The American Journal of Surgery xxx (2018) 1–5

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

The "TRAUMA LIFE" initiative: The impact of a multidisciplinary checklist process on outcomes and communication in a Trauma Intensive Care Unit

Kimberly Joseph*, Sameer Gupta, James Yon, Renee Partida, Lee Cartagena, John Kubasiak, Vanessa Buie, Jared Miller, Dorion Wiley, Kimberly Nagy, Frederic Starr, Andrew Dennis, Matthew Kaminsky, Faran Bokhari

The Department of Trauma and Burns, John H. Stroger Hospital of Cook County, 1900 West Polk St. Room 1300, Chicago, IL 60612, USA

ARTICLE INFO

Article history:
Received 9 August 2017
Received in revised form
24 January 2018
Accepted 6 March 2018

Keywords:
Checklists
Quality metrics
Family Message
Communication
ICU

ABSTRACT

Background: Checklists have been advocated to improve quality outcomes/communication in the critical care setting, but results have been mixed. A new checklist process, "TRAUMA LIFE", was implemented in our Trauma Intensive Care Unit (TICU) to replace prior checklists. The purpose of this study was to evaluate the impact of the "TRAUMA LIFE" process implementation on quality metrics and on patient/family communication in the TICU.

Methods: "TRAUMA LIFE" was considered maturely implemented by 2016. Multiple quality metrics, including restraint order compliance, were compared between 2013 and 2016 (pre- and post-implementation). Compliance with the "Family Message" (FM), a part of the "TRAUMA LIFE" communication process, was analyzed in 2016.

Results: Improvement was seen in CAUTI, VAE, and IUCU; CLABSI rates increased. Restraint order compliance increased significantly. FM delivery compliance was inconsistent; improvement was noted in concordance between update content and FM documented in Electronic Medical Record.

Conclusion: Implementation of "TRAUMA LIFE" was well integrated into the rounding process and was associated with some improvement in quality metrics and communication. Additional evaluation is required to assess sustainability.

1. Introduction

In 2006, Pronovost and colleagues described the use of an evidence-based intervention in a cohort of Intensive Care Units (ICUs) designed to reduce the incidence of Central Line-Associated Bloodstream Infection (CLABSI).[1] This project, launched in 2003 as the Keystone ICU Project, demonstrated that the intervention resulted in a significant and sustained reduction in CLABSI; it was hoped that similar such interventions might be used to improve outcomes for other standard ICU quality metrics. This work also built on prior investigations by the same group examining communication among ICU team members using a Daily Goals form.[2] Even earlier work by Morris described the use of computerized protocols to inform ICU decision-making.[3] However, implementation of such processes can be challenging; variations in staffing and service clinical activity, team member commitment to the process, and characteristics of the process itself may become barriers to successful implementation.

The purpose of this study was to examine the implementation of a multidisciplinary checklist process in a dedicated Trauma Intensive Care Unit (TICU) at a busy urban Level 1 Trauma Center. Prior to the study time period, a checklist had been used in the TICU with limited success. A revised process, using a new checklist with the mnemonic "TRAUMA LIFE" was developed and integrated into the ICU rounding process with the goal that the initiative would result in improvements in standard quality metrics as well as TICU team-to-family communication.

* Corresponding author. Department of Trauma and Burns, JHSHCC, 4226 N Kolmar Ave, Chicago, IL 60641, USA.
E-mail address: kjoseph@cookcountytrauma.org (K. Joseph).

https://doi.org/10.1016/j.amjsurg.2018.03.012
0002-9610/

2. Methods

2.1. Data source

The study is a mixed-methods design including retrospective analysis of prospectively-collected data on multiple quality metrics, and survey data collection regarding TICU team-to-family communication.

The population studied consisted of patients admitted to the TICU between 2013 (prior to implementation of the "TRAUMA LIFE" process) and 2016 (when the "TRAUMA LIFE" process was considered mature). The TICU patient population was majority male (78%) over the study period, with the largest cohort of patients between the ages of 20 and 40 (48%). 60% of the patients in the ICU during the study period were African-American or Hispanic. There was a trend towards increases in TICU census, TICU admissions per year, and percentage of patients in the TICU whose primary mechanism was penetrating trauma.

2.2. The "TRAUMA LIFE" initiative

Like prior checklists that had been used in the TICU, the "TRAUMA LIFE" Initiative mandated daily discussion of certain aspects of care that were felt to be integral to improved patient outcomes; it also allowed TICU team members to discuss and clarify the daily goals of care. In addition, the Initiative formalized a "Family Message" (FM), which was a brief description of the daily goals of care in layman's terms that was stated verbally on rounds. Daily updates could be given to the patient and/or family by any member of the TICU team using this FM as a template. Table 1 illustrates the elements of the "TRAUMA LIFE" checklist. Isolated elements of "TRAUMA LIFE" were trialed in 2014/2015. By 2016 the entire process, including a dedicated note in the Electronic Medical Record (EMR), was felt to be fully mature.

2.3. Quality metric data collection

As part of the routine quality/performance improvement program in the TICU, data on several quality metrics were collected prospectively and analyzed retrospectively monthly, quarterly, and/or annually. This program was well-established several years prior to the current study. Incidence/occurrence data were collected by the TICU medical director or designee; denominator data, such as device days, were collected by the Department of Trauma and Burn Surveillance staff and cross-checked when appropriate with data collected by the hospital's Infection Control team. All information was maintained in a database which was analyzed monthly, quarterly, and/or annually to identify potential trends. Table 2 illustrates the metrics routinely monitored and how they were quantified. For the purposes of this study, information on Ventilator-Associated Events (VAE), Catheter-Associated Urinary Tract Infections (CAUTI), Indwelling Urinary Catheter Utilization (IUCU), CLABSI, and restraint order compliance were included. In designing the study, it was felt that these metrics had presented particular challenges to the TICU in terms of performance improvement. The study goal with regard to VAE, CAUTI, CLABSI, and IUCU was to demonstrate sustained improvement with no specific benchmarks targeted; for restraint orders, the goal was 100% compliance. Current Centers for Disease Control (CDC)/National Healthcare Safety Network (NHSN) definitions of CAUTI and CLABSI were utilized to identify occurrences. VAE information for the study was obtained in accordance with the 2012 definitions established by the CDC in collaboration with the Critical Care Societies Collaborative (CCSC). Information regarding ventilator associated pneumonia (VAP) prior to 2012 was collected according to 2006 CDC/NHSN algorithms.

The decision was made *a priori* to exclude collected data on Venous Thromboembolic Events (VTE) and Upper Gastrointestinal Bleeding (UGI); multiple prior TICU analyses had demonstrated near 100% EMR order compliance as well as consistently low occurrence rates in these categories on annual reviews. Data on Hospital-Associated Pressure Ulcers (HAPU) were also excluded as multiple new educational and procedural interventions for HAPU prevention were put in place during the study period, possibly affecting the results. In contrast, no new educational, monitoring, or procedural processes other than "TRAUMA LIFE" were introduced during the study period for the included metrics.

Table 1
Elements of the TRAUMA LIFE checklist elements discussed on daily ICU rounds and entered into the electronic medical record.

T = **T**hromboembolism Prophylaxis
R = **R**estraints
A = **A**nalgesia/Sedation/Delirium Management
U=**U**lcer Prophylaxis
M = **M**etabolic/Nutrition/Glycemic Control
A = **A**ctivity/Weight Bearing
L = **L**ines/Tubes/Drains
I=Skin **I**ntegrity
F=**F**amily Message- daily communication in layman's terms regarding care plan
E = **E**xpected Disposition

2.4. Trauma team-to-family communication data collection

As part of "TRAUMA LIFE", the FM was verbalized daily on rounds for each patient in the TICU. In 2016, once the initiative was felt to be mature, family members were surveyed to determine: 1) whether or not they had received an update from a team member in the last 24 h; 2) whether or not the update was consistent with the EMR-documented FM; and 3) whether the family member felt the frequency of updates received was adequate. A total of 76 family members agreed to participate in the surveys, which were conducted in April/May, July/August, and October/November of 2016. The surveys were conducted by a single interviewer, who also judged the concordance between the received message and that documented in the EMR.

CAUTI, CLABSI, VAE, IUCU, and restraint compliance were analyzed using a two-proportion Z test. Application of statistical inference to the Family Message survey compliance data was considered inappropriate given the limited sample size and survey periods.

The study was approved by the Institutional Review Board of the Cook County Health and Hospitals System.

3. Results

Prior to 2013, rate of CAUTI in the TICU had varied between 8 and 17 episodes/1000 indwelling catheter days, with no clear pattern of improvement despite education of both the nursing and medical staff regarding strategies for prevention. VAE/VAP rates had been decreasing slightly prior to 2013 but had appeared to plateau at between 8 and 10 episodes/1000 ventilator days each year. Table 3 denotes the difference between absolute measurements in quality metric parameters pre- and post-"TRAUMA LIFE", while Fig. 1 illustrates the trends in CAUTI, VAE, and CLABSI rates over the study period. CAUTI rates decreased (8.3 vs. 3.2 episodes/1000 catheter days) along with IUCU (1430 vs. 945 days). VAE rates also decreased (8.46 vs. zero episodes/1000 ventilator days). CLABSI rates increased overall between 2013 and 2016 (zero vs. 3.5 episodes/1000 line days). However, the CLABSI rate in 2015 was also zero. Reduction in VAE rate and IUCU appeared to be statistically

Please cite this article in press as: Joseph K, et al., The "TRAUMA LIFE" initiative: The impact of a multidisciplinary checklist process on outcomes and communication in a Trauma Intensive Care Unit, The American Journal of Surgery (2018), https://doi.org/10.1016/j.amjsurg.2018.03.012