

The Effect of Electronic Health Record Implementation on Community Emergency Department Operational Measures of Performance

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Study objective: We study the effect of an emergency department (ED) electronic health record implementation on the operational metrics of a diverse group of community EDs.

Methods: We performed a retrospective before/after analysis of 23 EDs from a single management group that experienced ED electronic health record implementation (with the majority of electronic health records optimized specifically for ED use). We obtained electronic data for 4 length of stay measures (arrival to provider, admitted, discharged, and overall length of stay) and 4 measures of operational characteristics (left before treatment complete, significant returns, overall patient satisfaction, and provider efficiency). We compared the 6-month “baseline” period immediately before implementation with a “steady-state” period commencing 6 months after implementation for all 8 metrics.

Results: For the length of stay measures, there were no differences in the arrival-to-provider interval (difference of -0.02 hours; 95% confidence interval [CI] of difference -0.12 to 0.08), admitted length of stay (difference of 0.10 hours; 95% CI of difference -0.17 to 0.37), discharged length of stay (difference of 0.07 hours; 95% CI of difference -0.07 to 0.22), and overall length of stay (difference of 0.11 hours; 95% CI of difference -0.04 to 0.27). For operational characteristics, there were no differences in the percentage who left before treatment was complete (difference of 0.24%; 95% CI of difference -0.47% to 0.95%), significant returns (difference of -0.04%; 95% CI of difference -0.48% to 0.39%), overall percentile patient satisfaction (difference of -0.02%; 95% CI of difference -2.35% to 2.30%), and provider efficiency (difference of -0.05 patients/hour; 95% CI of difference -0.11 to 0.02).

Conclusion: There is no meaningful difference in 8 measures of operational performance for community EDs experiencing optimized ED electronic health record implementation between a baseline and steady-state period. [Ann Emerg Med. 2014;63:723-730.]

Please see page 724 for the Editor’s Capsule Summary of this article.

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0196-0644/\$-see front matter

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<http://dx.doi.org/10.1016/j.annemergmed.2013.12.019>

INTRODUCTION

Background

Electronic health records have the potential to improve the quality, safety, and efficiency of health care delivery.¹⁻¹² To accelerate the adoption and use of electronic health records, the federal government is providing \$17 billion to give incentive for the adoption and meaningful use of health care information technology, with penalties for hospitals and providers that do not comply by 2015.^{13,14} Although emergency physicians and management groups are not eligible to receive incentive payments, emergency department (ED) electronic health record use can support the fulfillment of hospital-specific meaningful

use criteria, so there is a shared motivation to adopt ED health care information technology.¹⁵

Importance

Hospitals are increasingly adopting and using electronic health records in response to these national policies¹⁶; however, less attention has been paid to the effect on workflow, efficiency, and accuracy of documentation.^{17,18} Recently, the economic and operational benefits and projected cost savings of health care information technology have been called into question.¹⁷ Emergency clinicians often complain that electronic health records slow them down, are difficult to use, and are limited by repetition

Editor's Capsule Summary

What is already known on this topic

Electronic health record implementation in some emergency departments (EDs) has been reported to have a significant effect on their efficiency.

What question this study addressed

Changes in length of stay and other measures of timeliness, left without being seen rates, patient returns, and patient satisfaction before and after electronic health record implementation across 23 EDs (13 rural) staffed by a community physician group, with a mean admission rate of 12%. Twenty of the EDs used software that was ED oriented and optimized.

What this study adds to our knowledge

Averaged over the group of EDs as a whole, transient increases were observed in length of stay immediately after electronic health record implementation, but these metrics returned to baseline, not appreciably deteriorating or improving.

How this is relevant to clinical practice

These data suggest that community emergency physicians adjust to this type of electronic health record and that commonly measured operational characteristics are not permanently worsened or improved. These findings cannot be extrapolated to academic settings or major enterprise-wide electronic health record products.

of canned phrases.¹⁷ These operational challenges are particularly important in the ED, which plays a critical role in the health care system as the primary source of admission to hospitals, supporting primary care practices and serving as a vital safety net for society's most vulnerable patients.¹⁹ Additionally, the ED is one of the largest contributors to overall hospital operational efficiency.²⁰ As a result, streamlined patient flow and provider efficiency in the ED are fundamental to delivering high-quality care not only to the ED but also throughout the hospital and health system. Several groups have found that length of stay increased during ED electronic health record implementation, with a return to baseline in the postimplementation ramp-up period.²¹⁻²³ Other studies have found conflicting results with reduced length of stay and improved efficiency.¹ However, these are single-site studies at academic facilities, limiting the generalizability of their findings. As hospitals and EDs continue to adopt electronic health records, continued investigation is needed to better understand and find ways to mitigate

disruptions associated with electronic health record implementation and to maximize operational efficiencies.

Goals of This Investigation

We sought to study the effect of ED electronic health record implementation on operational metrics before and after steady state of implementation across a broad range of EDs. Our goal was to describe how an aggregate group of EDs responded to electronic health record implementation, not the factors associated with returning to baseline. We hypothesized that ED performance measurements would return to baseline after implementation.

MATERIALS AND METHODS

Study Design, Setting, and Selection of Participants

In January 2013, we collected data from an enterprise data warehouse created by Schumacher Group, a multistate, diverse management group, herein referred to as "the management group," that offers physician and midlevel provider services for EDs and other clinical settings. The management group provides emergency care in 27 states, including approximately 160 hospital-based ED sites. Each facility transmits electronic and scanned paper charts daily to a centralized location to be stored in an internal storage management system.

The management group uses trained personnel to extract uniform data fields from scanned copies of heterogeneous documentation systems. A group of 30 to 40 rotating data abstractors were trained with the management group's data extraction processes. Initially, a supervisor oversaw all data extraction. As accuracy and reliability improved, direct supervision gradually decreased, transitioning to sample audits for ongoing monitoring of data quality. Data extractors use standardized processes and standard fields, and data were subsequently stored in an enterprise data warehouse. The data extraction process occurs routinely, whether an electronic health record is being implemented or not, as a part of the management group's quality and informatics processes. All data extractors were blind to the presence of a study, its purposes, the facilities under review, and the duration of review.

Time-stamped data were preferentially used. However, if time stamps were unavailable, time entered by nurses or physicians in the electronic health record was used. Our inclusion criteria were facilities within the management group's purview that implemented an electronic health record in the ED in the previous 36 months. Specifically, to be included, sites had to have electronic operational data available for 1 year immediately before electronic health record implementation and 1 year after implementation.

To operationalize the definition of "electronic health record implementation," we first had to define this event. An ED electronic health record is specifically designed to manage data and workflow in support of ED patient care and operations, including patient registration and tracking, clinical documentation, computerized provider order entry, results reporting, and discharge management.²⁴ ED electronic health record components can be

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