

a larger sample, and those that more aspects of provider appearance would lend support to this conclusion. Future research should look to analyze EMS attire in response to different scenarios- not just a low acuity patient with chest pain. Our study was small, and limited by the number of outfits tested but our results conclude attire as a minor factor in EMS responses.

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RN assessment of the inferior vena cava diameter to determine intravascular volume using bedside ultrasound^{*}



Of the roughly 750,000 annual cases of sepsis, 220,000 patients will die. Costing approximately 17 billion dollars yearly, sepsis adds a momentous cost to healthcare [1]. At \$18,400 per diagnosis, sepsis is double the average cost when compared to the average hospital stay [2].

At a large urban hospital in southern California, a Sepsis Committee evaluates patient fallouts quarterly. A fallout is defined as a patient who fails to receive all required interventions from the Centers for Medicare and Medicaid Service's (CMS) 2015 Sepsis Core Measure (SEP-1) Bundle [3].

The indication for this evidenced-based practice (EBP) change was discovered when a quarterly Sepsis Mortality Report revealed a 13.3% mortality rate. As a result, a 12-month gap analysis was conducted. The analysis revealed most septic patients failed to receive the initial

30 ml/kg intravenous (IV) crystalloids bolus required by the SEP-1 bundle. Many physicians did not prescribe the required initial IV bolus for severe septic patients with comorbidities since they assumed the excess IV fluids would cause pulmonary overload, abdominal hypertension or other complications. Moreover, the fluid status of these patients was not assessed either. Research has shown measuring the collapsibility of the inferior vena cava (IVC) allows providers to quickly assess if septic patients would be responsive to additional fluids [4]. Moreover, measurement of the IVC using bedside ultrasound (BUS) has proven accuracy compared to traditional invasive measurements, is non-invasive, inexpensive, and easily trainable [5,6].

The PICO question for this study was: Would a nurse's bedside ultrasound IVC assessment to evaluate intravascular volume status, compared to current practice, result in more effective and timely delivery of the appropriate amount of IV fluids for severe septic patients?

This project was designed to train 26 Rapid Response Team (RRT) Register Nurses (RN) to measure septic patients' IVC using BUS. Each nurse underwent an hour-long verbal instruction and was to complete a minimum of 10 IVC assessments with an echocardiology technician (echo tech). Inclusion criteria for this study were all spontaneously breathing patients 18 years old and older diagnosed with severe sepsis in the ED and met the SEP-1 criteria. The evidence-based benchmark used for this project was the CMS Sepsis Core Measure (SEP-1) 2015 Bundle and the national average of SEP-1 compliance regarding initial fluid bolus administration, which is 55.2% [7].

Due to time restraints, only three RRTs were fully trained to perform IVC measurements. To that extent, the control chart displays the results of this study (Fig. 1). There is an, undesirable downward trend from February to March 2017. There are desirable data points in May and December 2017 as a result of hospital leadership recognizing the previous downward trend. Noteworthy, this was also the only time the hospital was above the national average for SEP-1 compliance. The desirable point in December 2017 was likely due to the anticipation of this study.

The control chart (Fig. 1) shows the post-intervention mean slightly increased to 38% from 33% with slight movement toward the desirable side. Additionally, the upper and lower control limits post-intervention are moved closer together; however, there was no significant improvement in the number of septic patients who received the 30 ml/kg IV bolus.

The cost of completing this EBP change would be significant. The average time to train each of the 26 RRT nurses is approximately 17 h. With the average hourly wage of an RN at \$48.68 [8] and \$42.00 per hour for an echo tech [9], it would cost \$40,081 in hourly wages to pay for this practice change. Additionally, an estimated 442 echocardiograms would be deferred and cost \$260,780 in lost revenue [10]. Overall, the cost of initial training would be \$300,861. To avoid exorbitant costs, it would be more beneficial to hire a new full-time “ED Sepsis Nurse” with the primary role of sepsis management in the ED. The estimated cost of a new ED Sepsis Nurse is \$100,000 per year [9]. This recommendation would equate to a 200% return on investment. Moreover, annual refreshers training for the RRTs is estimated at \$140,402 per year.

The most significant barrier for this project was the lack of time to train personnel. Only one echo tech was available to instruct all 26 RRTs. Education was also impeded because the RRT nurses would respond to calls during training. Moreover, only one US machine was available.

While the results of this study did not demonstrate the significant impact on septic patients, it reveals shortfalls with attempts to implement such a considerable practice change without sufficient resources. Future investigators can appreciate the complexity of this change and use the findings to improve their study. This innovative EBP change offers RNs the knowledge, autonomy, and skills to identify septic patients early and implement life-saving interventions rapidly. It also increases compliance with the Joint Commission's 2015 Sepsis Core Measure (SEP-1) Bundle [11] and could potentially reduce mortality.

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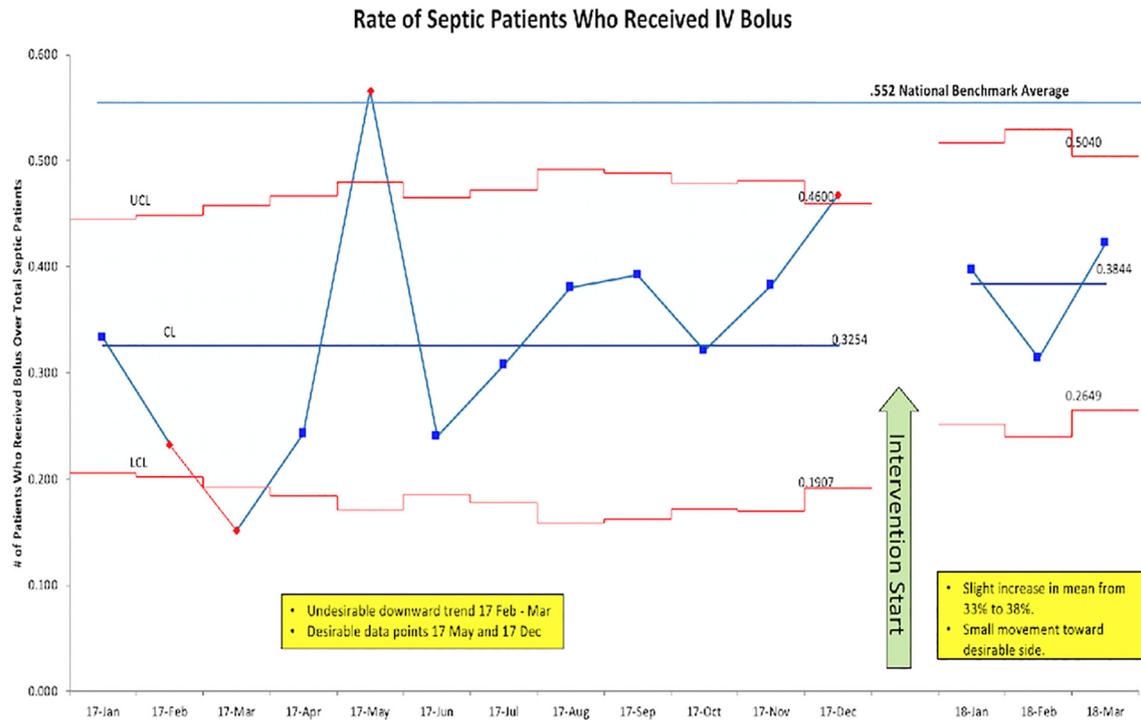


Fig. 1.

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A leadership-based program can reduce boarding time of emergency department admissions



To the Editor

Emergency medicine leadership may have a role in not only helping to identify successful solutions to crowding in the emergency departments (EDs), but also becoming a communication bridge between frontline workers and personnel out of the ED [1,2]. We conducted a leadership-based quality improvement (QI) program to improve boarding time of ED admissions in the Hsin-Chu branch of the National Taiwan University Hospital (NTUH) between January 2014 and December 2016. The ED director acted as the team leader, and the ED frontline workers, and the administrative personnel as members.

The Hsin-Chu branch is a regional academic hospital with 600 acute-care beds. The ED is staffed by 5 attending physicians at day-shift and 4 at night-shift, all with board certified in emergency medicine, and has approximately 76,000 visits per year. The decision for admission is made by the emergency physicians and specialists simultaneously. The process of ED admissions is shown (Fig. 1).