Healthcare Information Technology (HIT) and Patient Safety: A Two Edged Sword

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In April 1912 Titanic was the world’s newest, most technologically advanced and largest liner.

Despite all of its innovative technology the ship sank on a clear night on its maiden voyage with the loss of over 1500 lives.
Use of HIT in Patient Safety

- Healthcare Information Technology (HIT) has been offered as a solution to solving patient safety problems and the prevention of harm to patients.
- Yet despite the many benefits of HIT, it can also be the source of error and the cause of harm.
- HIT is truly a two edge sword.
- This presentation will discuss the benefits and the risk of HIT as they relate to patient safety.
Health Care Associated Injury

- An injury or harm to a patient attributed to the process of care rather than underlying physiological conditions
Hazard

- Anything which has the potential to cause harm

Risk

- The likelihood that somebody or something will be harmed by a hazard, multiplied by the severity of the potential harm
Goals of Patient Safety

- Reduce the risk of healthcare associated (caused by treatment) injury to patients
- Remove or minimize hazards which increase risk of healthcare associated injury to patients
Institute of Medicine Report

- Use technology to automate repetitive, time consuming, and error-prone tasks!
Health IT includes

- electronic health records (EHRs)
- patient engagement tools (e.g., personal health records), and
- health information exchanges;
- excluded is software for medical devices (e.g., software in an implantable cardioverter-defibrillator).
HIT as a Patient Safety Risk

- health IT can be a contributing factor to adverse events, such as the overdosing of patients due to
  - poor user interface design,
  - failing to detect life threatening illnesses due to unclear information displays,
  - and delays in treatment due to the loss of data.
- adverse events, such as these, have lead to serious injuries and death
Safety Risk of HIT

- Safety is an emergent property of a larger system that takes into account not just the software but also how it is used by clinicians.
- Poor user-interface design, poor workflow, and complex data interfaces are threats to patient safety.
- Lack of system interoperability is a barrier to improving clinical decisions and patient safety.
- Successful adoption of change requires education and training of the workforce.
we cannot consider technology especially HIT by itself.

technology exists in a nested five element Sociotechnical System
Nested Risks & Hazards

risks and hazards for harm associated with HIT are nested within these five elements not just the technology
People

- individuals working within the entire system and includes their knowledge and skills regarding both clinical work and technology as well as their cognitive capabilities such as memory, inferential strategies, and knowledge.
- the implementation teams that configure and support the technology and those who train clinical users.
Technology

- the hardware and software of health IT, as well as how these different parts interact with each other.
- can also include more clinically based information (e.g., order sets), although technologists regard order sets as the responsibility of clinical experts.
Process (sometimes referred to as “workflow”)

- set of actions and procedures clinicians are expected to perform during the course of delivering health care.
- clinicians use to interact with the technology are prescribed, either formally in documentation (e.g., a user’s manual) or informally by the norms and practices of the work environment.
- tasks such as patient scheduling.
Organization

- installs health IT, makes configuration choices, and specifies interfaces with health IT products.
- chooses the appropriate clinical content to use. These choices reflect the goals such as maximizing usage of expensive clinical facilities (e.g., computed tomography scanners, radiation therapy machines) and minimizing costs.
- rules and regulations set by individual institutions that clinicians must follow, and the environment in which clinicians work
External Environment

- refers to the environment in which health care organizations operate. Essential aspects of the environment are the regulations that may originate with federal or state authorities or with private-sector entities such as accreditation organizations.

- For example, health care organizations are often required to publicly report errors made in the course of providing care at a variety of levels, including the private-sector, federal, and state levels.
high risk industries have shown that where technology has been introduced human performance has been improved

can reduce skill based failures

decision support systems and other HIT systems can reduce rule based failures
Limits of Technology

- important human centered aspect in how individuals interact with technology determines its success for failure (Billings 1996)

- failures of technological systems cannot be forestalled by providing another layer of defense against failure (Cook) 1999)
all technology introduces new errors, even when its sole purpose is to prevent errors

health systems should anticipate trouble when introducing new technology based systems

To Error is Human page 175
Kukla’s Design Requirements

- technically efficient;
  - reduce costs, increase ease of operation, or increase productivity of the process

- easy to use:
  - people must be able to focus on their work not on the technology
Kukla’s Design Requirements

- better way
  - it must be a better way for operators to do their job or at least as good as current methods
- adaptable
  - must be adaptable to changing constraints and priorities of changing conditions in healthcare.
Human-Machine Interface

- allocation of functions between humans and machines
- configuration of the architecture of the system
- control characteristics
- informational characteristics
- allocation of responsibility between sharp end users (clinicians) and support personnel
Reliability

- situation awareness
- defining optimal level of technology
- appropriate level in trust in the system reliability
  - nothing recedes like success
Operational Testing of New Systems

- it is not until a system has been operating in the actual environment that some potential weak points and failures can be identified.
- systems must be studied in the early stages of implementation in actual operating conditions.
Safer IT Systems Include

- Easy retrieval of accurate, timely, and reliable native and imported data;
- A system the user wants to interact with; Simple and intuitive data displays; Easy navigation; • Evidence at the point of care to aid decision making;
- Enhancements to workflow, automating mundane tasks, and streamlining work, never increasing physical or cognitive workload;
- Easy transfer of information to and from other organizations and providers; and No unanticipated downtime.
Interoperability

- Failure to achieve interoperability has considerable risks for patient safety.

- Without the ability of different health IT products to exchange data, information must be transferred by hand or electronic means outside the primary method (e.g., facsimile).

- Every time information is copied or transmitted by hand, there is a risk of error or loss of data. Incomplete and erroneous records may cause delays in care and result in harm.
Process Predesign

- central to safe clinical implementation and use of health IT is adoption of redesigned workflows.
- implementation of an IT system cannot fix broken clinical process
HIT & Teamwork

- Health care is a team sport where everyone has a role to play.
- Clinicians & patients/families.
- An essential element of teamwork is creating a shared mental model everyone on the same page.
- HIT can help create a shared mental model.
Patient and Family Engagement Issues

- Patient access to their own personal health data in electronic formats (personal health information management)
- Effective communication between a patient (and family or caregiver) and health care providers and the health care delivery system so as to improve safety and quality.
Things we can do to use HIT to improve patient safety

- Care Coordination
- Detection of harm
A Personal Story

- Once upon a time, a patient had a DVT
- He was treated with Warfarin
- The health system used sophisticated health IT to create a virtual team of care
  - Primary Care Physician (PCP)
  - Pharm D
  - Laboratory
- This team also included one very important member—the patient!
What Does It Really Mean To Be ‘Patient-Centric?’
Potential Impact of Health IT On Health Care Quality

• gives clinicians real-time access to complete patient data and information support to make the best decisions
• helps patients become more involved in their own care
• makes it possible for third-party innovators to compete in creating widely applicable services and tools
HIT & Care Coordination Sandwich

Care Coordination - Virtual Teamwork (TeamSTEPPS)

EHR\PHR as a shared mental model

The Chronic Care Model
Chronic Conditions

- by their very nature the chronic conditions places the patient at risk
- coordination is essential to optimal care
- there are multiple teams and teams of teams
- patient is essential because it is the center of the coordination
- if we get it wrong the patient is harmed
- HIT can play a positive role
- or contribute to the problem
The power to improve safety lies not just with reporting requirements, but with the ability to act on and learn from reports. To this end, two distinct functions are also needed:

1. aggregating and analyzing reports and
2. investigating the circumstances associated with safety incidents to determine the conditions that contribute to those incidents

reporting that is voluntary, confidential, and nonpunitive
EHRs can be used to detect, document, analyze, track, and report patient safety problems, including both adverse events and errors.

These detection methods go by various names:
- Trigger (IHI Trigger Tool)
- Targeted Injury Detection (TIDS)
- Patient Safety Injury Detection (PSIP)
- Quality Safety Reporting System (QSRS)
EHR Enabled Detection is the Future

- These systems what ever you wish to call them should be implemented in every health care system.
- These more accurate data are coupled with actual cost of care data it can be a powerful change motivator.
- Systems that have done such coupling have found that by eliminating the harm you can save over 10% of the cost of care.
- In a three trillion dollar health care system 10% means big bucks.
General Lessons

- look for things that set individuals at the sharp end for failure
- identify hazards to patient safety within our system and eliminate them
- Implement technology with caution
- have a back up or redundancy
Parting Shot

- Focusing on Patient Safety means that the life you save maybe your own
- By eliminating the costs associated with harm mean the economy you save may be the US Economy
Questions?