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Need for in-hospital simulation-based educational facilitation for practical patient safety improvement

Keywords:
In-hospital
Simulation training
Patient safety
Interprofessional education

To the Editor,

Simulation-based education (SBE) methods have been developed and widely utilized for acquisition of both technical and non-technical skills regarding patient safety [1]. SBE is a principle component of many in-hospital Patient Safety and Interprofessional education (IPE) paradigms [2].

The Kirkpatrick model has been used for over 30 years as the major framework for evaluation of training effectiveness and outcomes. Kirkpatrick's vision and widespread application of the evaluation system have supported an increasingly rigorous body of evidence regarding effectiveness of various methods in professional healthcare training [3].

Increased healthcare worker competency and knowledge in the Patient Safety domain has been demonstrated following SBE courses using active learning techniques. However, outcomes measured have been largely limited to Kirkpatrick level 1 (reaction) and level 2 (learning) measures. Knowledge, skills and attitudes regarding patient safety can thus be "seeded" within organizations by key individuals who participate in Patient Safety Training incorporating SBE. Changes and improvement of hospital Patient Safety system outcomes however requires dissemination and adoption of knowledge skills and attitudes regarding patient safety throughout the entire workforce. Organizational dissemination of patient safety concepts can be measured and reported using tools such as the "Safety Climate Survey" [4]. Individual training is thus necessary, but not sufficient to effect measurable changes in outcomes, organizational dissemination and adoption of concepts by the entire professional healthcare workforce is required.

Achieving Kirkpatrick level 4 (result) Patient Safety program outcomes requires, interprofessional consensus. IPE scenario-based SBE with simulators or problem-based learning and discussion for patient safety can support consensus building. Development of facilitators for Patient Safety focused SBE is required. Fundamental Simulation Instructional Methods (FunSim) is a 2-day facilitator training curriculum developed at the SimTiki Simulation Center, University of Hawaii, completed by over 500 healthcare professionals and educators in Japan and the USA. Development of skilled facilitators for patient safety SBE within individual hospitals is one urgently required step towards realizing and measuring effective outcomes of hospital based patient safety programs. FunSim-J is an example of an adapted curriculum which was "localized" to for regional cultural, educational, and healthcare practices.

Nobuyasu Komasawa, MD, PhD
Department of Anesthesiology, Osaka Medical College, Japan
Corresponding author at: Department of Anesthesiology, Osaka Medical College, Daigaku-machi 2-7, Takatsuki, Osaka 569-8686, Japan
E-mail address: ane078@osaka-med.ac.jp

Benjamin W. Berg, MD
SimTiki Simulation Center, John A Burns School of Medicine, University of Hawai'i, United States

Toshiaki Minami, MD, PhD
Department of Anesthesiology, Osaka Medical College, Japan

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The authors respond: Top cited articles on ultrasound in the ED

Keywords:
Citation
Ultrasound
Emergency department

To the Editor,

Firstly, we would like to thank Dr. Lee for his detailed reviews and valuable contributions [1].

We have determined the most referenced studies in our study, by taking into account the total number of citations [2]. The same methodology was also used in former bibliometric studies [3,4]. However, taking into regard the possibility of a higher total number of citations in the former studies, we have also listed the annual citation numbers of the studies. We, as the reader, believe that the number of citations per year is an important parameter in demonstrating the rates of being read and cited, therefore the popularity of the studies. However, the total number of citations is also important for registering the cumulative effect of the study over the medical practice from the day it was published. For example, although annual citation numbers of the study titled Focused Assessment with Sonography for Trauma (FAST) are less than other USG areas, these studies have radically altered the USG applications in emergency departments. Likewise, as determined in our study, 32% of the most cited 100 articles in the field of emergency ultrasonography were on the evaluation of FAST.

As stated by Dr. Lee, review of the citations according to citation dates of the studies, may point to an important parameter in demonstrating the current popularity of the study. Indeed, newer studies included in our study had a higher number of annual citations. In contrast, as the reader states, there are no studies completed between 2011 and 2015, which were included in the most cited articles. Yet, the citation numbers can be very low for studies within the first 2 years following publication [5]. This evaluation is one of the many

restrictions of this study. Also, another restriction of our study is that self citations have not been researched.

While dividing the studies into five years periods based on their publication dates and comparing the annual citation rates, our aim was to draw attention to the differences between the annual citation numbers over the years. When this analysis is performed together with regression analysis, it is seen that the relationship between the publication date and the annual citation numbers are weak ($R^2 = 0.354$ and $p < 0.001$), however there is no meaningful relationship between the overall citation numbers and publication dates ($R^2 = 0.035$ and $p = 0.061$).

Lastly, our aim in statistical evaluation of the difference between the overall and annual citation numbers within USG fields was to review the relationship between USG study fields, and citation numbers and annual citations. Upon classifying the articles subject to our study based on the USG study fields, since a significant conclusion cannot be reached in such a subgroup analysis due to changing numbers (1–32), there are no remarks on the matter. In order to compare the effect of the USG study fields over citation numbers, we believe there is a need for more studies focused on this subject and more studies should be reviewed.

Başak Bayram, Assist. Prof. Dr
Department of Emergency Medicine, School of Medicine, Dokuz Eylül University, İzmir, Turkey
Corresponding author
E-mail address: basakdr@yahoo.com

Önder Limon, Specialist Physician
Gülsüm Limon, Specialist Physician
Department of Emergency Medicine, Medical Park Hospital, İzmir, Turkey

Volkan Hancı, Assoc. Prof. Dr.
Department of Anesthesiology and Reanimation, School of Medicine, Dokuz Eylül University, İzmir, Turkey
E-mail address: vhanci@gmail.com

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Application of high-flow nasal cannula to heterogeneous condition in the emergency department

Keywords:
High-flow oxygen therapy
Emergency department
Acute respiratory failure
Noninvasive ventilation,
Oxygen therapy

To date, there is limited evidence on the use of HFNC (high-flow nasal cannula) in adult patients presenting to the ED (emergency department) and on which patients benefit most from the therapy. There have been large-scale studies published which compared HFNC with COT (conventional oxygen therapy) regarding escalation to invasive ventilation, and the results seem conflicting until now. According to the HOT-ER study from New Zealand, HFNC was not shown to reduce the need for mechanical ventilation for subjects with acute respiratory distress compared to COT [1]. A total 303 patients were enrolled in the ED, and 3.6% in the HFNC group required mechanical ventilation compared to 7.2% in the COT group. On the other hand, Bell et al. reported that HFNC was associated with a lower proportion of patients requiring escalation in ventilation therapy (4.2% vs 19%. p = 0.02) compared with COT in a randomized controlled trial conducted in the ED with 100 patients [2].

Herein, we retrospectively reviewed the medical records of the patients with acute hypoxemic respiratory failure supported by HFNC therapy in the ED between January 2014 and February 2016. This study was conducted in an university hospital which is a tertiary hospital with 54 000 patients according to an annual census of ED visits. We included patients with hypercapnia, exacerbation of asthma or chronic respiratory failure, cardiogenic pulmonary edema, neutropenia, cancer or hemodynamic instability in order to represent the heterogeneity of patients vising ED, yet excluded patients with the duration of HFNC use less than 10 min and with the order of do-not-intubate. HFNC was delivered via a dedicated high flow delivery system (Optiflow, Fisher and Paykel, Auckland, New Zealand). Therapy success was defined as the avoidance of intubation during hospitalization, whereas therapy failure was defined as respiratory failure requiring intubation.

Over the 25-month study period, total 43 patients visiting the ED with acute respiratory distress were treated with HFNC. The baseline characteristics of the patients including initial vital signs and results of arterial blood gas (ABG) are shown in Table 1, and serial changes in the respiratory and physiologic data before and after HFNC are shown in Table 2. In our study, eleven out of 43 patients (25.5%) failed HFNC therapy and were subsequently intubated. Our intubation rate was higher than those from other studies conducted in the ED. Given that our overall mortality rate (4/43, 9.3%) was comparable to the FLORALI study (12/106, 11.3%) which was investigated in the intensive care unit (ICU) [3], it is likely that severity of the patients in our study was equivalent to those who were arranged to the ICU, which explains higher intubation rate. Despite severity of the patients we included in our study, HFNC therapy significantly improved physiologic and respiratory parameters. Serial vital signs showed an increase in Spo_2 via pulse oximeter and a decrease in systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR) and respiratory rate (RR). In addition, follow-up ABG revealed a decrease in $Paco_2$ and an increase in pH, Pao_2 and Spo_2 after HFNC therapy.

Furthermore, our study identified predictors of success or failure of HFNC in the setting of ED. Until now, most studies on HFNC in patients with hypoxemia with the purpose have been conducted in an ICU or high-dependency unit. Sztrymf et al. identified lower Spo_2, failure of RR to drop and persisting thoracoabdominal asynchrony as predictors of HFNC failure [4]. Most recently, Cho et al. reported that APACHE II score, Sequential Organ Failure Assessment score, cardiogenic pulmonary edema, and Pao_2 improvement at 1 and 24 h were associated with therapy success, and failure to improve oxygenation within 24 h was a useful predictor of intubation [5]. In our study, cardiogenic pulmonary edema was observed more frequently in the success group and the finding of bilateral pulmonary infiltrates on chest X-ray was more common in the success group as well. Whereas, the percentage of pneumonia was higher in the failure group and the group also showed higher mean level of CRP. Overall in-hospital mortality was 9.3%. No one died in the success group, yet mortality in the failure group was 36.6%.

Although our study has limitations such as retrospective design and lack of no-HFNC study arm to compare, we expect to arouse