There have been serious and, in some cases, possibly fatal mishaps from errors, malfunctions and oversights in the design of electronic health records (EHR) systems. There were 171 health information technology-related problems reported during a nine-week period to the ECRI Institute PSO, a patient safety organization in Plymouth Meeting, Pennsylvania, that works with health systems and hospital associations in Kentucky, Michigan, Ohio, Tennessee and elsewhere to analyze and prevent adverse events. Eight of the incidents reported involved patient harm, and three may have contributed to patient deaths [Ref. 1]. Among the mishaps were:

- A computer in the operating room that was supposed to allow access to the most recent radiographic information malfunctioned and would show only a blue screen. The patient’s time under anesthesia was extended while OR staff struggled to get the display to function properly.
- Following a consultation about a patient’s wounds, a nurse at one hospital tried to enter instructions into the electronic record, but the system would not allow the nurse to type more than five characters in the comment field.
- Medication label scanning functions failed.
- An error message was incorrectly displayed every time a particular drug was ordered.
- One system failed to issue an alert when a pregnancy test was ordered for a male patient.
- A system retrieved the wrong patient record because it did not ask the user to validate the patient identity before proceeding.
- One nurse recorded blood glucose results for the wrong patient due to typing the incorrect patient identification number to access the record.
- Incorrect medication and an unnecessary chest x-ray were ordered.

The leading cause of problems was a general malfunction, responsible for 29 percent of incidents. A quarter of incidents were related to data output problems, such as retrieving the wrong patient record. Twenty-four percent of incidents were linked to data input mistakes. Most of the remaining event reports were related to data transfer failures, such as a case where, even though the physician ordered a stop to anti-coagulant medication, the system failed and did not properly transfer this order to the pharmacy system. The patient received extra doses of the medication before it was stopped.

The ECRI Institute recommends that hospitals and clinics conduct extensive tests before using a new electronic system in patient care. They should also incorporate interfaces designed to prevent errors. For example, an interface should not allow alphabetic characters in numeric entry fields. To prevent wrong-record retrievals, systems should require validation of a patient’s identity, such as the patient’s initials, gender and age, before the electronic record is opened. From a system safety point of view, there is a lot that needs to be understood and addressed.

A December 2012 Pennsylvania Patient Safety Authority study found that the number of EHR-related adverse events reported to the Authority doubled in just one year, from 555 in 2010 to 1,142 in 2011. In response to a November, 2011 Institute of Medicine report, the Health and Human Services Department’s Office of the National Coordinator (ONC) for Health Information Technology in January released a plan to make tracking and fixing EHR-related problems easier. The ONC is urging health IT vendors to work with PSOs to collect and analyze adverse events. The concerns of physicians and other healthcare providers should be closely integrated in re-designing these systems to improve efficiency, quality of care and patient safety. Instead of taking more time away from physicians to spend at the patients’ bedside, the EHRs should require less time in front of a computer.
Improvements on the Horizon

Today, up to 70 percent of doctors nationwide use an EHR system, but most don’t do so willingly, according to Zubin Emsley, CEO of ChartLogic [Ref. 2]. During the past four years, he says, many practices have switched to EHRs for the sake of meaningful use incentives, but many of these products don’t offer much beyond the hope of a short-term reward. This means that many doctors are stuck using a clunky system that forces hundreds of clicks and slows them down. With the burden of extensive documentation and paperwork, physicians are forced to sometimes decrease time spent with a patient, which has caused significant dissatisfaction among doctors who want to provide valuable care, support and counseling to the patient and his or her family. He adds that vendors are finally realizing that, with the competitive EHR market we’re in now, their clients won’t be loyal to them if their products are still hard to learn and use. Likewise, the government is looking for ways to standardize usability. Increased focus on usability can only mean good things for the healthcare industry. The National Institute of Standards and Technology (NIST) has outlined some formal procedures for evaluating the usability of electronic health record software. This guidance can be a useful tool for EHR developers to demonstrate that their systems don’t lead to user errors.

Some suggested solutions

Much can be learned from reported problems. The following actions can be taken:

• Perform Failure Mode and Effects Analysis (FMEA) on workflow and processes to determine how the unsafe mistakes can be made. This will also help in maintaining accreditation. The Joint Commission requires hospitals to use this method at least once a year.
• Involve EHR users in developing a checklist of EHR problems found on search engines. Make sure these problems cannot occur before buying the EHR system. If you already have the system, find ways to mitigate these risks with the help of the vendor.
• Perform Preliminary Hazard Analysis (PHA) before buying the EHR system. If the EHR system has already been purchased, PHA may still be useful in upgrading the system. It provides a different view of mishap scenarios. This methodology was covered in a prior article [Ref. 3].
• Conduct extensive tests before full implementation to ensure that the health IT system operates as expected.
• Provide user training and ongoing support, and educate users about the capabilities and limitations of the system.
• Closely monitor the system’s ease of use and promptly address problems that users encounter.
• Require reporting of health IT-related events and near misses on incidence reports, with the goal of promoting improvement instead of litigation.

The electronic medical record system is a double-edged sword. With it comes portability, access and information systems transfer, but there is much room for improvement. Some systems can be expensive, cumbersome and time-consuming, compounded by malfunctioning technologies. Unfortunately, these limitations keep EHRs from achieving the intent for which they were created in the first place.

References