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Simulation and education

Tablet-based cardiac arrest documentation: A pilot study☆,☆☆

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ABSTRACT

Aim: Conventional paper-based resuscitation transcripts are notoriously inaccurate, often lacking the precision that is necessary for recording a fast-paced resuscitation. The aim of this study was to evaluate whether a tablet computer-based application could improve upon conventional practices for resuscitation documentation.
Methods: Nurses used either the conventional paper code sheet or a tablet application during simulated resuscitation events. Recorded events were compared to a gold standard record generated from video recordings of the simulations and a CPR-sensing defibrillator/monitor. Events compared included defibrillations, medication deliveries, and other interventions.
Results: During the study period, 199 unique interventions were observed in the gold standard record. Of these, 102 occurred during simulations recorded by the tablet application, 78 by the paper code sheet, and 19 during scenarios captured simultaneously by both documentation methods These occurred over 18 simulated resuscitation scenarios, in which 9 nurses participated. The tablet application had a mean sensitivity of 88.0% for all interventions, compared to 67.9% for the paper code sheet ($P = 0.001$). The median time discrepancy was 3 s for the tablet, and 77 s for the paper code sheet when compared to the gold standard ($P < 0.001$).
Conclusions: Similar to prior studies, we found that conventional paper-based documentation practices are inaccurate, often misreporting intervention delivery times or missing their delivery entirely. However, our study also demonstrated that a tablet-based documentation method may represent a means to substantially improve resuscitation documentation quality, which could have implications for resuscitation quality improvement and research.

1. Introduction

Quality improvement for resuscitation requires precise and uniform documentation of interventions, including exact time of intervention delivery.[1–3] However, conventional paper documentation techniques are notoriously unreliable, and the time sources used during documentation are often inaccurate.[4–6] As a result, time documentation during resuscitations can be highly erroneous.[6,7] This study aimed to compare a tablet-based documentation method to a conventional paper-based method.

2. Methods

2.1. Study design and setting

We conducted a prospective interventional trial comparing the use of a tablet application for documenting resuscitations to a conventional paper-based record. The comparison was conducted during resuscitation simulations performed by hospital resuscitation teams during the summer of 2012. The study protocol and consent materials were approved by the University of Chicago Institutional Review Board.

The simulations studied are part of an annual, multi-disciplinary training, involving a team of three to four physician trainees and one to two nurses per scenario. Each team participates in four cardiac arrest scenarios of approximately ten minutes in duration, each followed by a debriefing, the details of which have been previously published.[8] The nurse participants in the study represented a convenience sample of nurses available to participate in the resuscitation training. Depending on availability, one or two nurses were present at each scenario. All simulations were video recorded (iSys Global, Fruit Heights, UT) and a CPR-sensing defibrillator/monitor

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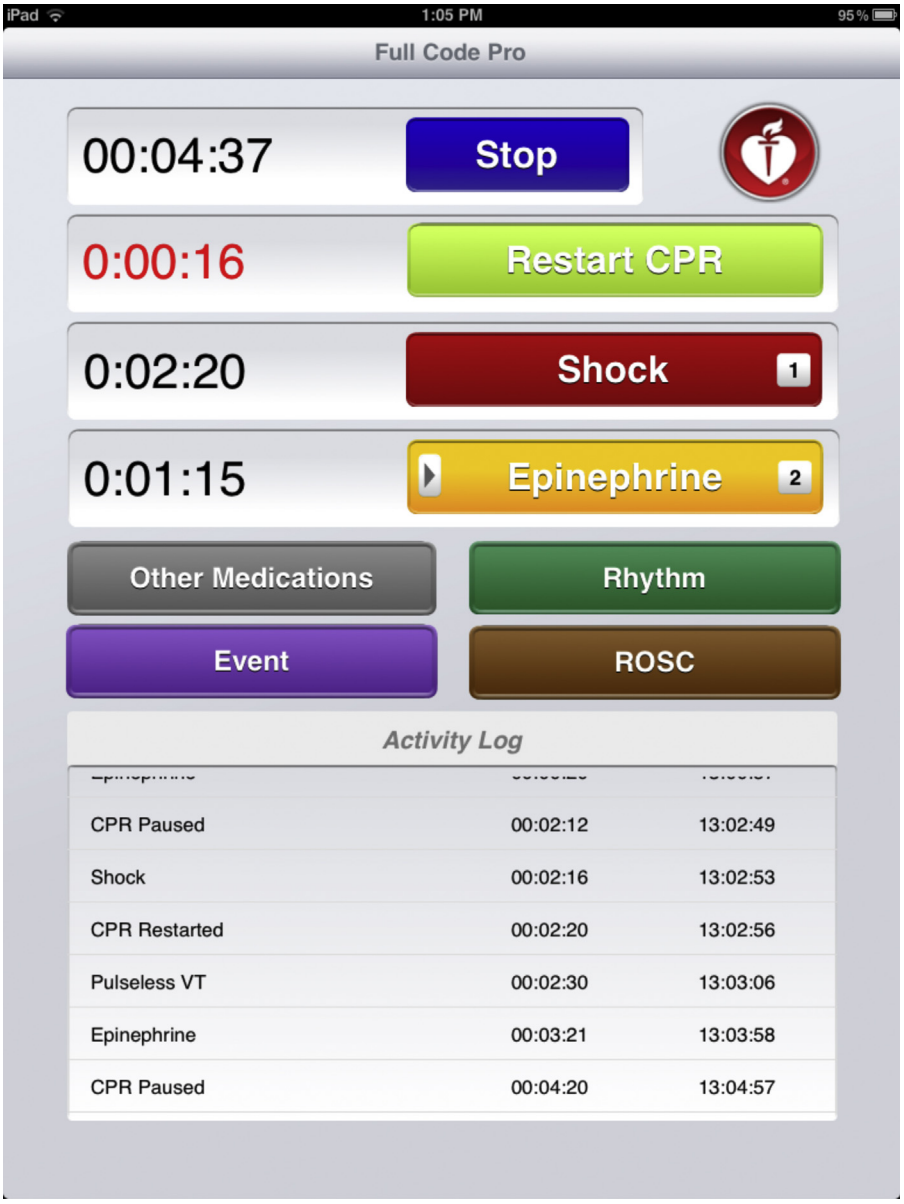

Fig. 1. Main screen of the tablet computer-based application, Full Code Pro.

(HeartStart MRx, Philips Healthcare, Andover, MA) was used. Prior to each simulation, both devices were synchronized to coordinated universal time (UTC) as displayed by www.time.gov.

In addition to documenting the simulation using a conventional paper code sheet, nurses in this study alternately used a software application (Full Code Pro, American Heart Association, Dallas, TX) installed on a tablet computer (iPad, Apple Inc., Cupertino, CA) to document resuscitation interventions. The tablet application employs a touchscreen interface for documenting interventions administered during a resuscitation (Fig. 1). We alternated which method (tablet or paper) a nurse would use first. When more than one nurse was present, the two methods were collected simultaneously, each by one nurse. Prior to documenting a simulation, nurses were allowed to briefly view and use both the paper code sheet and the tablet application, but no instruction was given for either method. Finally, at the conclusion of each simulation session, nurses were given a survey that solicited attitudes and preferences regarding their subjective evaluation of the two documentation methods. The survey utilized a 5-point Likert scale to compare the two documentation methods in terms of accuracy of data input, speed of documentation, and ease of use for reporting. A score of 1 indicated the tablet was much better for that measure, a score of 5 indicated the paper code sheet was much better, and a score of 3 indicated the two methods were equal.

2.2. Data analysis

A blinded investigator (J.P.) generated an objective, gold standard transcript for each simulation using the multifeed video recordings of each scenario and the log from the CPR-sensing defibrillator/monitor. Gold standard defibrillation/cardioversion times were abstracted from the defibrillator log, while other interventions, including medications, central lines, and intubations, were abstracted from the video record. Exact times of all interventions were recorded in a spreadsheet application (Excel, Microsoft Corp, Redmond, WA).

Statistical analysis was conducted using a statistical software package (Stata 12, StataCorp, College Station, TX). Two parameters were considered for each recorded event: whether the event was actually recorded (sensitivity) and the correspondence