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Intermediate care to intensive care triage: A quality improvement project to reduce mortality☆,☆☆,☆☆☆

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ABSTRACT

Purpose: Medical patients whose care needs exceed what is feasible on a general ward, but who do not clearly require critical care, may be admitted to an intermediate care unit (IMCU). Some IMCU patients deteriorate and require medical intensive care unit (MICU) admission. In 2012, staff in the Johns Hopkins IMCU expressed concern that patient acuity and the threshold for MICU admission were too high. Further, shared triage decision-making between residents and supervising physicians did not consistently occur.
Methods: To improve our triage process, we used a 4Es quality improvement framework (engage, educate, execute, evaluate) to (1) educate residents and fellows regarding principles of triage and (2) facilitate real-time communication between MICU residents conducting triage and supervising physicians.
Results: Among patients transferred from the IMCU to the MICU during baseline (n = 83;July–December 2012) and intervention phases (n = 94;July–December 2013), unadjusted mortality decreased from 34% to 21% (p = 0.06). After adjusting for severity of illness, admitting diagnosis, and bed availability, the odds of death were lower during the intervention vs. baseline phase (OR 0.33; 95%CI 0.11–0.98).
Conclusions: Using a structured quality improvement process targeting triage education and increased resident/supervisor communication, we demonstrated reduced mortality among patients transferred from the IMCU to the MICU.

1. Introduction

Critical care triage decisions are not difficult for conditions that are typically managed in an intensive care unit (ICU). Examples include acute respiratory failure requiring endotracheal intubation, vasopressor dependent shock, and hemodynamically unstable gastrointestinal bleeding [1,2]. By contrast, the triage of "borderline" patients, whose needs surpass what is feasible on a general ward, but do not clearly require ICU care, are challenging [3-7]. An alternative to ICU admission in some hospitals is admission to an intermediate care unit (IMCU) [8,9]. However, some patients admitted to IMCUs deteriorate and require ICU transfer [10,11], which has been associated with longer hospitalizations and higher mortality than direct ICU admission in some settings [11-17]. Indeed, IMCUs are enriched with patients who may progress to require ICU admission [17-19]. The referral of such patients to the ICU often occurs because of increasing care needs over time that outpace, or begin to outpace, the intensity of care that IMCU staffing ratios and IMCU staff training can safely provide. Strategies are needed to improve the ability of clinicians to identify when the boundary between IMCU care and ICU care has been crossed, and thereby trigger IMCU to ICU transfer.

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One approach to improve triage decisions is the use of guidelines based on diagnoses and/or objective parameters [1,20-22]. However, non-adherence is common [23,24]. Other approaches include 24-hour in-house intensivist coverage [25,26], a centralized intensivist who facilitates triage for several ICUs [27], and dedicated ICU consult services [24,28]. The human resources required for each add significant operational costs without a substantial or consistent impact on mortality [2]. Many teaching institutions instead rely on a process in which resident physicians, with supervision, make decisions to admit or decline admission of patients to the ICU [2,6,29–31].

Based on admission and discharge logs from 2009 to 2011, approximately 15% of patients admitted to the Johns Hopkins Hospital medical IMCU require transfer to the medical ICU (MICU). In 2012, nursing feedback raised concern that IMCU patient acuity and the threshold for MICU transfer were too high. It was also observed by MICU faculty and fellows that shared triage decision-making between residents and supervising physicians often did not occur. In response to these observations, and a sentinel event in the summer of 2012, we conducted a quality improvement (QI) project utilizing an educational program and a communication tool for MICU residents conducting triage and their supervising physicians to improve mortality and other outcomes of patients transferred from the IMCU to the MICU.

2. Materials and methods

This project was deemed QI by the Johns Hopkins University institutional review board and is reported in accordance with SQUIRE 2.0 guidelines (Standards for Quality Improvement Reporting Excellence 2.0) [32].

2.1. Patients

Included patients are those transferred from the IMCU to the MICU during the baseline (July–December 2012) and intervention (July–December 2013) phases.

2.2. Setting

The IMCU and its admission guidelines have been characterized previously [11]. Briefly, the IMCU is an "open" unit intended for the care of medical patients. All IMCU patients receive continuous pulse oximetry and 12 lead cardiac telemetry. Vital signs and laboratory data are obtained as often as every 2 h. The majority of patients are admitted from the emergency department or ward, with a minority from ICUs or outside hospitals. The IMCU is in close proximity to the medical wards in a different building than the MICU. It is staffed with a nurse to patient ratio of 1:3. Nursing shifts are also staffed by a charge nurse who does not have primary patient care responsibilities, one or two support associates, a unit clerk, and a unit-dedicated respiratory therapist 24 h per day. Ancillary services, such as physical, occupational and speech therapy, as well as social work resources are available from a hospital-wide pool. Patient transport is supervised by an inpatient critical care transport team service so that IMCU nurses are infrequently removed from bedside care. Patients admitted to the IMCU are managed by one of eight different non-overlapping physician teams (residents supervised by faculty and fellows). Each physician team (daytime) and on call team members (overnight coverage) care for their patients in the IMCU or ward (before, during, and after IMCU admission) until hospital discharge. This includes daily bedside assessments and clinical decision making by the assigned physician team (rounds). For patients transferred to the MICU, all care responsibilities are assumed by the MICU physician and nursing teams.

The MICU is a closed unit with a nurse to patient ratio of 1:1.5. There are two physician teams, each composed of an attending intensivist, a critical care fellow, three residents, and two interns. Residents rotate on a three-day cycle. Fellows alternate nights on call, but are rarely on site at night, and attendings are present during the day and available by phone at night. There is not a nighttime intensivist.

During the baseline and intervention phases of the study, the numbers of staffed beds in the IMCU and the MICU increased. However, there were no changes in the nurse to patient ratio, ancillary or provider staffing models, or other structural changes that occurred between the baseline and intervention phases of this QI project.

2.3. Overview of project – design and timing

This QI project sought to reduce the mortality of patients transferred from the IMCU to the MICU by: (1) formally educating residents and fellows regarding principles of triage, (2) facilitating real-time communication between MICU residents conducting triage and supervising physicians, and (3) expediting the transfer of patients with clinical deterioration from the IMCU to the MICU. These changes were facilitated by a "triage card" that went into use as of June of 2013 (see Online Supplement eFigure 1).

The triage card was developed with faculty (DNH) and resident (RWB, SC) input. It was designed to capitalize on a process already in place and another intended to be in place, but underutilized. Specifically, prior to the QI intervention, consults were called to the admitting MICU resident who wrote down patient information (i.e. patient name, record number, diagnosis) on routinely discarded blank paper. The triage card created a structured and durable place to record data residents were already collecting, and a mechanism for quality control as recommended by professional societies [1]. The intended process, inconsistently used before the QI intervention, was for residents to discuss any patient they planned to deny MICU admission with a supervising fellow or attending in real-time. It was also expected that new admissions would be discussed, but the timing of discussions was not clearly defined. During the intervention phase, the expectation was changed so that *all* triage decisions were to be discussed in real-time and documented on the triage card.

2.4. The QI process: 4E's model

Changes in practice were implemented using a structured 4E's QI framework: Engage, Educate, Execute and Evaluate [33].

2.5. Engaging and educating

The multidisciplinary QI team was composed of IMCU and MICU medical leadership (DNH, RGB), IMCU and MICU nursing leadership, resident physicians (RWB, SC), representatives from central bed management, and a member of the Johns Hopkins Armstrong Institute for Patient Safety and Quality (MS). Other stakeholders included MICU fellows and faculty.

Champions from the QI team engaged stakeholder groups in formal meetings in the Spring of 2013 to understand workflows, challenges, and concerns relating to MICU triage in general, and the triage of IMCU patients to the MICU in particular. These exchanges identified several issues. First, MICU residents and fellows were frequently unaware that triage decisions were to be discussed. Second, MICU faculty had varying understandings and opinions of when residents were to engage a supervising physician in the context of triage. Third, patients in the MICU deemed appropriate for downgrade often remained in the MICU while deteriorating patients, whose clinical trajectories were not clear, were either admitted to, or remained in the IMCU. Fourth, IMCU nursing staff felt patient acuity in the unit and the threshold for MICU transfer was too high.

Based on these findings, an educational program were developed to introduce the triage card and emphasize the following points:

1. Delayed ICU admission is associated with higher mortality in patients needing intensive care [12-14,34].
2. Unplanned transfers from IMCUs to MICUs are more common in some conditions (i.e. sepsis, respiratory insufficiency,