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Design of Electronic Health Records Can Lead to Patient Harm

Overview

The shift from paper medical records to electronic health records (EHRs) has caused unintended patient safety problems. Although the federal government has spent more than $30 billion to encourage hospitals and medical clinics to adopt these records, design deficiencies can disrupt clinician workflow and cause providers to miss key information. This, in turn, can threaten the safety of patients. Examples include people receiving the wrong medications, clinicians accidentally dismissing alerts of harmful drug interactions, and physicians missing important test results.

To address these design-related hazards, practices for testing EHRs should focus more on safety, and the federal government, hospitals, clinicians, and software vendors should collaborate to study problems associated with these products and disseminate lessons learned.

Patient harm due to EHR design

EHR usability refers to how clinicians input information and otherwise interact with the system. Usability problems have caused serious patient safety incidents, including death:

- One pediatric patient received 38 times the appropriate amount of an antibiotic and suffered a seizure as a result. The physician prescribed what appeared to be a routine dose of the antibiotic, not realizing that the EHR default setting for pediatric medication orders was set to milligrams per kilogram. Instead of ordering a 160-mg pill, the physician inadvertently ordered a 160-mg/kg dose. Although several alerts were in place to notify the physician, pharmacist, and nurse of the potential overdose, they were dismissed because the EHR was known to commonly issue unhelpful or erroneous warnings.[1]
- A patient in a Maryland hospital died due to an automated order change in the EHR system. The patient was prescribed a pureed diet because he was having trouble swallowing. A few days later, his nurse noted in the EHR that he should also receive a low-calorie diet, but this caused the system to override the initial order and the patient choked when trying to eat a regular meal.[2]

Policy solutions to improve patient safety

Addressing these safety problems requires changes to the testing requirements for EHRs and more data on the most prevalent ways that the design of these records can put patients at risk.

Enhance EHR testing

Regulations governing electronic health records require vendors to state that their products can perform certain functions but not that those tasks can be accomplished safely. Although regulations require clinician input during the design of health record systems, researchers have found that some vendors do not appropriately consult with usability experts while their products are being developed.[3]

To address usability, EHR vendors should test their products for safety and functionality throughout product development (during the design process, immediately before it is sold, and following its installation within a facility).

Establish a health information technology safety collaborative

To efficiently identify safety problems and disseminate best practices to address them, an entity should be established to convene EHR vendors, users, researchers, and the government to improve patient safety.

An expert panel convened by the Institute of Medicine first recommended the development of a safety center in 2011.[4] Subsequently, experts convened by the Office of the National Coordinator for Health Information Technology (ONC), which oversees EHRs, have refined this proposal to establish a multistakeholder collaborative.[5] Congress should pass legislation authorizing seed funding and encouraging the creation of such a network. Once established, this organization should develop and refine its business plan to ensure that its operations are self-sustaining.

Endnotes

1 Bob Wachter, "How Medical Tech Gave a Patient a Massive Overdose," *Backchannel*, March 30, 2015, https://backchannel.com/how-technology-led-a-hospital-to-give-a-patient-38-times-his-dosage-ded7b3688558#.t5q1urahi.

2 Maryland Department of Health and Mental Hygiene, *Maryland Hospital Patient Safety Program Annual Report: Fiscal Year 2013* (January 2014), http://dhmh.maryland.gov/ohcq/hos/docs/Reports/Hospital%20Patient%20Safety%20Report,%20FY13,%20FINAL.pdf.

3 Raj M. Ratwani et al., "Electronic Health Record Usability: Analysis of the User-Centered Design Processes of Eleven Electronic Health Record Vendors," *Journal of the American Medical Informatics Association* 22, no. 6 (2015): 1179–82, http://dx.doi.org/10.1093/jamia/ocv050.

4 Institute of Medicine, *Health IT and Patient Safety: Building Safer Systems for Better Care* (2011), http://www.nationalacademies.org/hmd/Reports/2011/Health-IT-and-Patient-Safety-Building-Safer-Systems-for-Better-Care.aspx.

5 Office of the National Coordinator for Health Information Technology, *Health IT Safety Center Roadmap: Collaborate on Solutions, Informed by Evidence* (2015), http://www.healthitsafety.org/uploads/4/3/6/4/43647387/roadmap.pdf.

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