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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

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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.

Keywords

Critical Care; Triage; Supervision; Patient Safety; Medical Education; Internship and Residency; Communication

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.

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 [28, 29]. 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, 30–32].

Based on admission and discharge logs from 2009–2011, 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.

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) [33].

Patients

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

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 two hours. 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 hours 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 and/or 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 ICU, all care responsibilities were assumed by the ICU 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.

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.

The QI Process: 4E’s Model

Changes in practice were implemented using a structured 4E’s QI framework: Engage, Educate, Execute and Evaluate [34].

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 were too high.

Based on these findings, an educational program was 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, 35].
2. Unplanned transfers from IMCUs to MICUs are more common in some conditions (i.e. sepsis, respiratory insufficiency, gastrointestinal bleeding) and are associated with higher mortality [10, 11].
3. Clinical trajectory is an important aspect of triage. Patients who may worsen and need ICU care will be better served in an ICU than patients awaiting ICU downgrade [36].
4. Shared decision-making improves triage decisions [37].
5. Critical care benefits patients with moderately severe disease more than those that are either too well or too sick to benefit [1, 21, 38].

In June of 2013, the educational program was delivered by an attending intensivist (DNH) to IMCU and MICU nurses, personnel from the bed management office, and MICU attending physicians. In addition, the program was delivered to MICU residents and fellows in a compulsory morning teaching session. June of 2013 also served as a run-in period for the initial deployment of the triage card in order to familiarize the QI team and stakeholders with the new process.

Executing

To maintain knowledge and expectations regarding use of the triage card during the intervention phase, the educational program was delivered to MICU residents and fellows during morning teaching sessions at least once per month. The project leader also met directly with MICU faculty, fellows, and residents at the start of their MICU rotations to remind them of the QI project rationale and objectives. This was reinforced further via individual emails to all providers containing a 5-slide PowerPoint presentation with highlights of the educational program.

Outcomes reported in this QI project are limited to patients transitioning from the IMCU to the MICU during the baseline and intervention phases. However, to improve adherence to intended triage practices, triage cards were to be completed on all patients assessed by MICU residents during the intervention phase of the project.

Evaluating

During the intervention phase, triage cards were collected each morning from residents, reviewed by the supervising fellow, and submitted to the QI team. When cards were incomplete or absent, direct feedback was provided to the resident, fellow and attending by the QI team leader. In addition, feedback was solicited regularly from stakeholders to

identify misunderstandings relating to the use of the triage card. This feedback also helped focus ongoing educational efforts.

Evaluation of the QI Project

A comparison of patient outcomes among those transferred from the IMCU to the MICU during the baseline and intervention phases was conducted. All patients aged 18 or older making this transition were identified from unit admission and discharge logs. However, only data from each patient's first IMCU to MICU transfer were recorded. No data were collected from January to June of 2013.

Data Collection

Data were independently recorded, in duplicate, by trained staff (AMAH, PC). Inconsistencies were arbitrated by a third independent review (DNH). The Acute Physiology and Chronic Health Evaluation score version 2 (APACHE II), Simplified Acute Physiology Score version 2 (SAPS II), and Charlson Comorbidity Index (CCI) were calculated based on data from the first 24 hours following MICU admission [39–41]. Additional patient-level data recorded were patient demographics, admitting diagnoses, date and time of hospital, IMCU, and MICU admission and discharge, and disposition at hospital discharge.

In addition to patient-level data, unit-level data for the IMCU and MICU were collected. These data included numbers of staffed beds on each unit, unoccupied beds available for new patients at 6 a.m. each morning (e.g. capacity), numbers of admissions to each unit during the baseline and intervention phases, and rapid response or “code blue” events on the IMCU.

Outcomes

The primary outcome was hospital mortality. Secondary outcomes included pre-MICU LOS, MICU LOS, post-MICU LOS, and total hospital LOS. IMCU outcomes included the proportion of patients transferred to the MICU at any time, the proportion transferred within 24-hours of IMCU admission, and the proportion for whom a rapid response or “code blue” was initiated while admitted to the IMCU.

Statistical Analysis

Data were summarized using descriptive statistics. Patient and unit related variables during each phase of the project were compared using a two-sample t-test, a two-sample test of proportions, or the Wilcoxon rank-sum tests, as appropriate. Multivariable logistic regression was used to evaluate if the QI intervention was associated with decreased mortality. A priori, it was decided to adjust the multivariable model for severity of illness and numbers of unoccupied beds in the IMCU and MICU, and any other variables that differed ($p < 0.20$) between baseline and intervention phases. Scatterplots with locally weighted smoothing were used to confirm a linear relationship between continuous variables and mortality [42]. Variance inflation factors were used to confirm the absence of multicollinearity in the multivariate regression model [43]. Model fit was assessed using the Hosmer and Lemeshow goodness-of-fit test [44]. Statistical significance was defined as a 2-sided p -value < 0.05 . Stata version 11.0 (College Station, TX) was used for all analyses.

Results

During the baseline and intervention phases, 83 and 94 patients, respectively, were transferred from the IMCU to the MICU (Table 1). Comorbidity and severity of illness indices did not differ between the baseline and intervention phases. The most common diagnostic category was respiratory, which accounted for 37% and 39% of admissions during the baseline and intervention phases, respectively. The only diagnostic category that differed significantly between phases was cardiac, which was less common during the intervention phase (23% vs. 10 %; $p=0.02$).

Both the IMCU and the MICU increased in size during the QI project (Table 1). The IMCU increased from 15 to 21 beds, and admissions increased from 765 to 1171 in a six-month period. There was also a significant increase in the number of unoccupied beds at 6 a.m. (1.9 vs. 2.7; $p=0.002$). Similarly, the MICU increased from 18 beds to 24 beds with an increase in admissions from 542 to 729 in a six-month period, as well as number of unoccupied beds available at 6 a.m. (1.5 vs. 4.6; $p<0.0001$).

Unadjusted mortality was 34% and 21% during baseline and intervention phases, respectively ($p=0.06$). In a multivariable regression model, the QI intervention was associated with lower mortality (OR=0.33; 95%CI:0.11–0.98) after adjusting for severity of illness (SAPS II), diagnostic category, and bed availability (Table 2). In a sensitivity analysis excluding patients with cardiac diagnoses, the mortality benefit persisted in both unadjusted ($p=0.046$) and adjusted analyses ($p=0.049$). An additional post-hoc sensitivity analysis limiting diagnostic categories to three (cardiac, metabolic, and all others) to assess for and potential over-fitting of the model demonstrated a similar protective effect of the QI interventions (OR 0.32; 95%CI:0.11–0.92).

Other outcomes that changed during the intervention phase included decreases in the median pre-MICU LOS ($p=0.003$), MICU LOS ($p=0.08$), post-MICU LOS ($p=0.01$), and total hospital LOS ($p=0.001$) among survivors of each phase of hospitalization (Table 3). In addition, the proportion of admissions that required transfer to the MICU within 24 hours of IMCU admission decreased between baseline and intervention phases (7% to 5%; $p = 0.07$), as did the proportion that ever required transfer to the MICU (13% to 10%; $p = 0.05$) (Table 4). Lastly, the proportion of patients admitted to the IMCU for whom a rapid response or code blue event occurred decreased during the intervention phase (8% to 5%; $p = 0.007$).

Review of all triage cards for patients moving from the IMCU to the MICU during the intervention phase revealed that 82% met minimum requirements (i.e. patient name and location, date and time of triage, triage decision, and triage resident name). Not that 82% underestimates the actual completion rate, as we know some residents discarded some cards.

Discussion

Using a structured QI process, we sought to improve the triage process for IMCU consultations to the MICU team. Our findings demonstrated similar severities of illness for patients admitted from the IMCU to the MICU during baseline and QI phases, but a significant reduction in mortality during the QI phase. Other important findings included

reductions in lengths of stay, proportionally fewer IMCU to MICU transfers, and a reduction in rapid response and code blue events on the IMCU.

Previous efforts to improve triage have focused on predictive scores, algorithms, and guidelines [1–3, 45]. Though these tools help stratify risk, issues of calibration and generalizability limit their value [46]. Other approaches have added new personnel in triage roles, such as rapid response teams, triage officers, and 24-hour intensivist coverage [25–28, 47–50]. Though each of these approaches has demonstrated value in small, single center studies, larger studies are either needed or have not consistently confirmed their value. Importantly, each approach requires significant investments in personnel that may not be feasible for many institutions [47, 51]. By contrast, our QI project utilized an educational program and communication tool, and capitalized on existing human resources.

Although we are unaware of published reports of a triage communication tool like ours, the process the QI initiative introduced is not unique. It is common for resident physicians, with supervision, to be the primary assessors of patients for ICU admission [2, 32, 52]. What is unknown is the extent to which communication occurs between residents and supervising physicians, the content and quality of any communication, and the timing of such communication. Although the Accreditation Council for Graduate Medical Education requires that training programs establish guidelines detailing circumstances in which residents must communicate with supervising faculty, triggers for these communications are left to the discretion of each training program [53].

At Johns Hopkins, the Graduate Medical Education Committee's policy on the supervision of postdoctoral trainees states that for ICU residents, decisions regarding patient care, including admission, discharge, treatment and end-of-life decisions, and performance of invasive procedures, are to be discussed and reviewed by faculty. In practice, this occurs daily during morning MICU rounds and on an as-needed basis at other times. Though we can detail the intended standard for when additional communication between residents and supervising physicians was to occur prior to the QI project, inconsistent messaging from supervising physicians may have caused a migration toward or beyond the boundaries of safe practice [54, 55]. As we discovered from stakeholders prior to the QI intervention, residents and supervising physicians were frequently not discussing new MICU admissions until morning rounds, and in many cases were not discussing patients denied MICU admission at all.

There are established explanations for this migration. Kennedy et al. described non-clinical influences that affect trainees' decisions to seek input from supervising physicians [56]. These include the availability and approachability of the supervisor, as well as concern that asking for help will damage the trainee's professional credibility. Stewart et al. showed that trainees, in an effort to avoid displaying knowledge gaps or slowing down the clinical team, will only ask for help when they are convinced not doing so would harm the patient [57]. Another study reported that 30% of residents found it difficult, when they were busy, to pursue input from supervisors [58]. Thirty-six percent did not escalate care because they did not want to wake up supervisors. Importantly, 30% acknowledged they had previously not escalated care because they failed to recognize a patient's worsening clinical trajectory.

Paradoxically, there are significant discrepancies between what supervisors want to be called about and what trainees perceive supervisors want to be called about [59–62]. Of note, residents also place a high value on knowing the specific circumstances in which communication with supervisors is expected [63]. By creating a standard process in which real-time communication with supervising physicians was expected to occur for all MICU consults, regardless of MICU admission status, we avoided the uncertainty residents may have previously had regarding when to call.

A similar structure to support communication between resident and supervising physicians has been successful in surgical training programs [64]. Arriaga et al. demonstrated that the use of a laminated card detailing minimum criteria for resident-attending contact improved communication rates on critical patient events from 67% to 98%. Importantly, audited trainees reported that supervising attendings were receptive and easy to contact. Though patient outcomes were not reported in this study, two systematic reviews demonstrate the benefits of increased clinical supervision on patient outcomes [65, 66], including mortality [66].

There are potential limitations to this QI project. First, our findings reflect the experience of a single hospital and are limited to medical patients transitioning from an IMCU to the MICU. The extent to which our findings would be reproducible in other settings is not known. Moreover, we do not have data to evaluate any impact of the intervention on patients admitted to the MICU from sources other than the IMCU (e.g. ED or hospital wards). Second, because baseline knowledge of triage principles and prevalence of trainee/supervisor communication could not be collected retrospectively, we do not know the extent to which triage education versus implementation of the triage card and increased communication with more experienced clinicians lead to our improved patient outcomes. However, the decreased LOS prior to MICU admission suggests residents during the intervention phase, with input from supervisors, were more proactive in admitting patients to the MICU. This is corroborated by the significant reduction in RRT and cardiac arrest events on the IMCU during the intervention phase. Deteriorating patients may have been transferred to the MICU before standard triggers for activating the RRT and cardiac arrest teams were reached. Further, the overall reduction in transfers of IMCU patients to the MICU and the proportion transferred within 24 hours of IMCU admission (undertriage), suggest that some patients who may have historically been triaged to the IMCU were instead directed to the MICU. Third, the number of beds in the MICU increased between baseline and intervention phases, which may have lowered the threshold for MICU admission. However, our multivariable regression analysis included bed availability as a co-variate, and suggests it was not associated with hospital mortality. Lastly, as a before-after project, we cannot infer causation as there may be unmeasured or residual confounding for differences between baseline and intervention phases.

Conclusions

In a before-after comparison, our structured QI project that combined triage education with increased communication between residents conducting triage and supervising physicians, we observed a reduction in mortality and length of stay for patients transferred from the

IMCU to the MICU. Our low cost QI intervention capitalized on existing resources and emphasizes the importance of future research evaluating the role of education and communication tools to improve triage decisions and patient outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- An alternative to ICU admission is admission to an intermediate care unit (IMCU)
- IMCUs are enriched with “borderline” patients who may progress to require ICU admission
- A structured quality improvement (QI) process targeted resident triage of IMCU to ICU patients
- Key interventions included triage education and real-time resident/supervisor communication
- Deteriorating patients transferred from IMCU to ICU after the QI project had lower mortality

Table 1**Patient and Hospital Unit Characteristics**

<u>Patients</u>	<u>Baseline: July – December 2012</u>	<u>Intervention: July – December 2013</u>	<u>P-Value^{a,b}</u>
Number of IMCU to MICU transfers ^c	83	94	
Age Mean (SD)	58 (14)	58 (14)	0.9
Female N (%)	43 (52)	54 (58)	0.45
Charlson Comorbidity Index, mean (SD)	2.7 (2.1)	2.8 (2.3)	0.67
Severity of Illness, mean (SD)			
APACHE II	24 (7)	23 (6)	0.31
SAPS II	37 (17)	34 (15)	0.19
Diagnostic Category (%)			
Respiratory	37	39	0.78
Cardiac	23	10	0.02
Gastrointestinal	12	18	0.27
ID (Sepsis)	17	24	0.21
Metabolic/Renal	6	2	0.18
Neurologic	5	6	0.64
Hospital Mortality (%)	34	21	0.06
<u>Medical Intensive Care Unit</u>			
Staffed Beds	18	20–24 ^d	
Admissions	542 ^e	729 ^e	
Unoccupied Beds 6 a.m. Day of Triage (SD)	1.5 (1.1)	4.6 (2.3)	< 0.0001
<u>Intermediate Care Unit</u>			
Staffed Beds	15–18 ^f	18–21 ^g	
Admissions	765 ^e	1171 ^e	
Unoccupied Beds 6 a.m. Day of Triage (SD)	1.9 (1.2)	2.7 (1.9)	0.002

^aTwo sample t-test^bTwo sample test of proportions^cUnique patient admissions, no patients is represented more than once^d20 beds from 7/1/13 – 8/27/13; 22 beds from 8/28/13 – 11/27/13; 24 beds from 11/28 – 12/31/13^eMay include repeat admissions (patients admitted to the MICU or IMCU on more than one occasion)^f15 beds from 7/1/12 – 11/10/12; 18 beds from 11/11/12 – 12/31/12^g18 beds from 7/1/13 – 10/11/13; 21 beds from 10/12/13 – 12/31/13

MICU: Medical Intensive Care Unit

IMCU: Intermediate Care Unit

SD: Standard Deviation

APACHE II: Acute Physiology and Chronic Health Evaluation Score version 2

SAPS II: Simplified Acute Physiology Score Version 2

Table 2**Multivariable Logistic Regression Analysis for Hospital Mortality**

Variable	OR	95% CI	P-Value
Intervention vs. Baseline Period	0.33	0.11 – 0.98	0.046
SAPS II	1.09	1.05 – 1.12	< 0.001
Diagnostic Category			
<i>Respiratory</i>	ref	ref	ref
<i>Cardiac</i>	0.49	0.16 – 1.52	0.21
<i>Gastrointestinal</i>	0.57	0.17 – 1.92	0.37
<i>Infection (Sepsis)</i>	0.61	0.21 – 1.80	0.37
<i>Metabolic/Renal</i>	0.14	0.01 – 1.48	0.10
<i>Neurologic^a</i>	NA	NA	NA
Unoccupied MICU Beds 6 a.m. Day of Triage ^b	1.14	0.93 – 1.41	0.20
Unoccupied IMCU Beds 6 a.m. Day of Triage ^b	1.02	0.79 – 1.31	0.89

^aNo deaths in patients admitted with neurologic disorders.

^bNo statistical interaction between intervention group and bed availability.

OR: Odds Ratio

CI: Confidence Interval

SAPS II: Simplified Acute Physiology Score Version 2

Ref: Reference Group

NA: Not Applicable

MICU: Medical Intensive Care Unit

IMCU: Intermediate Care Unit

Table 3

Median (IQR) Length of Stay Outcomes (Days)

<u>Outcome Variable</u>	<u>Baseline: July – December 2012</u>	<u>Intervention: July – December 2013</u>	<u>P-Value^a</u>
	N	N	
Pre-MICU LOS	83	94	0.003
MICU-LOS; survivors	55	74	0.08
MICU-LOS; dead	28	20	0.83
Post-MICU LOS; survivors	55	74	0.01
Post-MICU LOS; dead	11	10	0.22
Total hospital LOS; survivors	55	74	< 0.001
Total hospital LOS; dead	28	20	0.05

^aWilcoxon Rank-sum test

MICU: Medical Intensive Care Unit

IQR: Interquartile Range

LOS: Length of Stay

Table 4

Intermediate Care Unit Outcomes

<u>Outcome Variable</u>	<u>Baseline: July – December</u>	<u>Intervention: July – December</u>	<u>P-Value^a</u>
	<u>2012</u>	<u>2013</u>	
Admissions	765	1171	
Transferred to MICU (%) ^b	13	10	0.05
Transferred to MICU within 24 hours of IMCU admission (%)	7	5	0.07
IMCU RRT/Code Events (%)	8	5	0.007

^aTwo sample test of proportions

^bIncludes patients transferred from the IMCU to the MICU on more than one occasion

MICU: Medical Intensive Care Unit

IMCU: Intermediate Care Unit

RRT: Rapid Response Team