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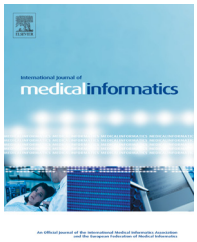

Contingency planning for electronic health record-based care continuity: A survey of recommended practices☆

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ABSTRACT

Background: Reliable health information technology (HIT) in general, and electronic health record systems (EHRs) in particular are essential to a high-performing healthcare system. When the availability of EHRs are disrupted, alternative methods must be used to maintain the continuity of healthcare.

Methods: We developed a survey to assess institutional practices to handle situations when EHRs were unavailable for use (downtime preparedness). We used literature reviews and expert opinion to develop items that assessed the implementation of potentially useful practices. We administered the survey to U.S.-based healthcare institutions that were members of a professional organization that focused on collaboration and sharing of HIT-related best practices among its members. All members were large integrated health systems.

Results: We received responses from 50 of the 59 (84%) member institutions. Nearly all (96%) institutions reported at least one unplanned downtime (of any length) in the last 3 years and 70% had at least one unplanned downtime greater than 8 h in the last 3 years. Three institutions reported that one or more patients were injured as a result of either a planned or unplanned downtime. The majority of institutions (70–85%) had implemented a portion of the useful practices we identified, but very few practices were followed by all organizations.

Conclusions: Unexpected downtimes related to EHRs appear to be fairly common among institutions in our survey. Most institutions had only partially implemented comprehensive contingency plans to maintain safe and effective healthcare during unexpected EHRs downtimes.

☆ The views expressed in this article are those of the authors and do not necessarily represent the views of the University of Texas, St. Luke's Health System, or Department of Veterans Affairs.

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1. Introduction

The United States of America's (USA) Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 [1] has led to increased adoption and use of health information technologies (HIT), particularly use of electronic health record systems (EHRs) [2] in previously paper-based healthcare systems. As such, healthcare processes are increasingly dependent on availability of HIT. However, HIT is not infallible and is subject to disruptions and downtimes that may threaten the continuity of operations [3] and cause adverse patient care outcomes, both of which can lead to financial and operational difficulties for healthcare organizations [4].

Over the last several years, there have been several highly publicized, widespread (i.e., affecting multiple facilities simultaneously), extended (i.e., lasting greater than 12 h) EHRs downtimes in the USA and Canada [5–12]. EHRs downtimes have also been reported in China [13]. However, there is little published description of practices that institutions are using to maintain the safety and effectiveness of continuous healthcare delivery while EHRs are unavailable. Our study goal was to describe EHRs downtime practices across a variety of healthcare institutions and identify practices that could be useful for planning for and dealing with EHRs unavailability. By describing and highlighting important elements of contingency plans across a variety of EHRs-enabled healthcare systems, our goal was to provide healthcare organizations with more comprehensive information to prepare for the risks of potential operational disruptions and avoid harm to patients.

2. Methods

2.1. Survey development

Before survey development, we reviewed the existing literature and did not find any previous survey that systematically described or assessed EHRs downtime practices within healthcare organizations. Therefore, we developed a survey for the purposes of the present study. The conceptual foundation for the survey was Sittig and Singh's eight-dimension sociotechnical model of safe and effective HIT use. Although not specific to EHRs downtime, this model describes the complex interactions within eight components or "dimensions" of a HIT system and/or process [14]. These include hardware and software; clinical content; user interface; people; workflow and communications; organizational policies, procedures, and the physical environment; external rules, regulations, and pressures; and system measurement and monitoring. By applying these dimensions to downtime processes, we developed survey items that addressed multiple, interrelated aspects of downtime preparedness and processes.

Following review of published articles describing noted EHRs downtimes along with articles describing best practices for contingency planning, we conducted fact-finding interviews (April–September 2011) at three large academic institutions and two community hospitals to elicit policies, procedures, and practices related to EHRs downtimes. Interview participants included IT personnel and hospital administrators. These interviews revealed a large degree of heterogeneity between institutions in policies, procedures, and practices and informed the development of items related to each dimension of our sociotechnical conceptual model. For example, in the "people" dimension, representatives from all institutions mentioned the need to train key personnel on appropriate downtime procedures, although there were significant differences in the type and extent of training offered. In addition to interviews, we observed a planned downtime (November 2011) at one of the academic hospitals to enable a better understanding of practices related to the "workflow and communication" dimension. Thus, a combination of data from interviews, our observations of a planned downtime, and a pre-publication copy of the American Health Lawyers Association (AHLA) Emergency Preparedness Checklist [15], developed by a team of lawyers with extensive experience in managing the aftermath of unexpected EHRs downtimes, provided information required to create items for our EHRs downtime survey. These data also provided us with a conceptual basis to discover potentially useful practices for EHRs contingency planning. Early drafts of the survey were pilot tested with five subjects, not involved in the original survey development, who had extensive experience working in EHRs-enabled healthcare organizations. Several questions and many of the response options were modified in response to their feedback. The final version of the survey consisted of 96 multiple choice and free text items where respondents could describe their institutions' policies, procedures and practices during scheduled or unscheduled downtimes (see Appendix A).

2.2. Survey administration

We administered an online version of the downtime survey through a web-based questionnaire hosting service (https://www.SurveyMonkey.com). Following approval by our local institutional review board (December 2011), the survey was distributed to the Scottsdale Institute's member email distribution list in February 2012 [16]. At the time of the survey, the Scottsdale Institute consisted of 59 member organizations focused on improving their organization's HIT practices. The Scottsdale Institute reported that their members have a mean, Health Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM) score of 4.6. In addition, 75% of these members reported a score of 4 or greater. Healthcare organizations with HIMSS EMRAM scores of 4 or greater are using computerized physician order entry with clinical decision support, have implemented the major ancillary systems (i.e., pharmacy, laboratory, and radiology), have a clinical data repository for results review, and have an electronic medication administration record. These organizations are likely at much greater risk in the event of system unavailability for any reason [17]. Members included institutional leaders (e.g., chief executive officers, chief information officers, and chief financial officers) and HIT experts from large healthcare organizations across the USA. Participants were asked to base their responses on the current EHRs downtime practices of their respective organizations. One email reminder was sent to prospective participants after 2 weeks, and the survey was closed after one month.