant to take time away from patient care to report near misses. When asked in meetings to recall near misses, though, they were able to do so. This highlights the difference between noticing and reporting. As noted by Hospital C:

“When a nurse has to make a choice between filling out a report or meeting a patient need, then the patient need should take precedence.”

As Tucker has noted, production pressure may cause health care professionals to participate in “first-order” problem solving, in which short-term remedies are used to “patch” problems. This leads to omission of “second-order” problem solving, in which more long-term solutions seeking to change underlying causes of the problems are implemented.<sup>31</sup> First-order problem solving, as well as dependence on individual vigilance, is illustrated in the following narrative:

“At Hospital C, our staff leader, Sue, caught a near miss, in which a patient she was discharging was prescribed a pain medication for home use that had not been administered during the patient’s hospitalization. This meant that there had been no prior testing of the effectiveness of this medication for pain management in this patient. Sue contacted the surgeon discharging the patient and noted the problem. As a consequence, the prescription was changed to be consistent with the pain medication the patient had received while in the hospital. Sue was so effective in communicating this example to others on the team that subsequent to her communications about this event to others, close scrutiny revealed that pain medications being prescribed at discharge were consistent with those provided during hospitalization.”

Balancing the immediacy of patient care with concerns about factors “upstream and downstream”<sup>5</sup> is an ongoing challenge in event reporting. This was echoed in the wisdom of a summary statement by an administrative staff member at Hospital C:

“Finding a methodology that allows staff to report these important events without taking away from patient care is the challenge that we all need to address.”

This tension among frontline workers between taking care of patients’ needs and taking steps to learn from near misses and events is not likely to go away. As noted in this narrative, we will need to find a way to address this issue if we are going to improve patient safety on the frontlines of health care.

### **Near Misses: Investigating Recovery and Near Failure**

Recovery, whether planned or unplanned,<sup>28</sup> is an important component of learning from near misses. Recovery is illustrated in the narrative below:

“At Hospital D, we identified a near miss in which a patient’s coumadin was put on hold for several days. To alert the patient’s physician, the patient’s chart was stamped with a reminder for the physician that the patient’s coumadin had been put on hold. As a consequence, the physician wrote an order for the patient to resume receiving coumadin. However, the physician’s order was not transcribed. This meant the order for coumadin was not placed on the electronic medication administration record (eMAR), and hence, the pharmacy did not send the patient’s coumadin to the unit. The RN coming on the p.m. shift, however, reviewed the patient’s anticoagulation flow sheet and noted the discrepancy between the patient’s status as being back on coumadin on the anticoagulation flow sheet but not having any coumadin on the unit to administer to the patient. Upon further investigation, she discovered that the physician’s order for coumadin had not been transcribed. As a consequence, she implemented prompt recovery by getting the coumadin from the pharmacy, assuring that the patient received the coumadin on time as ordered by the physician.”

This was an unplanned recovery by a nurse who was vigilant, or mindful, in her practice. What is particularly noteworthy, though, is that the Hospital D project team did not stop with understanding the recovery. Rather, they moved to understand the causes of the process failures that had occurred and made the recovery necessary.

“What points in the system failed and led to this near miss, in which this patient would not have received the prescribed coumadin therapy? ...As we entered our investigation of the near miss into the (MERS-TH) database, the experience of walking through the consequent event and retrospectively through the antecedents gave us a clear picture of the unfolding of the trail of antecedent activities and decisions that led to the discoverable event. ... Based on the MERS Eindhoven Classification Model, contributing factors included latent organizational issues as a consequence of a newly implemented eMAR change. These changes included the complexity of the procedure itself and staff adjustment to the changes. A component of the change was that the transcribing process was shifted from the clinical unit to the pharmacy department. This modification in

workflow required considerable staff adjustment.... As we continued to move through the MERS event investigational process, we focused on antecedent activities and decisions occurring at the pharmacy. The failure to transcribe the order occurred at the pharmacy, largely due to lack of pharmacy understanding of the procedural changes. Due to the learning curve associated with the changes in the eMAR, it was difficult to determine if inattention or technical performance had contributed to the transcription failure. As we worked through the investigation and assigned the Eindhoven Classifications codes to the root causes, we gained an appreciation of the process involved in bringing our understanding of the near miss to a level of objective study of error. This objective understanding brought us a feeling of shedding the sense of blame that had at times been prominent in past event investigations. In addition, the process helped us focus on developing more substantial strategies for safeguarding our system. By working with the MERS-TH system, it both demanded and enabled a change in our basic thinking. Organizing the event retrospectively through the antecedents and then asking the “why” questions were new for our staff. The process of retrospective reconstruction of event antecedents and root causes generated an overall systems-thinking approach to event detection and investigation.”

Moving from understanding recovery to learning from the failure to the point of recovery is likely to increase the harvest of knowledge from near misses. This narrative also illustrates investment in the investigation required for second-order problem solving.<sup>31</sup> In addition, the investigative process, as well as the Eindhoven Classification Model, appear to have gained a strong foothold in the minds of frontline workers. Expanding health care workers mental models in this way is likely to increase what they notice in terms of system vulnerabilities.

## **Collective Sensemaking**

Dr. Nancy Dixon visited each hospital to conduct a collective sensemaking session. A narrative from a pharmacy staff member at Hospital A illustrates how the collective sensemaking session was received by hospital staff:

“We were introduced to the concept of sensemaking at our initial meeting of the PSLP in Salt Lake City in April 2003. With subsequent learning sessions and reading, I thought I had a good understanding of this tool of sensemaking. I later found that, until I actually experienced it in action, I never completely understood the insight and value the addition of collective sensemaking could lend to the expanded investigation of an event. With the externally facilitated collective sensemaking session by Dr Nancy Dixon in November 2003, as I was standing in front of my peers, I quickly realized that, although I understood the sensemaking concepts intellectually, I was unsure of how to proceed with facilitating an actual collective sensemaking session. I was getting my root cause investigation techniques confused and intermingled with the collective sensemaking of the findings of the root cause investigation. In addition, I tried to direct the group and individuals instead of soliciting their opinions and perceptions in making sense of the events. Because of this experience, I no longer felt confident in using this tool of collective sensemaking. However, my perception changed as I facilitated a second sensemaking session. At this second sensemaking session, the group sat in a circle. We asked that group members share their personal experiences with errors. This exercise was

valuable in demonstrating to everyone present that we were all on equal footing. Prior to the second meeting, a causal tree for an actual near miss had been constructed and placed on Post-it® notes. These notes, representing the chronological antecedent activities and decisions and root causes for the near miss, were presented to the group. Although discussion of the near miss evolved slowly, members of the group began to open up and more freely discuss the event. Members began to question one another. It became clear to me that the members were trying to make sense of each other's reasoning and contributions. Suggestions for preventing future events were offered, and we collectively developed an action plan. In the end, I felt great satisfaction knowing that the discussion did indeed go beyond the surface understanding of the near miss. In addition, hospital administrative staff present in the group reported that they had gained new insights into the different workflow processes within the pharmacy clinical microsystem. The amount of participation by all members also assured me that the meeting was successful in providing a tone of learning and not blame or defensiveness.”

Four issues emerge from this narrative:

- First, the topic of this planned collective sensemaking activity was a near miss that had been fully investigated, with the findings visually represented on a causal tree. As noted by Kaplan<sup>14</sup> and Battles,<sup>15</sup> the causal tree in MERS is a powerful tool for organizing event information for use in collective sensemaking. As such, it offers an opportunity for making individuals’ thinking about event causes explicit and hence, shareable. However, as pointed out by Weick,<sup>17</sup> the extent to which individuals must hold a common sense in order to act remains open to question.
- Second, the focus shifted from attempts to discover the “right” causal tree to participants questioning others to learn how they had made sense of the event’s causes. That is, the event was brought into being and infused with meaning through the social process involved in the sensemaking session.
- Third, the sensemaking led to a deeper understanding of the causes of the event. As individuals shared their own sense of the event, their multiple interpretations and meanings enriched the collective understanding of the event.
- Fourth, consistent with sensemaking being about the “interplay of interpretation and action,”<sup>17</sup> the activity resulted in an action plan.

## Human Factors Engineering

Human factors educational sessions were convened at each of the three learning sessions. In addition, staff from the Utah QIO, with expertise in human factors, visited each of the four hospitals to assist their project staff in understanding how human factors play a role in events. In Hospital B, the focus of the human factors visit was failure of staff to adhere to fall prevention policies and procedures, including use of bed alarms, patient fall risk identifiers, and their staff’s perception of patients’ risk for falling. The narrative below illustrates how they thought about the relation between human factors and improving patient safety:

“We have been analyzing and creating reports of falls with and without injuries for several years. We have used these reports to identify patterns and trends related to when falls occur, as well as common factors contributing to their occurrence. In reviewing

these reports, it was clear that staff were often not compliant with the hospital's fall policy. Prior to participation in this project, however, we had not explored with staff, by requesting their feedback, why they were not complying with the fall policy... The human factors visit (by Utah QIO staff) confirmed for us some of the barriers that the system had put in place that did not allow staff to comply with the fall policy. This experience in learning more about human factors alerted us to several significant documentation requirements for reporting falls that were redundant and inconvenient. These redundancies in reporting interfered with staff compliance with our fall policy and procedures. A second area of concern confirmed for us was how our staff had become desensitized to bed alarms. By virtue of the sheer number of times the alarm goes off, staff became less responsive to the alarms and hence the time between the alarms going off and staff response increased. Through this learning experience, we have come to believe that you must explore the human factors related to events before you can move to a higher level of performance that can directly impact the safety of your patients."

With regard to training in human factors, comments from a manager at Hospital B are of interest:

"Managers will need more extensive training to understand human factors. Understanding human factors will allow managers to gain valuable insight as to why staff respond as they do in particular situations. Without this insight gained through an understanding of human factors, managers may entirely miss the true causes of why an event occurred. This could lead to unnecessary tampering with the system and could actually cause greater potential for future events to occur. In addition, managers will need adequate expertise in human factors to instruct and train staff."

This narrative, typical of those from the other three hospitals, highlights the view of the participating hospitals regarding the significant role human factors engineering plays in both diagnosing and remedying causes of system failures. It is certain, however, that as hospitals come to recognize the need for this expertise, they will encounter significant challenges.

## **Study Limitations**

This was a small demonstration project involving only a few hospitals. We report only narratives from the frontlines. Given these limitations, we cannot be sure that the findings can be generalized to other hospitals. However, several of the findings are consistent with the findings of earlier studies and are consistent with the theoretical underpinnings of patient safety practice.

## **Conclusion**

The findings of this qualitative study suggest that, as patient safety experts continue to develop tools and bring concepts from other disciplines to the field, there will be an ongoing need to understand how these tools and concepts will be thought about and used by those working on the frontlines of health care. As observed in this project, event reporting at the local hospital level is neither simple nor entirely straightforward. The local nuances of how events are defined by those on the frontlines may influence what is noticed, reported, investigated, and acted upon.

Although the value of reporting near misses is well established in terms of understanding the causes of failures to the point of recovery and coming to a better understanding of the recovery process itself, it appears that focusing more on the recovery side of near misses than on their potential for patient harm may have the unintended consequence of reducing the motivation of staff to report near misses. In addition, we observed an ongoing tension between frontline workers taking care of patients' needs and taking steps to learn from near misses and events. It will be essential to address this tension to improve reporting of near misses and events.

We also observed that learning from events requires a shared mental model about their causes. The Eindhoven Classification Model appeared to have gained a strong foothold in the minds of frontline workers, facilitating their learning from events.

To the extent that what is being learned in sensemaking is integrated with our reporting efforts, it is likely that our improvements in patient safety will be significantly magnified. The health care professionals in this study found the use of the causal trees in the MERS-TH reporting system helpful for organizing and sharing event information. The causal trees made the information about events more explicit and hence, shareable in planned collective sensemaking sessions.

The sensemaking process shifted health care professionals' focus from attempting to discover the "right" causal tree for any event to engaging in communication to learn how others had made sense of the events. This led to participants coming to a shared and deeper understanding of the causes of events. It is noteworthy that frontline workers reported that collective sensemaking sessions led to their seeing a wide array of actions they could design to address the causes of the system failures.

With regard to human factors engineering, health care workers came to understand its value in both diagnosing and remedying the causes of system failures. They reported that without understanding human factors engineering, they could not improve system performance. In addition, they came to see that, without this knowledge, their attempts at improvements might result in tampering with the system, which could make things worse. At the same time, they had to confront their limited access to this expertise. This observation appears to suggest that a significant investment will be required to build an infrastructure providing health care professionals with ready access to human factors engineering expertise. In the absence of such access, as highlighted by the frontline hospital workers in this study, the benefits of our best efforts at reducing patient harm are likely to be significantly reduced.

Finally, designing and implementing tools and methods to improve patient safety—although very complex tasks—only represent a first step. These tools and methods will be successful in improving patient safety only to the extent that they are used by frontline health care workers. Hence, understanding how these methods and tools are actually being received, interpreted, and used by frontline workers may well accelerate our efforts at reducing patient harm.

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