

Afterwords: The Quality of Medical Accident Investigations and Analyses

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Abstract

Adverse events, or accidents, in healthcare can have significant clinical outcomes including loss of property, health (morbidity), and life (mortality). Healthcare accidents have features that make post-event investigations particularly difficult. The investigation and analysis of medical accidents is intended to discover information that explains the nature and cause of what occurred in the interest of preventing or minimizing future loss. The thorough, objective investigation of medical adverse events rarely happens due to the complexity of the environment, litigation, risk, and socio-political implications. Special concerns can undermine investigation depth, breadth, and quality. Healthcare's distinct difference from other high hazard sectors such as aviation and nuclear power requires a unique approach. Healthcare accident examination requires detailed domain knowledge and the use of diverse investigation methods. This paper describes the current state of medical accident analysis, obstacles to understanding such accidents and strategies to overcome them, as well as future investigation and analysis approaches.

Introduction

Healthcare is a particularly difficult environment for the conduct of accident investigations. This dense, complex, high stakes setting makes it difficult to get beyond the first story about what happened to the "afterwords," or second story, about what actually occurred. This paper describes the current state of medical accident analysis, obstacles to understanding such accidents and strategies to overcome them, as well as future investigation and analysis approaches.

1. The current state of accident analysis

Accident investigation is well developed in other high hazard domains such as air transportation and nuclear power generation. The National Transportation Safety Board (NTSB) is an independent U.S. federal agency that is charged by Congress with the investigation of every civil aviation accident in the United States, as well as significant accidents in the other modes of transportation (railroad, highway, marine and pipeline). It is also charged with issuing safety recommendations that are aimed at preventing future accidents. NTSB engages accident investigation and analysis in ways that build confidence in their ultimate findings and their approach has become the standard for investigation of transportation accidents since its inception in 1967.

The "Go Team" concept is at the core of any NTSB investigation. The team begins the investigation of a major accident at the scene as quickly as possible, assembling the broad spectrum of technical expertise that is needed to solve complex transportation safety problems.

Each investigator on the Go Team is a specialist who leads a "working group" in one area of expertise that is responsible for a clearly defined portion of the investigation. The expertise that is included on the team depends on the transportation mode involved in the event. One of the five members of the NTSB accompanies the team to the site. At least once a day during the on-scene phase of an investigation, the Board member briefs the media on the latest factual information that the team has developed.

The individual working groups remain as long as necessary at the accident scene, then continue their work at the NTSB's Washington, D.C. headquarters. This activity forms the basis for later analysis and the drafting of a proposed report that goes to the Safety Board twelve to eighteen months from the date of the accident. Safety recommendations may be issued at any time during the course of an investigation. NTSB procedures such as these provide an examination of accidents that is inclusive, analytical in character, and grounded in data and proven methods. Similar methods are used in other settings, notably military accident investigation.

2. *Why the current state in healthcare accident analysis is unsatisfactory*

Thorough, objective investigation of medical adverse events is crucial in order to understand their causes. Unlike the transportation sector, health care organizations have no objective national resource to rely on for the investigation of their own adverse events. Instead, each healthcare institution is responsible to develop its own program using resources at hand. The “safety” programs that result in such an environment are designed to meet the approval of the hospital’s accrediting organization when it conducts a review. This arrangement amounts to a social contract that works well until an event occurs that draws attention of the public and regulatory organizations such as state medical boards.

The environments in which medical accidents occur have additional traits that make objective, in-depth post-accident investigations difficult to conduct. As a service sector, individuals and procedures are a significant aspect of healthcare. Teams and procedures vary widely. What activities occurred and how they occurred may rely on perceptions and recollections more than physical evidence. Equipment and workstations are arranged *ad hoc* as a way to cope with procedure and care variety. Whether the set-up and its outcome was “normal” or an anomaly is not as clear as the cockpit or directed flight path of an airliner. Causation is not as clear, as patients routinely enter the care system in some kind of compromised state. In addition, the independence of investigators, varieties of media attention, and potential legal exposures can undermine the depth, breadth, and quality of the investigation process.

Investigation process quality—Each healthcare organization’s safety committee tends to be comprised of administrative and medical staff members who have little to no experience in systems analysis or accident investigation. Unfamiliarity with accident theory tends to result in committees that follow a single method such as root cause analysis to conduct their investigation. As members of accident investigation panels are employed by the institution they are investigating, it is difficult to be impartial. The investigation tends to discover information that is limited to an individual event. Information that is gathered is not shared with other medical institutions, which prevents the improvement of safe practices.

Media attention—The inability to respond to

accidents with timely, independent, comprehensive accident investigations creates new difficulties for the organization under scrutiny. Local investigations are open to suspicion of complicity in a “cover-up.” Attention from news media can be perceived as eroding confidence in the institution. Continued adverse coverage can lead to diminished support by constituencies such as funding sources that are crucial to its survival. Making information public can also be seen as playing into the hands of those who would use it to discover facts to support litigation that seeks remedies for losses that were incurred.

Legal exposure—The public consideration of such events can be used to obstruct finding out just what happened. Such tactics can include finding a scapegoat, or “sending a message.”

This reality of healthcare accident analysis compels a deeper inquiry into the actual nature of why investigations are conducted, what is learned, and what approach is most likely to reveal the actual nature of what occurred.

3. *What is missing from healthcare accident stories*

Accident stories that result from the conditions just described are incomplete. Accounts by Dekker (2000), Reason (1997) and Cook, Woods and Miller (1998) describe elements that must be added to accident stories, including aspects of the system, precursors to the event, social and political influences, operational tempo, and procedures.

System—Analysis of an adverse event in a system must reflect an understanding of this complex environment. Investigation of an adverse event necessarily accounts for the regulations and standards, policies, management, staff, equipment, tools and instruments, activities, and facility that comprise the work environment. Changes in another system can cause ripple effects that cause changes to one’s own system in unexpected ways.

Precursors—Reason (1997) described “resident pathogens” that exist in any environment that can be triggered by unsafe actions. Factors that contribute to an adverse event can occur at places and times that are far removed from the adverse outcome. Management Oversight and Risk Tree Analysis (MORT), Fault Tree Analysis, and Event Tree Analysis are some of the approaches that can be used to account for circumstances that contribute to an adverse event. (Nemeth, 2004)

Social and political influences—Accident investigation and analysis is not the simple documentation of an adverse outcome but rather what Tasca (1990) terms a social construction. The complexity of the healthcare environment, litigation, risk, and socio-political implications all work to frustrate investigation efforts and reduce the quality of analytical insight. The result of such pressures is an accident story that falls short of an accurate description of what actually occurred.

Operational tempo—Variation in the demand for care, and reallocations of the resources to provide it, can cause the pace of operations to shift quickly. Systems can fail to adequately support such changes in operational tempo.

Procedural approaches—Modified or new procedures that staff members, vendors, or subcontractors employ can change the nature of how services are provided. Changes can come about from a wide range of causes including changes to standards or professional guidelines, the introduction of new equipment, new software programs, new approaches to clinical practice, or staff reductions.

4. How to obtain what is missing from accident stories

Aspects of the system, precursors to the event, social and political influences, operational tempo, and procedures are just some of the crucial information that is routinely missing from accident stories. This is because investigation panels are populated nearly exclusively by members of a hospital’s medical staff. This singular point of view ensures that crucial insights will be unavailable during the investigation.

The nature of risk management encompasses a much greater range of elements than a single field of practice or even a single hospital. Failure to account for those elements ignores many of the aspects that influence how each facility operates. Insights into adverse events flow from diverse, not uniform, points of view. Rasmussen (1998) described the relationships among various disciplines that are involved in risk management (Figure 1). Professionals in engineering, human performance, organization and management, and the social sciences can, and should, be available in order to bring insight to the accident investigation. Each of these disciplines understands the nature of action, judgment and plans at the work and staff levels. This is the “sharp end” (Cook and Woods, 1998) where

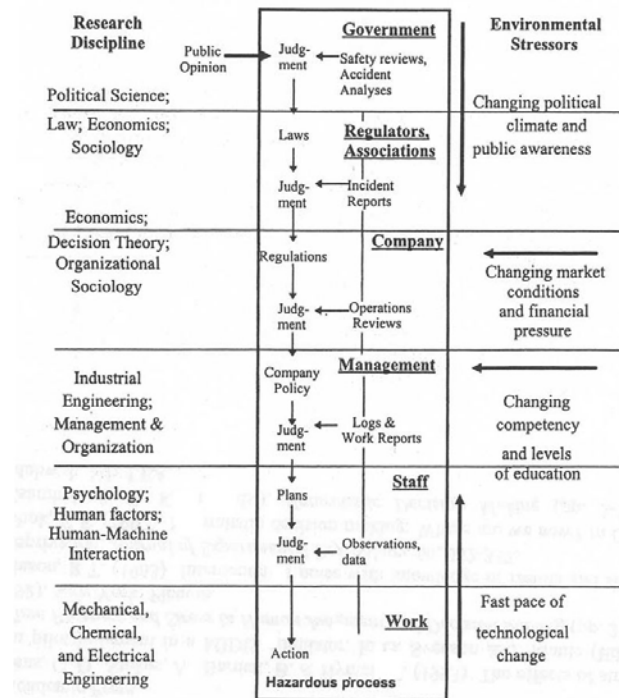


Figure 1: Hierarchy of Levels of Decision Making in Risk Management. (Rasmussen, 1998)

practitioners enact their knowledge to provide healthcare services and where changes occur at the fastest rate.

Panel members also need to be familiar with forensic practice. Knowing where to look and what to look for results in investigations that move quickly beyond the initial description to deeper understanding of actual events. This is particularly important in healthcare, where physical evidence plays less of a role and practitioner recollections of events and individual roles are more important to fact-finding.

5. The state of healthcare accident analysis can be advanced by contributions from multiple disciplines

The same disciplines that make it possible to thoroughly collect information are also well-suited to its analysis. Professionals who are versed in accident analysis follow the evidence to its logical conclusion. This process relies on placing information that is discovered during the investigation in context in order to look beyond initial impressions to the substantive influences that may have caused the event.

6. *Obstacles to obtaining the missing aspects of healthcare accident stories*

Without an impartial panel of qualified professionals, healthcare accident investigation and analysis can fall prey to the influence of the hospital organization, turf conflicts, legal concerns, and limited investigator expertise.

Organizational—Organizations are inclined to treat investigations as threats to institutional integrity. It is common to cast adverse events as anomalies, and to identify and remove the event's proximate cause in order to restore the organization to "normal" conditions. The identification of "operator error" as the cause for an adverse event flows in large part from the need to obtain closure in post-accident investigations.

Turf conflicts—Divisions among different fields of practice can make it difficult to discover information that is crucial to understanding an adverse event.

Legal—Legal procedures that seek to discover information related to an adverse event can exert a chilling effect on those who will be subject to scrutiny. (Nemeth, *in press*)

Investigator expertise—Individuals who manage accident investigation programs may have no background in forensics. With no proven theory or methods, there is no means to determine whether investigation results are correct.

Domain complexity—The underlying complexity of the medical domain is substantially higher than other domains in which accident investigation is conducted. This makes the assembly and validation of the precise sequence of the accident and its surrounding context more difficult than in other fields. The variety of technical knowledge in this domain is exceptionally high. The creation of a cadre of investigators who have the necessary technical knowledge could result in a very large group of professionals. During a recent investigation planning phase, for example, it became clear that investigating the particular incident would involve epidemiologists, infectious disease specialists, and medical device materials technologists, among others. Creating teams of such investigators that could mobilize quickly to an accident site would require substantial "up front" work.

7. *Strategies to overcome obstacles to healthcare analysis quality improvement*

Resources will need to be dedicated at more than one level in order to significantly improve accident investigation and analysis in healthcare.

Individual institution—Members of medical organizations can receive training and resources to improve their ability to understand, evaluate, and report on accidents. Section 6 outlined the circumstances that confront local efforts and the pressures on individual hospitals that make it difficult to overcome these obstacles. Even comprehensive training would not overcome the following three limitations.

- Suspicion that a panel's "in house" work is biased in favor of the institution
- The inability to validate the performance of the investigators among many institutions
- Difficulty in using the results of local inquiries for learning about safety beyond the boundaries of the organization in which an investigation takes place

Those who are best qualified to understand sharp end issues are hard pressed to stay abreast of developments in their own field. Given the relatively low accident rate for individual healthcare facilities, it is unlikely that any single institution can create and sustain the cadre of experts who are qualified and experienced in the additional expertise that is necessary to the performance of various types of investigations.

Service agency—Firms outside of medical organizations can assist with training and with accident investigation. An independent organization that is qualified in healthcare systems and accident analysis has the potential to assist individual hospitals. Such a relationship relies on frequency and breadth of training for hospital staff members, and how deeply the outside firm is allowed to probe the organization. Because of the potential to become entangled in tort litigation, some form of protection for the work product of the firm would be needed. If the product of such work remains the property of the organization in which the accident has occurred, concerns over bias and limited extra-organizational learning will continue. Several groups have undertaken initial steps to create such an agency.

National investigator—It is possible that an organization could be created to provide the same

kind of impartial, public forum for medical accident analysis and prevention that NTSB does in transportation. A national board would require significant government-level support in order to be established and operated. There is, at present, no broad based support for such an approach. The potential difficulties that are associated with managing the exposure created by investigations that would be conducted by a “National Patient Safety Board” are formidable.

8. How to achieve the next stage in accident analysis

No progress can occur without the commitment of genuine resources to accomplish authentic results. The motivation to commit resources can come from ethical, legal, regulatory, and operational factors among others.

Ethical—Some organizations do make decisions on the basis of the “right things to do.” Hospitals dedicated to the well being of their staff and patients have the option to make the change based on a genuine interest in alleviating the adversity such events impose. Teaching hospitals, for example, could create a consortium on issues related to patient safety in the same manner as they lead research into other aspects of healthcare.

Legal—The cost of litigation already drives risk management activities among hospitals and their insurers. Including accident investigation and analysis within the legal framework would leverage risk reduction efforts.

Regulatory—Organizations that deal with patient safety issues could encourage learning among hospitals. For example, accreditation organizations currently encourage hospitals to use a single method approach. A more powerful approach might make accreditation approval contingent on whether a hospital operates an effective adverse event investigation and analysis program.

Operational—Lost time means lost revenue. Hospitals could choose to reduce the downtime that adverse events cause as a means to optimize their ability to generate revenue.

9. Summary

Individuals who are qualified in clinical and forensic aspects of healthcare have the ability to write the “afterwords” that accident investigation and analysis

must have to move beyond current approaches to adverse events in healthcare. Changes such as those outlined in this paper have the potential to leverage that insight at the national level to the benefit of hospitals, staff members and patients alike.

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