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Patient Hand-Off iNitiation and Evaluation (PHONE) study: A randomized trial of patient handoff methods

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ABSTRACT

Background: As residency work hour restrictions have tightened, transitions of care have become more frequent. Many institutions dedicate significant time and resources to patient handoffs despite the fact that the ideal method is relatively unknown. We sought to compare the effect of a rigorous formal handoff approach to a minimized but focused handoff process on patient outcomes.

Methods: A randomized prospective trial was conducted at a large teaching hospital over ten months. Patients were assigned to services employing either formal or focused handoffs. Residents were trained on handoff techniques and then observed by trained researchers. Outcome data including mortality, negative events, adverse events, and length of stay were collected and compared between formal and focused handoff groups using t-tests and a multivariate regression analysis.

Results: A total of 5157 unique patient-admissions were stratified into the two study groups. Focused handoffs were significantly shorter and included fewer patients (mean 6.3 patients discussed over 6.7 min vs. 35.2 patients over 20.6 min, both $p < 0.001$). Adverse events occurred during 16.7% of patient admissions. While overall length of stay was slightly shorter in the formal handoff group (5.50 days vs 5.88 days, $p = 0.024$) in univariate analysis only, there were no significant differences in patient outcomes between the two handoff methods (all $p > 0.05$).

Conclusions: This large randomized trial comparing two contrasting handoff techniques demonstrated no clinically significant differences in patient outcomes. A minimalistic handoff process may save time and resources without negatively affecting patient outcomes.

1. Introduction

The patient handoff – the transfer of patient information from one medical caregiver to another – has become an increasingly important topic in healthcare. National requirements reducing work hours of physicians in training is one significant factor that has led to an increase in the number of these handoffs.[1] The University of California, San Francisco (UCSF) documented that ACGME duty hour requirements resulted in 15 handoffs per patient during an average five-day hospitalization and each intern was involved in over 300 handoffs during a typical month-long clinical rotation.[2] Unfortunately, the number of handoffs is inversely proportional to information retention, with only 2.5% of patient information being retained after 5 cycles of verbal simulated handoffs.[3] These communication issues have been implicated in delayed diagnostic evaluations, medication errors, and more patient complications.[4] According to The Joint Commission's Sentinel Event Database, communications breakdowns were the root cause of more than two-thirds of 2981 sentinel events from 2009 to 2011.[5] Ultimately, increased handoffs in patient care results in more opportunities for miscommunication and information loss.

In response, The Joint Commission on Accreditation of Hospital Organizations (JCAHO), Centers for Disease Control and Prevention (CDC), Accreditation Council for Graduate Medical Education (ACGME), and the World Health Organization (WHO) have all

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demonstrated an increased focus on patient safety, specifically emphasizing handoff communication.[6–10] Despite universal emphasis on communication, there is currently no high-level evidence regarding the patient handoff process.[11] Previous studies have attempted to evaluate organized sign-out processes, but few studies to date have managed to evaluate objective patient outcomes. Instead, these studies were methodologically limited by self-reporting of errors and before-and-after approaches, both potentially fraught with bias.[12,13] Residents and physicians who have participated in patient handoffs express mixed results. While the information may be useful, the sheer volume of information transferred at one time, along with the difficulty of quickly applying this information in critical situations typically experienced during overnight call reduces the utility of this procedure. These limitations along with the paucity of data regarding true patient outcomes leaves the typical sign-out more a custom of habit and administrative compliance rather than obvious benefit. There is a growing need to evaluate, standardize, and improve patient handoffs.[14,15]

In an era of reduced work hours and difficulty meeting educational needs, the true utility of a mandatory daily sign-out has also been called into the question. Due to the inherent weaknesses of a typical formal handoff, and existing safety mechanisms in place, we hypothesized that there would likely be minimal difference on actual patient outcomes between a daily mandatory formal patient handoff and more brief focused handoffs. As such, we began the Patient Hand-Off iNitiation and Evaluation (PHONE) study, with the aim to prospectively study two contrasting methods of patient handoffs and determine if, after proper training and with a structured process of communication, patient outcomes are affected.

2. Methods

2.1. Setting

A prospective randomized trial of handoff methods among resident physicians was conducted at a single large (572-bed) teaching hospital over ten months from September 2012 to June 2013. The study was approved by departmental administration and the hospital institutional review board with a waiver of informed consent. All patients admitted or consulted to any of the surgical services were included and prospectively tracked. Seven services staffed with a total of thirty-five residents (PGY-1 through PGY-5) were used for this study.

2.2. Intervention

Training and education regarding communication and handoffs were given to residents before implementation of the study. A modified SBAR (Situation − Background − Assessment − Recommendations) handoff mnemonic to be used for formal handoffs was created and taught to each resident. After training, residents participated in a simulated patient handoff in order to evaluate handoff techniques and troubleshoot the handoff method before full implementation.

Two separate handoff methods were utilized during the study period, named *formal* and *focused*. Formal standardized handoffs followed a specific protocol and occurred each day during a formal sign-out (a group meeting involving multiple patient handoffs). These sign-outs were both written and verbal, took place at a specific time, in a quiet environment, done in person with a senior resident, using the mnemonic, and incorporating printed lists generated from the electronic medical record (EMR). Focused handoffs were informal, often minimalistic, ad lib events which focused only on patients felt to require specific attention, and most often only contained a verbal component. These handoffs were not required to be in person or at a specific time, and were even occasionally omitted if no specific concerns were to be addressed overnight. This represented the minimum amount of time and effort put forth towards handoffs while still maintaining appropriate standards of patient communication and care set forth by JCAHO and the ACGME and overseen by surgery administration. Night float or on-call residents received all handoffs. The electronic medical record (EMR) used during both handoffs remained uniform over the entire study period and included current information regarding patient name, location, medical record number, admission date, admitting physician, and a brief clinical history.

The type of handoff used for any given patient was randomized by admission date. A schedule was created such that in any month each service employed either formal or focused handoffs and an equal amount of time was spent at both the service and resident level. Patients were then admitted to an individual service based on pathology and acuity within this assigned schedule. Fig. 1 depicts allocation of patients into each group.

2.3. Measurements

Handoffs were randomly monitored and recorded by trained independent observers (first, second, or third year medical students not otherwise involved in patient care). Study participants were not aware of which handoffs would be randomly observed until immediately before the sign-out took place. Documented information included the number of patients, number of assigned tasks for the call team (e.g. post-operative check of a patient, or review of pending laboratory results), and time taken for each sign-out. The observers also recorded whether the sign-out took place face-to-face, in a quiet environment, involved a senior resident, and whether the EMR was used. Additionally during each formal sign-out, three patients were randomly selected to assess for utilization of the handoff mnemonic.

In order to compare patient groups, demographics and clinical data were collected and used to calculate Acute Physiology and Chronic Health Evaluation II (APACHE II) scores. As Glasgow Coma Scale (GCS) scores were not regularly entered into the electronic medical record, a modified APACHE II score excluding GCS was used for each patient. APR-DRG SOI (All Patient Refined Diagnosis Related Groups Severity of Illness) levels were also recorded for each patient. If a patient underwent surgery during hospitalization, the American Society of Anesthesiologists physical status classification system number (ASA score) was collected. Comorbidities listed in the EMR were used to calculate a Charlson Comorbidity index score. A record of whether the patient underwent surgery during hospitalization was also maintained, and surgeries were categorized into elective, urgent, and emergent according to hospital policy.

Outcome data included mortality, negative events, adverse events, length of stay (LOS), and intensive care unit (ICU) length of stay. Any undesirable and unintended consequence of medical care, whether preventable or not, was considered a *negative event*, including patient safety events, medication errors, health-care acquired infections, and rapid response team activations. An *adverse event* was any negative event that caused harm to the patient. Negative event data was collected utilizing the hospital's established patient safety performance improvement systems, which included the institution's medication error hotline, internal review by the Patient Safety Committee, and assessment by managers and directors involved in patient safety, medication safety, and infection control.

All members responsible for collecting event data were blinded to the study groups. Due to the often delayed nature of safety data, records were additionally reviewed several months after discharge