

IMPROVING PATIENT SAFETY THROUGH HEALTH CARE INCIDENT REPORTING, ANALYSIS, AND PROCESS CHANGE SYSTEMS

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ABSTRACT

Every year, tens of thousands of patients in North America die from preventable errors. Incident reporting and learning provide a means of decreasing this number, but due to several barriers, these systems are not currently reaching their full potential in health care. The goal of this study is to improve patient safety by designing strategies to advance incident learning in health care. A literature review was conducted to gather details about health care, aviation, and nuclear power incident learning systems. This information was used to identify areas for improvement in health care's incident learning processes and extract potential strategies for improvement. The suggested strategies to be developed in this research could be followed by administrators who are making crucial decisions pertaining to the incident learning process. This should help create more effective systems, and in turn, improve patient safety.

INTRODUCTION

According to the American Institute of Medicine, between 44,000 and 98,000 people die annually in United States hospitals as a result of medical errors¹. The estimated rate of adverse events among patients in Canadian acute care hospitals is 7.5%, with 20.8% resulting in death and 36.9% deemed preventable. This translates to close to 70,000 preventable adverse events a year and 9,250 to 23,750 annual preventable deaths². To minimize adverse events and improve patient safety, we must understand why errors occur and implement changes to safeguard against similar circumstances in the future. Incident reporting, data analysis, and improvement processes provide a means to accomplish this.

The primary purpose of incident reporting is to learn from past experiences and ensure that all responsible parties are aware of major hazards³. It reveals gaps and inadequacies in health care systems in which errors occur⁴. Incident reports have been identified throughout the literature as an effective organizational instrument to detect preventable safety incidents and capture contextual information surrounding incidents^{5,6}. Despite the potential usefulness of incident learning systems for preventing adverse events and improving patient outcomes, these systems have experienced mixed success in health care⁷, especially when compared to the effectiveness demonstrated by incident reporting processes in other high risk industries, such as aviation^{8,9} and nuclear power^{10,11}. The aviation safety transformation is particularly well-documented: in 1924, fatal accidents were occurring daily⁸ compared to now, when aviation is one of the safest ways to travel, responsible for far fewer deaths than drowning, falls on stairs, and motor vehicle accidents¹². A lot of credit for this improvement is given to incident learning, which has been motivating changes in the system and informing the rules that the system enforces from as early as the 1930s⁸.

Efforts are currently underway to improve the effectiveness of health care incident learning processes, guided by industry leaders like the World Health Organization (WHO). Although the WHO has provided recommendations for the ideal qualities of an incident learning system (Table 1)¹³, there currently is no literature outlining effective strategies for health care institutions to achieve these qualities. This is where lessons learned in other high risk industries, such as aviation and nuclear power, can serve as examples for health care, and input from end users can further tailor recommendations to the unique

health care environment. If incident reporting, analysis, and process change systems can be made more effective, it is highly likely that preventable errors and deaths will decrease.

Table 1: Successful qualities of health care incident learning systems¹³.

Quality	Description
Non-punitive	Reporters are free from fear of retaliation against themselves or punishment of others as a result of reporting.
Confidential	The identities of the patient, reporter, and institution are never revealed.
Independent	The reporting system is independent of any authority with power to punish the reporter or the organization.
Expert Analysis	Reports are evaluated by experts who understand the clinical circumstances and are trained to recognize underlying systems causes.
Timely	Reports are analyzed promptly and recommendations are rapidly disseminated to those who need to know, especially when serious hazards are identified.
Systems-oriented	Recommendations focus on changes in systems, processes, or products, rather than being targeted at individual performance.
Responsive	The agency that receives reports is capable of disseminating recommendations. Participating organizations commit to implementing recommendations whenever possible.

Since health care, aviation, and nuclear power are all complex and dynamic sociotechnical systems, Rasmussen's risk management framework¹⁴ provides a common lens through which to examine and compare their incident learning processes. Rasmussen proposes a hierarchy of actors in a system, with the government at the top and the hazardous process being controlled at the bottom, and emphasizes closed loop communication between levels^{14,15}. Decisions made at higher levels should be communicated downwards while information about the current state of affairs should move upwards (Figure 1)¹⁴. Incident learning systems and processes can be mapped to Rasmussen's hierarchy by placing components and actors on the hierarchy and illustrating their interactions¹⁵.

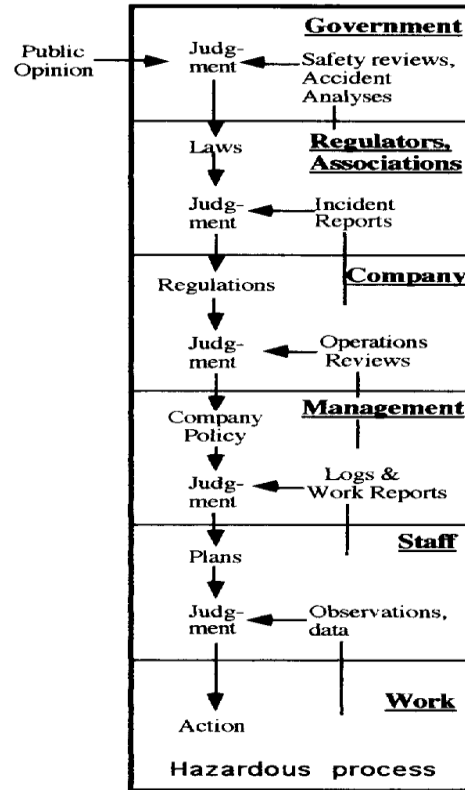


Figure 1: Rasmussen's risk management framework¹⁴.

OBJECTIVES

1. Compare current health care incident reporting processes to the WHO's stated industry incident learning goals. Identify gaps and room for improvement.
2. Examine incident reporting, analysis, and system improvement in other high risk industries (i.e. aviation and nuclear power) and compare to health care. Identify the strategies that these industries have implemented to achieve their success.

METHODS

A literature review was conducted to gather details about the current implementation, structure, and workflow of aviation, nuclear power, and health care incident learning systems. To date, general trends in health care incident learning processes have been examined, along with eight specific systems and three case studies, internationally (developed countries) and across disciplines to achieve diversity in the data collected. Systems

were compared according to the WHO's recommended qualities¹³, and by mapping information flow and communication to Rasmussen's risk management framework¹⁴.

This information was used to identify areas for improvement in health care's incident learning processes and extract potential strategies for advancement.

RESULTS

Table 2: Aviation, nuclear power, and health care incident learning structures compared using the WHO's recommendations and Rasmussen's framework.

Quality	Aviation ^{8,9,16}	Nuclear Power ^{10,11,17}	Health Care* ^{4,5,18,19,20}
Non-punitive	Federal legislation provides immunity for reporters.	A safe reporting culture has been established.	Making an error can result in disciplinary measures, risk of legal actions, re-training, and shaming, all causing fear for the reporter.
Confidential	Reporters have uncompromised confidentiality.	-----	Varies.
Independent	Reporting systems are separate from all groups with the power to impose corrective actions.	Reporting systems run through independent, external regulatory bodies.	Varies.
Expert Analysis	Reports are analyzed by aviation technical and management experts.	Reports are analyzed by nuclear experts and personnel with human factors knowledge.	Resources are not available to make sense of data reported.
Timely	-----	Time requirements are outlined for reporting and analysis in an effort to maintain promptness.	Reports are completed in retrospect and are time consuming, resulting in many forgotten and unreported, or incompletely reported events.
Systems-oriented	Adopts a systems approach to error analysis.	Adopts a systems approach to error analysis.	Blames individuals and human qualities for errors.
Responsive	The government disseminates data analysis results to the airlines and frontline staff, who are committed to taking appropriate actions.	International and national bodies exist stating their responsibility to analyze data and disseminate results, and monitoring that plant management implements changes.	It is unclear how hospitals distribute and use their incident reporting data.
Information flow across Rasmussen's framework	Reports come from frontline staff, move up through the airlines, and then to government bodies. Analysis occurs, and trends, alerts, and new rules are communicated back down.	Reports come from plant operators, move up through the organization, and then to national and international regulators. Analysis occurs and lessons learned are fed back to operators through regulations, meetings, emails, publications, and a search engine.	Information flow does not consistently reach the top of the hierarchy and when it does, it is even rarer that closed-loop communication is achieved; information travels upwards, but changes are rarely developed and communication back down for implementation.

*there is a lack of standardization across health care, therefore general trends are reported.

DISCUSSION

As described in Table 2, aviation and nuclear power have implemented relatively standardized incident learning systems that accomplish all of the WHO's recommendations for health care. These systems also achieve closed-loop communication across Rasmussen's risk management hierarchy. The high reliability of both aviation and nuclear power¹⁸ provides strong evidence that these are indeed qualities linked with successful safety improvement that health care should be striving towards.

Although there are few specific implementation details published about incident learning systems in health care, it is clear that these systems are quite varied, but very few of them are reaping the full benefits of incident learning. Using the results in Table 2, three main areas in which health care can improve have been extracted:

1. Creating a safe reporting culture.
2. Making the reporting and analysis processes logistically manageable.

3. Disseminating information and changes back to frontline staff.

The next step in this work is to interview key players and stakeholders in the incident learning process (i.e. nurses, physicians, risk managers, hospital executives, regulators, and government policy makers) to gain a better understanding of the current system, user needs, and process barriers (e.g. large size of health care systems). Strategies to address the three main areas for improvement in health care will be extracted from aviation and nuclear power. The hypothesis is that these successful incident learning systems have key traits in common, which can feasibly be adopted in the unique health care environment and translated into incident reductions and improved patient safety. This hypothesis will be evaluated through focus groups and interviews with the end-users listed above.

CONCLUSIONS

Incident learning systems, which have a tremendous amount of potential to create patient safety improvements, are not currently being optimized in health care⁷. Ultimately, the goal of this work is to provide suggestions to administrations making incident learning decisions and influence future government, regulatory, and institution policies, strategies, and recommendations.

Over time, improvements in this field will result in more system and process safeguards, which will proactively decrease preventable adverse events and increase patient safety²¹. Developing such a system is paramount in learning from previous errors and decreasing the number of deaths seen annually in Canadian hospitals.

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