THE JUSTIFICATION OF THE USE OF INFORMATION TECHNOLOGY IN PATIENT SAFETY INITIATIVES

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Abstract: Using information technology (IT) to reduce adverse events in healthcare has been a growing trend since its endorsement in the 1999 Institute of Medicine (IOM) report. The implementation of comprehensive information systems in healthcare practices has proved to be a path riddled with pitfalls. Not unlike other industries, initially there are more failure stories than successes. Unfortunately the more comprehensive the technology, or the wider the span of the implementation, the more difficult it is to achieve success. This paper looks at the need for information technology (IT) in patient safety initiatives. Based on this foundation, it examines critical concepts in the process of implementation of systems supporting patient safety initiatives. Last, the paper identifies a sampling of ethical issues that commonly arise when IT is utilized in patient safety initiatives. Even though a transformational application of IT in this type of endeavor is difficult, it does not undermine the significant benefits that automation can provide and is required to provide by society and the law.

1 THE NEED FOR THE USE OF IT IN PATIENT SAFETY INITIATIVES

Patient safety, as defined by the U.S. National Patient Safety Foundation, is concerned with the avoidance, prevention, and improvement of adverse events or injuries caused by the process of healthcare. It is understood that safety is the outcome of the interaction of the variables in a situation. It is not based solely on the actions of a person; nor is it an organization's responsibility, but rather, it is a holistically driven outcome. An adverse event is defined as an injury caused by medical management, rather than the disease process, that results in either prolonged hospital stay or disability at discharge. A patient safety practice is a process by which the probability of adverse events resulting from exposure to the healthcare system, across a range of diseases and procedures, can be reduced or avoided. (Vincent, 2010) These processes, entwined in human intervention, become candidates for automation.

Methods will produce different levels of effectiveness; for example, Leape's study suggests that voluntary self-reporting will catch one in 500 adverse events, while the combination of computerization and chart review will catch one in ten adverse events. (Leape, 2002) Unfortunately the risk is not proportional; some patients may be at higher risk to suffer an adverse event or prone to the possibility of multiple events. In fact, studies report that a patient in ICU stands to suffer from 1.7 errors made in their care per day. (Spear, 2005)

Table 1: Comparative Effectiveness of Patient Safety Initiatives.

Patient Safety Initiative	Adverse Events Identified
Voluntary Self-Reporting	1/500
Computerization and Chart Review	1/10

1.1 Human Limitations and Organizational Memory

Since the invention of the computer in the 1950s, the key driver of its use has been the desire to retain and use data that the human brain does not have the capacity to maintain. Yet, significant resistance

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exists when it comes to turning over decision making to a computer. The fact is, machines are better at doing some things than humans are, while other tasks are better left alone; it is the ability to know the difference that is in short supply. The challenge lies in identifying the need for and persuading others to make use of computer systems, or, to rely solely on human intervention, or take advantage of both.

Information is the key asset of the knowledge organization. As individuals have limitations with their memory so do organizations that do not use automation to manage better processes. Efficient automation extends and amplifies an organization's memory by capturing, organizing, disseminating, and reusing the knowledge created by its employees. However, organizational memory is not just a facility for accumulating and preserving information; in fact, greater value is achieved via sharing knowledge.

1.2 Proven Success in Reduction of Errors through Automation

As knowledge is made explicit and managed, it augments the organizational culture, thereby providing a basis for communication and learning. In 2006, a comprehensive analysis of the literature that existed on the effects of healthcare IT systems on the quality and efficiency of care was completed. The research uncovered evidence that implementing a multifunctional automated healthcare system could increase the delivery of care that adhered to guidelines and protocols; enhance the capacity of the providers of healthcare to perform surveillance and monitoring for disease conditions and care delivery; reduce rates of medication errors; and decrease utilization of care. Effects on the efficiency of care and the productivity of physicians were mixed. (Blumenthal, 2007)

In 2003, Bates asserted that these systems reduce medication error by 55 percent. Approximately 28 percent of adverse events is attributed to medication errors and viewed as preventable. Fifty six percent of these errors occurred when drug orders were being placed, which automated systems would most likely have prevented. In addition, bar coding used in medication systems has proven to reduce drug errors by more than 50 percent, preventing approximately 20 adverse drug events per day.

Although the ultimate goal is to protect patients, these measures improve the bottom line, since the average adverse event costs an estimated $4,700 per patient in extra hospital days and ancillary services

Table 2: Impact of automated systems on drug error rates.

Percentage of total adverse effects that are drug-related	Percentage of total adverse effects that are drug-related when bar coding technology is utilized
28%	14%

excluding the cost of litigation. (Bates, 2003) As healthcare gets more complex, with patients having multiple prescriptions and physicians, tracking medical records (EHR) is adding to the problem of patient safety.

1.3 The Velvet Hammer: Electronic Healthcare Records

EHR automates the manual or semi-manual keeping of records. A survey conducted by the Medical Records Institute, shows that providers rank the ability to share information as the top benefit of EHR, followed by better quality of care, improved workflow and documentation, and reduction of medical errors. In 2009, U.S. Congress provided incentive and motivation to use IT to increase the usage of EHR, benefiting patient safety initiatives as well. The Health Information Technology for Economic and Clinical Health Act (HITECH) authorized incentive payments through Medicare and Medicaid to clinicians and hospitals when they use EHRs privately and securely to achieve specified improvements in care delivery. Using IT to reduce adverse events across the entire continuum of care incorporates the requirement of meaningful use.

2 IMPLEMENTING PATIENT SAFETY INITIATIVES WITH IT

There are a number of methods of investigation and analysis available in healthcare. A more recent paradigm includes the possibility for human error and is based on the premise that safety depends on creating systems that plan for errors or anticipate errors in order to prevent them before they happen. British psychologist, James Reason, developed a Swiss cheese model to represent organizational accidents, which became widely accepted. This model's critical point is that in complex structures, a single, sharp-end error rarely is enough to cause harm. Instead, this type of error must penetrate several layers of incomplete protection to cause a devastating result. Reason's model moves the focus

from trying to perfect human behavior to fixing the holes in the Swiss cheese, often called latent errors. In addition, the layers of overlapping protection must be put in place to decrease the probability of the sharp end or root cause making the error possible or inevitable. (Reason, 1995)

A number of analysts have identified a schema of most common medical error root causes. The most widely accepted is Charles Vincent's adapted directly from Reason's model. His schema forces the reviewer to ask basic questions as to whether there should have been a checklist or read-back, whether the resident was too fatigued, or whether the nurse was too intimidated to speak up. Usually, a wide variety of contributory factors lead up to the event; therefore, Vincent extended the root cause of the incident from a single root cause, to multiple. Vincent's model also moves the target past the cause of the incident. Though important, it is not the final goal of uncovering the gaps and inadequacies in the healthcare system. It concentrates on accident causation, reducing the focus on the individual persons who may have made an error and aiming it instead on pre-existing organizational factors. The framework essentially summarizes the major influences on clinicians in their daily work and the systemic contributions to adverse outcomes versus good outcomes. (Vincent, 2010) In the U.S., a national database (by AHRQ) has developed a starting point for healthcare organizations by identifying 27 patient safety indicators, which measure outcomes that are possible in patient safety events. Using a proven approach is a key tenet in IT systems and provides a launch point for patient safety initiatives and automation.

2.1 Realistic Expectations

There have been several cautionary studies on the effects on patients' health when using healthcare IT systems, from harm to mortality. In addition, though temporary, during transition and implementation physicians can see up to a 10 to 20 percent reduction in productivity for a period of six months or more. The most significant drawback to the use of IT or its success again comes back to the nature of human involvement. Though hardware malfunctions can happen, studies show that zero tolerance machines exist and stay up consistently. The true problem is the same as it has been since the invention of the computer; it is how human beings designed the system, many times ignoring the real-life way clinicians go about doing their jobs and ignoring the way they interact. Second, the implementation mechanism for these types of systems is commonly flawed due to numerous resource issues (such as people, time and money). Technology adaptation is not a concept of the future, but rather is engrained in the current individuals entering the healthcare field. The problems are known; the answers will be found in overcoming the obstacles.

Table 3: Project implementation considerations.

Application	▪ Ease of navigation ▪ Functionality must be perceived as better ▪ Cutover strategy#
People	▪ Executive champion ▪ Stakeholder buy-in ▪ Clear roles, responsibilities, expectation
Process	▪ Disciplined procedures ▪ Automated control system ▪ Structured reviews and sign-offs ▪ Communication strategy
Training	▪ Multiple levels of training by role ▪ Provided at the right time, quantity, and quality ▪ Hands-on commissioning

3 ETHICAL ISSUES IN PATIENT SAFETY INITIATIVES USING INFORMATION TECHNOLOGY

In the U.S., HIPAA regulations released in 2003 served as the means for regulating IT utilization in healthcare initiatives. Compliance with HIPAA was required by April 14, 2003, and the regulations, still in place today, applied to both electronic and paper records.

3.1 Autonomy of Patient

Under the regulations, patients have the right to inspect and obtain a copy of their entire medical record, with the exception of notes from psychotherapy. A physician can refuse to make the entire record available in cases in which harm to the life or physical safety of the individual or another person may occur. A person also has the right to an accounting of disclosures of protected health information made over the previous six years. There are, however, numerous exceptions to this accounting requirement.

One study showed that patients having access to their healthcare records electronically expressed

high value and interest in the concept of autonomy and welcomed greater access and control of their health information. While highly valued, autonomy was perceived as a double-edged sword. Sticking points, including concerns about the locus of responsibility for maintaining the accuracy and integrity of the information, were raised. Substantial variability based on age (over 35) was evident in opinions about the safety of their records. (Halamka, 2008)

3.2 Privacy of Data

Patients have had a right to have personal medical information kept private since the days of Hippocrates. Physicians have an obligation to keep medical information secret. The chief public policy rationale is that patients are unlikely to disclose intimate details that are necessary for their proper medical care to their physicians unless they trust their physicians to keep that information secret. Basic privacy doctrine in the context of medical care holds that no one should have access to private healthcare information without the patient's authorization and that the patient should have access to records containing his or her own information, be able to obtain a copy of the records, and have the opportunity to correct mistakes in them.

Without informed consent, outside the context of treatment, a patient's entire medical record can seldom be lawfully disclosed. The HIPAA regulations set a federal minimum, or floor, not a ceiling, on the protection of privacy. Thus, when other federal laws (such as laws protecting drug and alcohol treatment records) or state laws (such as laws that provide special protections for mental health or genetic records) provide more protection for patients' privacy than the new regulations, the more protective federal and state laws will continue to govern.

3.3 Moral Agency

The privacy of the information that is maintained in electronic storage and the freedom it provides is dependent on the personal integrity of employees and others who will likely never see patients or meet those who could be adversely affected by the systems being developed. IT professionals have no standard code of ethics. Not surprisingly, day-to-day decision making comes down to moral agency and personal ethics. However, human beings by nature have the capacity to recognize normative standards expected of their role or position. It is well accepted that this capacity brings with it accountability for one's actions, even without a code of ethics. Personal integrity will provide this type of accountability; however, without checks and balances, personal policing may not be enough to compensate for human errors.

4 CONCLUSIONS

The very low levels of adoption of the key health information technology systems required for meaningful use may indicate that hospitals face difficulty in achieving the level of use required to receive government incentive payments. This finding suggests a very specific need among hospitals for a greater look at the areas addressed in this paper, specifically, understanding the need for automation, the implementation issues, and ethical challenges in utilizing IT in patient safety initiatives.

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