"How To" Videos Improve Residents Performance of Essential Perioperative Electronic Medical Records and Clinical Tasks

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OBJECTIVE: The ability to use electronic medical records (EMR) is an essential skill for surgical residents. However, frustration and anxiety surrounding EMR tasks may detract from clinical performance. We created a series of brief, 1-3 minutes "how to" videos demonstrating 7 key perioperative EMR tasks: booking OR cases, placing preprocedure orders, ordering negative-pressure wound dressing supplies, updating day-of-surgery history and physical notes, writing brief operative notes, discharging patients from the postanesthesia care unit, and checking vital signs. Additionally, we used "Cutting Insights"—a locally developed responsive mobile application for surgical trainee education—as a platform for providing interns with easy access to these videos. We hypothesized that exposure to these videos would lead to increased resident efficiency and confidence in performing essential perioperative tasks, ultimately leading to improved clinical performance.

METHODS: Eleven surgery interns participated in this initiative. Before watching the "how to" videos, each intern was timed performing the aforementioned 7 key perioperative EMR tasks. They also underwent a simulated perioperative emergency requiring the performance of 3 of these EMR tasks in conjunction with 5 other required interventions (including notifying the chief resident, the anesthesia team, and the OR coordinator; and ordering fluid boluses, appropriate laboratories, and blood products). These simulations were scored on a scale from 0 to 8. The interns were then directed to watch the videos. Two days later, their times for performing the 7 tasks and their scores for a similar perioperative emergency simulation were once again recorded. Before and after watching the videos, participants were surveyed to assess their confidence in performing each EMR task using a 5-point Likert scale. We also elicited their opinions of the videos and web-based mobile application using a 5-point scale. Statistical analyses to assess for statistical significance ($p \leq 0.05$) were conducted using paired t-test for parametric variables and a Wilcoxon matched-pair test for nonparametric variables.

SETTING: Hospital of the University of Pennsylvania, Philadelphia, PA (a quaternary teaching hospital within the University of Pennsylvania Health System).

PARTICIPANTS: Eleven out of 15 interns (12 entered and 11 completed the study) from our categorical and preliminary general surgery residency programs during the 2016 academic year.

RESULTS: Before exposure to the brief "how to" videos, 6 of 11 interns were unable to complete all 7 EMR tasks; after exposure, all 11 interns were able to complete all 7 EMR tasks. Moreover, interns' times for each task improved following exposure. Interns self-reported improved confidence in booking an OR case (4 ± 0.9 vs. 4.7 ± 0.6, $p = 0.05$), ordering negative-pressure wound therapy supplies (3.1 ± 1.6 vs. 4.5 ± 0.7, $p < 0.05$), writing a brief operative note (3.7 ± 1.2 vs. 4.6 ± 0.7, $p = 0.05$), discharging patients from the postanesthesia care unit (3.3 ± 1.0 vs. 4.4 ± 0.8, $p < 0.05$), checking vital signs

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(2.5 ± 1.4 vs. 4.5 ± 0.8, p ≤ 0.01), and performing necessary EMR tasks during an emergency situation (2.4 ± 0.8 vs. 4.6 ± 0.7, p ≤ 0.0001). Participants also demonstrated a significant improvement in average clinical score on the emergency simulations (5.2 ± 1.7 vs. 6.6 ± 0.9, p < 0.05). Interns' opinions of the videos and the mobile phone application were favorable.

CONCLUSIONS: In our group of 11 surgery interns, exposure to a series of short "how to" videos led to increased confidence and shortened times in performing 7 essential EMR tasks. Additionally, during a simulated perioperative emergency, EMR tasks were performed significantly faster. Clinical performance also improved significantly following exposure to the videos. This just-in-time educational intervention could improve workflow efficiency and clinical performance, both of which may ultimately enhance perioperative patient safety. (J Surg Ed ∎:∎∎∎-∎∎∎. © 2017 Published by Elsevier Inc. on behalf of the Association of Program Directors in Surgery)

KEY WORDS: electronic medical records, instructional films and videos, mobile applications, medical simulation, internship and residency

COMPETENCIES: Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

Computer and information technologies have had and continue to have an effect on all facets of health care. During the last two decades, there has been increasing adoption of electronic medical records (EMR) in the United States. This surge in adoption is in many ways due to calls for widespread implementation[1-3] from the US Government Departments and Agencies aimed at improving health care quality and efficiency.[4-6] Therefore, the ability to use these systems efficiently has become an essential skill in any specialty, surgery included.

Despite facilitating new modes of information management and usage EMRs are often complex and challenging systems. Indeed, in our experience, residents' frustration and anxiety surrounding EMR tasks may detract from their clinical performance. Despite training sessions during pre-residency orientation, interns frequently learn EMR tasks by trial and error in the clinical setting, particularly at the beginning of the academic year. Therefore, it is not surprising that there is a subjective increase in perioperative staff complaints during July and August as new interns are figuring out how to use the system. As one example; at our institution, perioperative nurse managers report increased delays in placing of postoperative orders and postponed postanesthesia care unit (PACU) discharges at the beginning of the training year. These delays not only affect the

postprocedure units but also impact operating room (OR) workflows.

In an attempt to address these frustrations and workflow issues, we looked to leverage the advantages of new educational paradigms along with mobile technologies. Historically, physicians have created and relied on innovative technology to improve patient outcomes and quality of care.[7] A large proportion of today's trainees and learners belong to the millennial generation, and are therefore facile at employing computer and mobile technologies to help manage their personal and professional lives.[8] Indeed, data from the last decade show that as many as 93% of medical students and residents own a smartphone,[9] with at least 80% of these owning medical applications and 75% using these mobile applications at least weekly.[10-13] These evolving demographics of the medical trainee pool along with the availability of new technologies are changing the rules of engagement, shifting from a teacher-centric to a learner-centric model of medical education.[10] All of these changes provide new opportunities and methods for improving the educational experience.

We drew upon many of these technologies and approaches to devise a process that addressed the aforementioned EMR-related frustrations. The central intervention was the creation and deployment of a series of brief (1-3 minutes) "how to" videos demonstrating 7 key perioperative EMR tasks. The goal of these videos was to help the new interns navigate the system independently and enable them to complete critical orders essential for an efficient perioperative workflow. These were shared with the interns through a locally developed responsive web application called "Cutting Insights," a tool designed to support surgical trainee education by allowing users to upload, update, and access training multimedia content from any computer or mobile device. Finally, given the widely recognized role of simulation for improving trainee performance in the clinical environment and the OR[14-17] as well as the extensive experience with surgical and perioperative simulations in our institution, we incorporated this educational tool in our study as an additional way of evaluating the effectiveness of the "how to" videos.

We hypothesized that exposing our interns to these novel "how to" videos would enhance interns' clinical performance on the simulated emergencies and improve their efficiency, confidence, and task completion rate on performing these key perioperative EMR tasks. To evaluate our approach, we assessed the time it took our interns to perform key EMR tasks before and after having viewed the "how to" videos through our web application platform. We also assessed their use of these skills during a simulated perioperative emergency. Finally, we surveyed their level of confidence in executing these tasks both before and after exposure to the videos. Our aim was to demonstrate that these videos, deployed through an easily accessible mobile platform, could serve as an efficient adjunctive learning tool