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What's past is prologue: Organizational learning from a serious patient injury

Michal Tamuz [a,*], Keith E. Franchois [b], Eric J. Thomas [c]

[a] State University of New York, Downstate Medical Center, School of Public Health, 450 Clarkson Avenue, Box 43, Brooklyn, NY 11203, United States
[b] University of Texas, Houston School of Public Health, United States
[c] University of Texas Medical School at Houston, United States

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ABSTRACT

This exploratory case study examines how one hospital learned from an adverse event (AE), a medication overdose that seriously injured a patient. Using qualitative data analysis, we examined how four professional groups reacted to the AE: physicians, nurses, pharmacists, and representatives from the combined quality assurance and risk management departments. Following the AE, each professional group classified the event differently, assessed a different segment of history, made decisions about different issues, and chose different courses of action. Despite these differences, the physician, nursing and pharmacy management teams all decided on which solutions to implement before the first root cause analysis meeting was convened. Indeed, to understand how the hospital implemented changes in the aftermath of the AE, it was necessary to examine the learning from near misses and other warnings that preceded it. This case highlights the importance of the politics of organizational learning and raises theoretical and practical questions about how hospitals learn from potential and actual adverse events.

1. Introduction

An influential Institute of Medicine (IOM) report (Kohn et al., 2000) raised public awareness of medical errors and their serious consequences for patients and the healthcare industry. Drug-related errors, in particular, continue to be common (Aspden et al., 2007), costly, and can be harmful to patients (Thomas et al., 1999, 2000). However, adverse drug events that lead to permanent injury or death are uncommon in a single hospital. The IOM report advised healthcare organizations to "implement mechanisms of feedback and learning from error" as one of the fundamental methods of improving patient safety (Kohn et al., 2000).

Following the IOM report, two of the investigators initiated a research project to study how hospitals learn from medication errors. A hospital learns when decision makers weigh the organization's experience as a basis for changing the routines that will guide future behavior (Levitt and March, 1988; March, 1999). This definition emphasizes that organizational learning is a process rather than an outcome and, thus, need not result in change or improvement. Applying qualitative research methods, we interviewed healthcare providers and administrators at different levels of the hospital hierarchy who were familiar with the process of providing medications.

The research project focused primarily on intensive care units (ICU) in three tertiary care teaching hospitals in the U.S. We selected Rashomon Hospital[1] as a research site, in part, because it had developed programs for improving medication safety. The hospital pharmacy, for example, had invested considerable resources in carefully tracking and investigating medication-related incident reports.

As part of this project, the investigators were conducting interviews in a Rashomon Hospital ICU, when a patient was seriously injured by a drug overdose. Coincidently, some of the study participants were directly involved in or familiar with the circumstances surrounding this preventable patient injury or "adverse event" (AE) and talked about it in their interviews. In the following case study, we delve into the details of the AE in order to identify the underlying processes (Yin, 1989) that influenced organizational learning from an adverse event.

2. The adverse event

A patient received a massive, near fatal overdose of a high hazard drug (HH) that resulted in permanent injury. The patient was in a vulnerable state and could not take an active role in his own treatment. The drug administration continued over more than a day and therefore involved multiple nurses and pharmacists who, along with the physician who prescribed HH, contributed to

[1] Rashomon, a pseudonym, refers to the film directed by Akira Kurosawa (1950). The film recounts the story of a roadside attack in which a bandit attacks a wealthy merchant and his wife. The three participants and an observer retell the story, each time describing it anew from a different perspective.

* Corresponding author. Tel.: +1 347 557 1109; fax: +1 718 270 2533.
E-mail address: michal.tamuz@downstate.edu (M. Tamuz).

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the AE. The factors associated with the AE involved errors in each aspect of the medication process: ordering, dispensing, administration, and monitoring.

2.1. Ordering

A physician wrote a medication order for HH in a non-standard, idiosyncratic format, although the dosage was technically correct. A nurse received the order from the physician, double-checked it for completeness and accuracy, and relayed it to the pharmacy.

2.2. Dispensing

Despite automatic warnings, the pharmacy filled the prescription as ordered. Specifically, a pharmacist received the order from a nurse and attempted to type it into the pharmacy's computerized order entry system. The computer rejected the order because it was written in a non-standard format. The pharmacist "intervened" and contacted the physician to verify that the order was written the way the physician truly wanted. The physician assured the pharmacist that the order was written exactly the way he wanted it to be carried out. The pharmacist, believing that the order was technically correct, overrode the pharmacy's computerized order entry system and entered the order exactly as the physician had written it. Although the first dose was dispensed correctly, in response to a nurse's subsequent refill request, the pharmacy dispensed a large quantity of HH, more than could possibly have been needed in the time frame involved.

2.3. Administration

Nurses were required to perform a complex, non-standard calculation and then extract the right dose of HH from a multi-dose container and to do so without any oversight or independent verification by another nurse. The initial administration of HH was done correctly and without incident. In a subsequent administration, a different nurse drew up and administered a massive overdose. Specifically, that nurse miscalculated how much he would need. He called the pharmacy to request more HH and the pharmacy dispensed it.

2.4. Monitoring

The nurse responsible for the patient did not recognize that the fluids being administered to the patient contained an overdose amount of HH and allowed the treatment to continue until serious complications resulted. Caregivers detected the problem when they observed that the patient's health had visibly deteriorated.

2.5. Root cause analysis

The hospital convened a root cause analysis (RCA), a formal investigation designed to examine what went wrong and to propose corrective actions. Several weeks later, the Pharmacy Department received approval for making fundamental changes in the procedures that guide how physicians prescribe, pharmacists dispense, and the nurses administer HH.

3. Research methods

3.1. Research questions

We considered the event from four vantage points: physicians, nurses, pharmacists, and the combined representatives of the quality assurance and risk management departments (QA/RM) (who worked together in responding to adverse events at Rashomon Hospital). In all four groups, the management teams were composed of dedicated and skilled professionals who shared a strong commitment to protecting patient safety. However, we reasoned that the QA/RM staff might view the AE differently than healthcare providers who have detailed knowledge about supplying medications. Similarly, the healthcare providers might differ in how they perceived and responded to the AE because of their different roles in ordering (physicians), dispensing (pharmacy), and administering (nurses) medications. Therefore, we initially posed one main research question: How did the four groups of healthcare professionals learn from the same AE? Specifically, we asked how did each group classify and respond to the AE and what were the resulting outcomes? We expected[2] that Rashomon Hospital learned from the AE, because we knew it had approved changing the procedures for providing HH.

3.2. Data collection and analysis

The interview protocol included questions asking participants in the larger research project to discuss their experience with medication errors and describe programs designed to monitor medication safety (e.g., incident reporting systems). The interview questions were not designed to elicit descriptions of the adverse event. The confidential interviews were audio-recorded, transcribed professionally, checked for accuracy of transcription, and de-identified[3]. On average, each recorded interview lasted 90 min and resulted in a 45-page transcript. Field notes, document review, and observations of routine clinical and decision making activities supplemented the interviews. However, we did not have access to the RCA proceedings nor to other documents regarding the AE.

We drew our data from interviews with a structured sample of healthcare providers and administrators who serendipitously knew about the same event. After reviewing all 86 interview transcripts from Rashomon Hospital, an investigator (KF) selected a sample of 18 interviews (11 decision makers and seven clinicians) in which the participant described the AE or its precursors. In some excluded transcripts, the interviews preceded the AE and in others, study participants elected to discuss other errors and drug-related adverse events or provided only hypothetical examples. This sample also included interviews with two RCA participants, conducted specifically for this case study.

The investigators used qualitative research methods to analyze the data, including open coding, axial coding, and negative case checking (Miles and Huberman, 1994) and HyperResearch software to compile transcript excerpts. Building on Tamuz et al. (2004), the transcripts were initially coded for the healthcare professionals' classification of the AE, response to the AE, and the resulting outcomes of their actions. Two investigators (MT, KF) compared and discussed their interpretations of the data until reaching consensus and the third (ET) assessed whether the data supported the conclusions.

4. Describing the interview data

4.1. In the aftermath of the AE

This section describes how the four professional groups classified and responded to the AE and the outcomes of their actions.

[2] The third investigator, designated as our outside reviewer, purposely remained neutral and did not have particular expectations regarding the data analysis.

[3] The text uses male pronouns to refer to all study participants; the term "decision maker" refers to a member of one of the professional management teams. In quotes from the interviews, the text that appears in italics represents the emphasis added by the investigators and the text in brackets was changed to protect confidentiality or added to clarify the context.