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Administration of Emergency Medicine

A MODEL FOR ELECTRONIC HANDOFF BETWEEN THE EMERGENCY DEPARTMENT AND INPATIENT UNITS

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Abstract—Background: Patient handoffs between units can introduce risk and time delays. Verbal communication is the most common mode of handoff, but requires coordination between different parties. **Objective:** We present an asynchronous patient handoff process supported by a structured electronic signout for admissions from the emergency department (ED) to the inpatient medicine service. **Methods:** A retrospective review of patients admitted to the medical service from July 1, 2011 to June 30, 2015 at a tertiary referral center with 520 inpatient beds and 57,000 ED visits annually. We developed a model for structured electronic, asynchronous signout that includes an option to request verbal communication after review of the electronic handoff information. **Results:** During the 2010 academic year (AY) all admissions used verbal communication for signout. The following academic year, electronic signout was implemented and 77.5% of admissions were accepted with electronic signout. The rate increased to 87.3% by AY 2014. The rate of transfer from floor to an intensive care unit within 24 h for the year before and 4 years after implementation of the electronic signout system was collected and calculated with 95% confidence interval. There was no statistically significant difference between the year prior

and the years after the implementation. **Conclusions:** Our handoff model sought to maximize the opportunity for asynchronous signout while still providing the opportunity for verbal signout when deemed necessary. The process was rapidly adopted with the majority of patients being accepted electronically. © 2017 Elsevier Inc. All rights reserved.

Keywords—emergency department; communication; hospitalization; patient handoff

INTRODUCTION

Medical hospitalizations from the emergency department (ED) require transfer to an inpatient medical service once the need for inpatient care has been established and the emergency workup is completed. A verbal signout process traditionally supports this transfer of care between departments.

Importance

Although verbal signout facilitates exchange of critical information by providing opportunity for questions or clarifications, vulnerabilities may include loss of information by relying on nonstandard handoff formats, delays in patient flow because of the time needed to contact and connect the appropriate physicians and nurses, and an increased workload for both the sending and receiving providers.

All authors contributed to the design of the handoff system and contributed to the editing of the manuscript. L. D. Sanchez takes responsibility for the final manuscript. D. T. Chiu conducted the statistical analysis.

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Goals of This Investigation

We present an asynchronous patient handoff process supported by a structured electronic signout application, developed at our institution, intended to improve efficiency by reducing some of the aforementioned bottlenecks for admissions from the ED to the inpatient medicine service.

METHODS

Study Design and Setting

This study was a retrospective single-center review of consecutive patients that were admitted to the medical service from July 1, 2011 to June 30, 2015. From July 1, 2011 onward, medical admissions from the ED utilized the electronic signout protocol, which includes an option for verbal signout when needed. The Institutional Review Board reviewed and approved this study. The setting for this study was an urban, academic, tertiary referral center with 520 inpatient beds and >57,000 ED visits annually. Of the total annual ED visits, approximately 38% of the patients are admitted to the hospital. Of these admissions, approximately 40% are admitted to a medical, non-intensive care service. At our institution, emergency physicians are authorized to request assignment of a bed on the inpatient medical service without prior notification or approval from the medicine service. Once an available inpatient bed has been assigned, a member of the accepting medical team then communicates with the ED resident for handoff of the patient. Once signout has been conveyed and accepted, holding orders are placed, signaling that the patient is ready to be transferred out of the ED to the inpatient unit.

Outcomes

We analyzed several outcome measures in this study. The first was the number of signouts where verbal discussion was requested, measured as a proportion. We also looked at the change in median time from inpatient bed assignment until holding orders were placed. This metric represents the time it takes for an inpatient staff to accept an admission. We analyzed the rate of transfer from the floor to intensive care unit (ICU) within 24 h as a method of assessing unintended patient harm from the new system encouraging mis-triage of medically admitted floor patients. Another secondary outcome measure that was tracked was the volume of reminder pages sent out to the inpatient team to prompt them to view the ED dashboard and either request verbal discussion or accept the patient.

Analysis

Descriptive statistics are reported. Medians and interquartile ranges were calculated for non-normally distributed data, such as time to events. Rate and proportions were generated when dealing with ordinal data. The primary outcome measure was the duration between inpatient bed assignment time to time of holding orders. This represents a time to event that is not normally distributed. As such, we treated this outcome measure as survival analysis and generated Kaplan-Meier curves. One curve was generated for those admitted to the medical service with verbal signout and those with electronic signout. Log-rank test was performed comparing the time from inpatient bed assignment to ED holding orders placement between pre- and post-electronic signout implementation.

To account for potential confounders that could be affecting the outcome measure as well as to further test for significance comparing those who have signout accepted verbally to electronically, a Cox proportional hazard model was generated. The outcome measure again was time from inpatient bed assignment to ED holding orders placement. To this model, we added the covariate of interest that is whether the patient has verbal signout vs. electronic signout. We then added other potential confounding covariates, such as age, gender, patient acuity as defined by Emergency Severity Index, and the academic year of presentation. A Wald test was performed from the Cox proportional hazards model to test for significance. Microsoft Excel 2011 and JMP Pro 12 were used for statistical analysis.

RESULTS

During the academic year of 2010, there were a total of 10,862 admissions, all of which were signed out verbally. Electronic signout was implemented July 1, 2011 and there were 9559 medicine admissions. Of these, 7406 patients (77.5%) were accepted to the medicine service with the electronic signout workflow, while the inpatient team requested verbal discussion for the remaining 2153 patients. Each successive academic year saw a continued reduction in the percentage that required verbal discussion. The initial 77.5% electronic signout rate increased to 81.7% academic year (AY) 2012, 84.0% AY 2013, and 87.3% AY 2014 (Figure 1).

For the first 6 months after system implementation, there was a steady decrease in percentage of verbal discussion requested. The first month after implementation (July 2011), 33% of admissions had verbal discussion requested. By November 2011, the volume dropped to approximately 20% for the rest of that academic year.

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