Managing the Hazards of Health IT

Mr. Eric Woo
Regional Director, Asia Pacific,
ECRI Institute

ECRI Institute publishes an annual report on Top 10 Health Technology Hazards. The institute's team of scientists, engineers, clinicians and other patient safety analysts nominate key hazards to consider based on insights gained and expertise such as investigating accidents and adverse events. They weigh factors such as severity, frequency, breadth, insidiousness, profile and preventability when producing the final list of hazards. HIMSS Asia Pacific's Melissa Leong asks more questions about the 2017 list to Mr. Eric Woo, Regional Director, Asia Pacific ECRI Institute.

Can you share some key statistics on how these top 10 health technology hazards are impacting care adversely?

Medication errors are among the event types most frequently reported to ECRI Institute Patient Safety Organisation (PSO), representing about 25% of all reported events. The number of deaths per year from drug overdoses increased by 23% between 2010 and 2014 (from 38,329 to 47,055), according to a December 20, 2016, study from the Centers for Disease Control and Prevention (CDC).

More than one-third of medication events in intensive care units (ICUs) may be related to the electronic health record (EHR), with the majority coming in the ordering phase, according to a study published in the January 2017 Journal of Healthcare Risk Management. The authors assessed whether the EHR was related to 1,622 potentially preventable adverse drug events (ADEs) that impacted 624 patients at two ICUs at a large medical center. They found that 34% of medication events were related to the EHR. EHR-related events were also found to be more likely related to serious patient harms than non-EHR related events. For example duplicate information accounted for 17% of the 551 EHR-related errors, compared with 7% of the 1,071 non-EHR errors. Although 40% of EHR-related medication errors occurred during administration, the authors said many of these errors had their genesis in the ordering phase.

In a review of 436 medication errors involving health IT submitted to ECRI Institute PSO and partner PSOs between January 2011 and July 2014, it was found that many of the near misses, unsafe conditions, and adverse events involved the inadvertent, inappropriate, or incorrect use of the health IT system. In most of the reports reviewed, the health IT system functionality did not contribute to the error; rather, the staff member's misplaced expectations of the system's capabilities did.

A review of more than 3,600 intraoperative medication administrations found that most medication errors and adverse drug events were preventable, and that at least one third of them were either significant or life-threatening. In January 2016, The Journal of the American Society of Anaesthesiologists published that based on observations of 277 operations and identified 193 medication errors or adverse drug events, representing 5% of medication administrations. Of those events, 153 (79%) were judged to be preventable, including

51 significant errors and 3 potentially life-threatening errors. Drug labelling errors were most common, representing 24% of cases, followed by wrong-drug (23%), omitted medication (18%), documentation (17%), and monitoring (7%) errors.

A 2010 adverse event in Massachusetts is largely responsible for bringing alarm safety back into the spotlight. 2013 Sentinel Event Alert highlights the fact that of 98 reported events (including 80 reported deaths) in which alarm safety was a factor, 36 involved alarms that were turned off, 30 involved "absent or inadequate" alarms, 25 involved inaudible alarms, and 21 involved incorrect alarm settings (Joint Commission "Medical"). In the July 7, 2013, Washington Post, journalist Lena H. Sun noted that healthcare workers respond to the several hundred alarms per patient per day by simply ignoring them, muting them, or shutting them off (Sun). Nuisance alarms are a key contributing factor to the phenomenon known as alarm fatigue because they make up the bulk of alarms that are heard each day; 80% to 99% of alarms are clinically insignificant.

The Joint Commission's Sentinel Event database* includes reports of 98 alarm related events between January 2009 and June 2012. Of the 98 reported events, 80 resulted in death, 13 in permanent loss of function, and 5 in unexpected additional care or extended stay. Common injuries or deaths related to alarms included those from falls, delays in treatment, ventilator use and medication errors; all were traced back to alarm system issues. 94 of the reported events occurred in hospitals, with the majority of those events occurring in telemetry, intensive care, and emergency department areas. For the reported events, among the major contributing factors were:
► Absent or inadequate alarm system
► Improper alarm settings
► Alarm signals not audible in all areas
► Alarm signals inappropriately turned off

* The reporting of most sentinel events to The Joint Commission is voluntary and represents only a small proportion of actual events.

From January 2012 through June 4, 2014, ECRI Institute's Health Devices Alerts database received 72 alarm-related hazards, recalls, and alerts. Of those reports, 72% involved patient monitor, infusion pump, ventilator, or bed/bed-exit alarms. The types of problems reported include alarms not activating or becoming disabled, delayed or failed delivery of alarms to ancillary notification systems, inaudible alarms, and erroneous alarms.

ECRI's Top 10 Technology Hazards of 2017:

1	Infusion errors, which can be deadly if simple safety steps are overlooked
2	Inadequate cleaning of complex reusable instruments, which can lead to infections
3	Missed ventilator alarms, which can lead to patient harm
4	Undetected opioid-induced respiratory depression
5	Infection risks with heater-cooler devices used in cardiothoracic surgery
6	Software management gaps that put patients, and patient data, at risk
7	Occupational radiation hazards in hybrid ORs
8	Automated dispensing cabinet setup and use errors, which may cause medication mishaps
9	Surgical stapler misuse and malfunctions
10	Device failures caused by cleaning products and practices

Of the 10 hazards on the 2017 list, which in your opinion should receive top priority now? Why?

In my opinion, the 2017 list highlights repeat issues that have been hazards in the past. All 10 hazards were given a broader consideration. People & Process factors resulting to technology hazards were a major part of our report and remedy guidance. Although our list does not prioritise any one as the most important two hazards which I think Asia healthcare providers should pay heightened attention to:

1. Missed Ventilator Alarm

We have addressed the need to improve the safety of clinical alarm systems in every edition of our Top 10 Health Technology Hazards list since its inception in 2007. The importance of this effort was also highlighted by the US Joint Commission's National Patient Safety Goal on clinical alarm safety, which went into full effect in January 2016.

While we recognise that many healthcare facilities' alarm improvement efforts have, to date, focused on the alarms generated by physiologic monitoring systems, we must not ignore the risks associated with other devices, such as ventilators.

Ventilators are life-sustaining devices which generate a large number of alarms - and managing these alarms pose some unique challenges. Ventilators have limited options available for addressing these needs. With respect to improving the reliability of alarm notification, most ventilator alarms sound only at the patient's bedside. Ventilators do not include a central station that could display information from all the ventilators in the care area in one location, nor do they typically provide a means to allow the display of alarms outside the patient's room.

2. Automated Dispensing Cabinet (ADC) – Error Causing Medication Mishap

To improve care efficiency and effectiveness, many healthcare providers have adopted ADC technology. While I think, this technology achieves the desired objective, reports on associated hazards are still being reported, for instance medication errors.

Medication errors and near misses associated with ADCs have been traced to insufficient planning when setting up medication drawers, as well as errors made when stocking them. Findings indicate that poor choices made when setting up ADCs, as well as mistakes made during use, can lead to harmful medication errors.

We have received incidents reported that include: the presence of the wrong drug or dose in an ADC pocket, the availability of high-alert drugs in unsecured areas of the cabinet, and the unavailability of needed drugs.

Problems such as these have resulted in delays in patient care and the administration of incorrect drugs or drug concentrations, leading in some cases to severe patient injury.

Which type of current healthcare technology do you think has the most impact on preventing hazards?

There is no specific technology that prevents all hazards. From ECRI's accident investigation records, accidents and adverse events are caused by multiple factors and not just technology alone.

In our 2017 Top 10 Health Technology report, you will find cases where the underlining cause is a combination of factors such as ancillary products to a device/technology, processes, and users. Our data suggest that factors contributing to hazards are commonly a combination of Technology, People and Process.

Various attempts in the past to acquire better or updated technology with new features as a measure to mitigate such risks however, improved technology can only provide a partial solution, while other factors require attention as well in order to effectively mitigate this risk.

As part of risk mitigation, we often look at multiple angles particularly in Asia, for example;
i.   Look into the evidence justifying a technology that you are adopting
ii. Consider the impact on your current processes
iii. Consider the impact on skills, knowledge and human resources.
iv. Consider the safety aspects for both patients and users

Monitoring effort on performance of technology, processes and people could be improved by leveraging on monitoring systems, and the implementation of policies & guidelines.

How about in the future? Which type of futuristic healthcare technology do you think will have the most impact on lowering the occurrence of hazards?

The use of Information Technology system in monitoring elements of care provided would potentially play a great role in the risk mitigation strategy. I find that Health IT systems today are improving particularly in the space of managing care output data such as patient records, data from device-system integration etc. There is a huge potential for IT systems to support human intervention in managing risks associated to care in a healthcare facility.

We have witnessed the growth of patient-centered care where physicians use vast amounts of information about a patient in tailoring a personalized medicine treatment or therapy. This is primarily driven by the fact that patients are being more involved in their prognosis and treatment. Information and data become paramount in their decision-making process. Similarly, I believe the demand by the healthcare facility management on clarity of its risk will grow. Hospital management is duty-bound in ensuring risk is mitigated and monitored, effectively and accurately, hence leading me to believe that information technology systems can soon evolve to play a role in risk mitigation. Areas concerning policy and guidelines will need to be absolute spot on by the healthcare providers.

In three keywords or phrases, what is the key to preventing hazards from occurring in healthcare?

Justify technology with evidence	Assess impact factors	Monitor with risk policy and guidelines

EXCLUSIVE FOR HIMSS ASIA PACIFIC MEMBERS

This feature piece is based on the Executive Brief of 2017 Top 10 Health Technology Hazards which is the abridged version that highlights the 10 topics selected for 2017. This is free and downloadable here.

Detailed guidance for addressing each topic / hazard is only provided in the full report. ECRI and HIMSS are pleased to offer a special price of USD 100/report for HIMSS members only this year (usual price: USD 285/report). To take advantage of this offer, send your request to ECRI Institute Asia Pacific Regional office here.