

Administration of Emergency Medicine

OBSERVATIONAL STUDY AND ESTIMATE OF COST SAVINGS FROM USE OF A HEALTH INFORMATION EXCHANGE IN AN ACADEMIC EMERGENCY DEPARTMENT

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Abstract—Background: Federal initiatives to improve health care information sharing have led to the development of a new type of regional electronic medical record known as a health information exchange (HIE). **Objective:** Our aim was to investigate the ability of an HIE to decrease health services use for emergency department (ED) patients. **Methods:** We performed an observational, prospective study using a voluntary, anonymous survey among clinicians at an urban academic ED. All ED clinicians were eligible to participate. Survey items addressed clinician perception of whether information from the HIE avoided the use of hospital resources, improved quality of care, and reduced length of stay (LOS). Cost savings were estimated by multiplying the number of services the clinicians completing our survey reported they avoided through use of the HIE by the costs of those services at our facility. The study was approved by the Institutional Review Board at the study site. **Results:** The study was conducted between August and December of 2011. There were 18,529 patient encounters during the study period and 60 clinicians at the study site who were eligible to participate. The clinicians consulted the HIE for 5.39% of these encounters (998 patients). Surveys were completed by the clinicians caring for 13.8% (n = 138) of these patients. Of the completed surveys, 76% (105 surveys) referenced patients for whom the HIE was found to contain information on the patient under care by the clinician participant. These

105 patients formed the sample on which our analysis was based. Within this sample of patients, the following studies were reported to have been avoided by the clinicians participating in our survey: values are percent of patients for whom a study was reported to have been avoided (actual number of studies avoided): laboratory/microbiology: 30.5% (32 studies); radiologic studies: 47.6% (50 studies); consultations: 19% (20 consultations); and admissions: 11.4% (12 admissions). Calculated cost savings based on these estimates were as follows: laboratory/microbiology: \$462.85; radiologic studies: \$160,893.00; consultations: \$3,990.00; and admissions: \$118,131.84. Total savings: \$283,477. Clinicians participating in the study reported improved quality of care for 86.7% of their patients, as well as a mean time savings of 120.8 minutes. **Conclusions:** According to clinician estimates, use of an HIE in this urban academic ED resulted in reduced use of hospital resources, noteworthy cost savings, decreased LOS, and improved quality of care. **Limitations** included the observational nature of the study, selection bias, the Hawthorne effect, and cost estimates being from a single institution. Allowance was not made for additional services used because of information obtained from the HIE. © 2014 Elsevier Inc.

Keywords—administration; health information technology; HIE; HITECH; cost analysis

INTRODUCTION

Emergency department (ED) use is common. According to the 2007 National Hospital Ambulatory Medical Care Survey, 1 in 5 Americans visited an ED during that year (1). In fact, many patients obtain all their care from the ED and choose the ED as their preferred and trusted source of health care (2). Many patients use multiple EDs and their records are therefore fragmented and sporadic due to limited information sharing between unaffiliated regional hospitals. The consequence is often inefficient, poor-quality care that is extraordinarily wasteful and costly (3).

Health information exchanges (HIEs) were developed and funded in response to the American Reinvestment and Recovery Act passed by Congress in 2009 to improve access to these fragmented records and potentially decrease duplicative testing, treatment, and costs. Their intent was to allow information sharing between doctors' offices, hospitals, and across health care systems, leading to better coordination of care. The original legislation established Regional Health Information Organizations (RHIOs) that set the "ground rules" for designing and operating HIEs. Using frameworks established by the RHIOs, most states have begun the process of building HIEs (4). The Meaningful Use Incentive Program encouraged independent institutions to share information to improve quality, safety, coordination of care, and decrease costs (5). Hospitals and providers were financially rewarded for upgrading to or installing electronic health records that facilitated greater access to health care information from multiple sources.

Previous studies have shown that, when available, HIEs are frequently consulted. A study at the New York-Presbyterian Hospital/Columbia University Medical Center found that when an HIE was available, it was consulted for 59% of ED visits, and in a study before an HIE was available, clinicians requested records from outside facilities for as few as 0–10% of their patients (6,7).

HIEs have been shown to be cost effective. Frisse et al. illustrated the financial impact of an HIE at an 11-hospital system in Memphis, Tennessee, calculating that an annual savings of \$1.07 million would be realized if all regional hospitals participated in and used the HIE (8). Frisse et al. also reported that if an HIE were fully operational in the Memphis region, taking into account the potential savings from avoiding unnecessary use of the ED and using the HIE to steer patients toward appropriate primary care, estimated savings in excess of \$8 million per year were possible (9).

In coastal South Carolina, an HIE (The Carolina eHealth Alliance [CeHA]) was established in 2009 with

funding by a grant from The Duke Endowment. Through CeHA, emergency clinicians have access to the combined electronic medical records (EMR) from all major hospitals and EDs in our region. The goal of CeHA is to greatly minimize the time and effort involved with obtaining health information from multiple sources within our region and to increase the frequency with which health care providers seek this information. We performed a pilot study to examine the impact of CeHA on resource use at our academic medical center and trauma center. Based on our data, we estimated the cost savings associated with health care services that were reported to have been avoided during our study. We hypothesized that emergency clinicians would be able to avoid duplicate testing and treatments, prevent unnecessary admissions, and reduce overall costs by receiving access to an information-sharing network involving all major regional hospitals.

METHODS

Our HIE was developed using a federated model designed by TELUS Health Solutions. This secure network allowed ED providers immediate access to medical records from each of the four participating hospital systems for all patients in their EDs. Records included laboratory results, radiology studies, consultations, pathology reports, transcriptions, and ED notes for the past 180 days. The emergency physician could view records for 4 h (average length of stay for an ED patient). The limit of 180 days was chosen to minimize the time that the edge servers would take to query the other hospitals for data; longer intervals created increased retrieval times that limited the utility of the system at the time of this pilot study. The 4 h of availability was an administrative decision related to proprietorship and was intended to prevent other hospitals from retrieving data after a patient had left the ED. These parameters were established based on negotiations between participating institutions with input from TELUS regarding the capabilities of the system. Patients presenting to the EDs of participating hospitals had the ability to "opt out" of giving consent to access their medical records through the HIE at the time of registration. No patients opted out during the study period (only one patient has opted out during the entire 2 years that our HIE has been operating).

The study was conducted between August and December of 2011 in the ED of an urban, academic medical center. The study design was observational and prospective, using a voluntary, anonymous survey (see Appendix). Eligible participants included attending physicians, residents, and mid-level providers (Physician Assistants and Nurse Practitioners). Survey items addressed whether

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