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An empirical derivation of the optimal time interval for defining ICU readmissions

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Abstract

Background—ICU readmission rates are commonly viewed as indicators of ICU quality. However, definitions of ICU readmissions vary, and it is unknown which, if any, readmissions are associated with ICU quality.

Objective—Empirically derive the optimal interval between ICU discharge and readmission for purposes of considering ICU readmission as an ICU quality indicator.

Research Design—Retrospective cohort study

Subjects—214,692 patients discharged from 157 U.S. ICUs participating in the Project IMPACT database, 2001–2008.

Measures—We graphically examined how patient characteristics and ICU discharge circumstances (e.g., ICU census) were related to the odds of ICU readmissions as the allowable interval between ICU discharge and readmission was lengthened. We defined the optimal interval by identifying inflection points where these relationships changed significantly and permanently.

Results—2,242 patients (1.0%) were readmitted to the ICU within 24 hours; 9062 (4.2%) within 7 days. Patient characteristics exhibited stronger associations with readmissions after intervals greater than 48–60 hours. By contrast, ICU discharge circumstances and ICU interventions (e.g. mechanical ventilation) exhibited weaker relationships as intervals lengthened, with inflection points at 30 to 48 hours. Due to the predominance of afternoon readmissions regardless of time of discharge, using intervals defined by full calendar days rather than fixed numbers of hours produced more valid results.

Discussion—It remains uncertain whether ICU readmission is a valid quality indicator. However, having established two full calendar days (not 48 hours) following ICU discharge as the optimal interval for measuring ICU readmissions, this study will facilitate future research designed to determine its validity.

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Introduction

Several critical care organizations have proposed that one way to gauge intensive care unit (ICU) quality of care is to examine ICU readmission rates within 48 hours of initial ICU discharge (1, 2). Support for the use of ICU readmissions as a quality indicator stems from its associations with increased mortality, cost, and length of stay (3–10), despite the absence of evidence that ICU readmissions are *causally* related to any of these ultimate outcomes. It is thought that using ICU readmissions as a quality indicator could lead to improved decision making at ICU discharge and fewer "premature" discharges (11–21). However, definitions of ICU readmissions vary considerably (4, 7, 10, 21–28), and there is little empirical evidence identifying what time interval, if any, best identifies ICU readmissions attributable to ICU activities. Recent work has suggested 48 hours as the appropriate interval, reflecting the assumption that early readmissions are more likely due to ICU care or discharge decisions (2, 11). Yet this assumption remains untested.

We therefore sought to empirically determine the best interval of time between ICU discharge and readmission to use when evaluating the potential for ICU readmission to be used as a quality indicator. Although some experts question whether ICU readmissions should be used as quality indicator at all (paralleling a similar debate regarding 30-day hospital readmissions (29–31)), we reasoned that to address this question, we first needed to determine whether there was an interval at which ICU readmissions are *most likely* to be attributable to ICU activities, and least likely to be attributable to patient characteristics (32). To accomplish this goal, we examined how the relationships between patient and ICU discharge circumstance variables and the odds of ICU readmissions changed with increasing intervals between ICU discharge and readmission. We hypothesized that with longer intervals, variables measured at ICU discharge would become less strongly associated with readmission risk, and that patient variables representing chronic diseases would become more strongly associated with ICU readmission risk (11–13). If so, then the readmission interval at which the contributions of discharge factors stabilize or decline, or at which the contributions of patient factors increase, would represent the best interval to use for future evaluations of this candidate indicator of ICU quality.

Methods

Data Source

We performed a retrospective cohort study using a specially prepared version of the Project IMPACT database (Cerner Corporation, Kansas City, Missouri) that included date and time stamps for ICU admissions, discharges, and readmissions. Project IMPACT is a nationally representative, voluntary, fee-based ICU clinical information system used for benchmarking and research (33–43). Each ICU employs a trained data collector and a standardized web-based instrument to collect data regarding individual patients, care processes, and ICU characteristics (11, 35)

Variables

ICU readmission was defined as a second admission to the same ICU from which the patient was originally discharged during the same hospitalization. We excluded patients discharged from one ICU and then admitted to a different ICU because such ICU readmissions are more likely to be attributable to new problems than the quality of care for previous problems (11).

Exposure variables were initially classified in our models as patient characteristics and ICU discharge circumstances based on pre-specified scientific plausibility and previous findings in the literature (11–13, 21, 22) as shown in Table 1.

We grouped patient characteristics according to whether they were measured at (1) initial ICU admission, (2) throughout the ICU stay, (3) ICU discharge. Group 1 included functional status (independent, partially dependent, fully dependent) and the predicted probability of death calculated using the Mortality Prediction Model (MPM-III) (36), and primarily reflected the patient's severity of illness at ICU admission. Group 2 included receipt, during the ICU stay, of mechanical ventilation and process of care such as venous thromboembolism (VTE) prophylaxis. These variables primarily reflected clinical interventions undertaken by the ICU in response to patients' illnesses. Group 3 included the duration of time between extubation and ICU discharge, and discharge to a step-down unit. These variables largely reflected disease severity at ICU discharge or clinical decision making at this time.

Similarly, variables describing ICU discharge circumstances could be divided into two groups: (1) time of ICU discharge (6AM – 12PM, 12PM – 6PM, 6PM – 6AM); and, (2) variables reflecting ICU capacity strain at ICU discharge. Based on a previous conceptual model (44), we chose three ICU capacity strain variables: ICU census, defined as the number of patients using the ICU in a given 24 hour period for at least 2 hours, standardized for each ICU and year; ICU admissions, defined as the proportion of patients who were new admissions divided by the total number of patients cared for at least two hours in that ICU on that day; and ICU acuity, defined as the average predicted probability of death of the other patients in the ICU that day (44, 45).

Other patient characteristics, including race and source of ICU admission were included in our models based on known associations with readmissions (11–13, 22).

Inclusion/Exclusion Criteria

Eligible patients were admitted to U.S. ICUs April 1, 2001 to December 31, 2008. We excluded patients dying before initial ICU discharge or who were (a) ineligible to receive an MPM-III severity of illness score (36), (b) admitted to ICUs with <10 patients in a given year or that provided data <12 consecutive months, (c) discharged from the ICU with documented limitations on life support beyond simple do-not-resuscitate orders, or (d) discharged from the ICU in a "moribund" condition.

Statistical Analysis

Our outcomes included 25 ICU readmission variables, where ICU readmission was defined using increasing durations of time between ICU discharge and readmission in six-hour increments from 24 to 168 hours (1 – 7 days). Each increment included cumulative readmission counts (e.g., the 36-hour definition included all 30-hour readmissions plus those occurring between 30 and 36 hours). We chose a lower limit of 24 hours because few readmissions occurred prior to that, and an upper limit of 168 hours because readmissions after that point are unlikely to be due to ICU care (11). We compared patients readmitted to the ICU within each time period to patients not readmitted within that time, including those who died elsewhere in the hospital, were transferred to another hospital, or were later readmitted to the ICU. We also included patients discharged from the hospital as non-readmissions because these patients were well enough to be discharged, and thus unlikely to have been readmitted to the ICU had they remained in the hospital.

We chose multivariable fixed-effect logistic regression, rather than time-to-event analyses, to enable us to examine the effects of our exposures across iterative, non-independent definitions of ICU readmission within each ICU (46–48). Generalized linear models utilizing a log-odds model would have produced equivalent results (43). To visualize how the relationships between our exposures and ICU readmission changed as time to readmission increased, we plotted the odds of ICU readmission for each definition of ICU readmission and examined whether our point estimates changed over time. By defining ICU readmission at each time interval as including all earlier readmissions, confidence intervals became narrower at longer readmission intervals. Therefore we focused primarily on changes in odds ratios rather than on confidence intervals.

To determine the location of inflection points, we compared the odds of ICU readmission at each time definition with successive definitions up to 24 hours later. Inflection points were identified as time points where changes of 5% or greater across successive definitions were followed by a 24 hour interval with changes of less than 5%, or vice versa. This method was chosen because each definition of ICU readmission was conditional on shorter definitions; therefore methods requiring that each point be independent of all other points were not appropriate. Five percent was chosen because of the small incremental number of events added over each successive interval. Anticipating that inflection points would not be identical across exposures, we selected the optimal duration of ICU readmission using the most common time interval at which there was an inflection point among our exposures, prioritizing inflection points for exposures related to ICU discharge decisions in the event multiple time points were identified, as these are more likely to be under ICU control. This choice minimized the probability of including ICU readmissions not attributable to the ICU, but avoided excluding too many readmissions that might have been.

Finally, because medical and surgical patients may have different risk factors for ICU readmission, we conducted a stratified analysis of patients who had surgery within seven days of index ICU admission vs. those who had not.

Sensitivity Analysis

Because ICU readmission rates may be influenced by how hospitals manage patients who become unstable on the floor or in step-down units, we conducted a sensitivity analysis grouping ICU readmissions, deaths on the floor or step-down unit, and transfers to another institution in “critical” condition as adverse outcomes following ICU discharge. Because only the date of death or transfer was available, we assumed that all deaths and transfers occurred at noon. Because hospitals with multiple ICUs may readmit patients to another ICU for logistical reasons, particularly during times of increased capacity strain, we conducted a second sensitivity analysis in which such readmissions were also counted.

All analyses were performed using STATA 12.1 (StataCorp, College Station, TX). This study was deemed exempt by the University of Pennsylvania institutional review board. Neither the funding sources nor Cerner Corporation had a role in the design of this study or in the decision to submit it for publication.

Results

From an initial dataset of 381,582 admissions in 186 ICUs, we included 214,692 patients discharged from 157 ICUs in 107 hospitals (Supplemental Figure 1). Among these, 2,242 (1.0%) were readmitted to the ICU within 24 hours; and 9,062 (4.2%) within 168 hours, or 7 days, of initial ICU discharge. The full distributions of the timing of ICU readmissions, in-hospital deaths, and post-ICU-discharge transfers to other hospitals in critical condition are

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depicted in Figure 1. 11–12% of ICU readmissions were to different ICUs within the same hospital, constant across readmission intervals.

Unadjusted analyses

The median predicted probability of death at ICU admission was 7% (IQR: 3%, 14%); 16% of patients were partially and 6% fully dependent at initial ICU admission; 31% required mechanical ventilation during the ICU stay (Table 1). Sixty percent of patients were discharged 12PM-6PM; 30% 6PM-6AM.

Adjusted analyses

Patient Variables

Patient variables recorded at ICU admission exhibited increasing odds as the readmission interval lengthened. For instance (Figure 2), the odds of ICU readmission for the log of patients' predicted probability of death increased 32% from 1.19 (95%CI: 0.66, 2.12) at 24 hours to 1.57 (95%CI: 1.07, 2.31) at 60 hours following ICU discharge, after which point they increased only an additional 1% through 102 hours. Variables such as the log of the number of comorbidities present at ICU admission, and partially and fully dependent functional status exhibited similar patterns. For comorbidities, an inflection point occurred at 60 hours; for both partially and fully dependent functional statuses, an inflection point occurred at 36 hours.

Of the variables recorded during the ICU stay, receipt of mechanical ventilation or vasopressors exhibited decreases in the odds of ICU readmission as the readmission interval increased. For example, among patients who required vasopressors, the odds of ICU readmission declined 11% from 1.27 (95%CI: 1.11, 1.45) at 24 hours to 1.14 (95%CI: 1.03, 1.27) at 42 hours. For both, attenuation of the declines in their associations with readmissions started 36 hours following ICU discharge. There was no change in odds as the readmission interval lengthened for Stress Ulcer or VTE Prophylaxis.

Finally, we examined variables recorded at ICU discharge. Patients discharged to a step down unit versus a floor exhibited higher odds of ICU readmission, which declined 8% between 24 and 42 hours following ICU discharge from 1.59 (95%CI: 1.45, 1.75) to 1.46 (95%CI: 1.36, 1.57), leveling off thereafter, with an inflection point at 36 hours. The odds for the duration of time between extubation or vasopressor discontinuation and ICU discharge did not change as the readmission interval lengthened.

ICU Discharge Circumstance Variables

Of our three variables representing day of discharge ICU capacity strain (Figure 3), the proportion of new ICU admissions and total ICU census on the day of ICU discharge exhibited positive associations with ICU readmission, the odds of which decreased as the readmission interval increased. Both exhibited an inflection point at 30 hours. For example, for ICU admissions, the odds of ICU readmission decreased by 4% from 1.14 (95%CI: 1.10, 1.20) at 24 hours to 1.09 (95%CI: 1.05, 1.13) at 36 hours, followed by smaller decreases thereafter. ICU acuity on the day of discharge was not associated with ICU readmission for any duration of readmission, nor did its magnitude of association change across the range of intervals.

Finally, the odds of ICU readmission for ICU discharge time increased and decreased in sinusoidal fashion as the definition of ICU readmission increased by 6 hour increments (Figure 3). Swings occurred in 24 hour cycles, but diminished in magnitude at progressively longer intervals. At 24 hours the odds of readmission for night discharges were 20% higher

(OR: 1.24 (95%CI: 1.04, 1.47)) than at 36 hours (OR: 0.99 (95%CI: 0.87, 1.14)); afternoon discharges exhibited a similar pattern. As a result, during the first three days following ICU discharge, night discharge was significantly associated with ICU readmission at 24 and 48 hours, but not for other time intervals. This pattern is explained by the fact that most ICU readmissions occurred in the afternoon, regardless of the time of initial ICU discharge (Table 2). Because patients are rarely readmitted within several hours of ICU discharge, patients who are discharged during the morning have fewer opportunities to be readmitted within a 48 hour time period than patients discharged at night – the latter experience two afternoons for potential readmissions and the former only one.

In light of this finding, we performed an additional analysis using full calendar days as the time intervals for readmission definitions. Using two full calendar days as the interval to readmission (Supplemental Table 1, Supplemental Figure 2), there were no relationships between afternoon (OR: 1.01 (95%CI: 0.91, 1.12)) or night discharge (OR: 0.96 (95%CI: 0.86, 1.07)) and ICU readmission. The relationships of other exposure variables and ICU readmission remained unchanged with this new definition; inflection points for variables measured during the ICU stay and at ICU discharge occurred 2 calendar days following ICU discharge. Variables measured at ICU admission exhibited inflection points at 2 (ICU length of stay, MPM-III, # comborbidities), or 3 calendar days (functional status).

Medical vs. Surgical patients

The changes in odds with progressively longer readmission intervals were comparable among medical and surgical patients for most exposures (Supplemental Figures 3–6). Two exceptions were Stress Ulcer and VTE Prophylaxis. For medical patients, the odds of readmission among patients who received Stress Ulcer Prophylaxis increased 11% from 24 hours (OR: 0.90 (95%CI: 0.71, 1.15)) to 42 hours (OR: 1.00 (95%CI: 0.82, 1.21)); in surgical patients, odds declined 14% from 24 hours (OR: 1.21 (95%CI: 0.81, 1.8)) to 36 hours (OR: 1.04 (95%CI: 0.77, 1.42)). For VTE prophylaxis, among medical patients the odds of readmission declined 11% from 24 hours (OR: 1.18 (95%CI: 0.94, 1.48)) to 54 hours (OR: 1.05 (95%CI: 0.91, 1.23)); there was no change in odds for surgical patients over this interval.

In-hospital deaths, hospital transfers, and ICU Readmission

Findings similar to our primary analyses were observed in analyses including in-hospital deaths and hospital transfers with ICU readmissions as post-ICU-discharge adverse events(Supplemental Figures 7+8), and in analyses that included readmissions to other ICUs within the same hospital as events (Supplemental Figures 9+10).

Discussion

This national study across a diverse sample of ICUs shows that the relationships between important exposure variables and the odds of ICU readmission are dependent on the interval between ICU discharge and readmission used to define an ICU readmission. Changes in the odds ratios of various exposures occurred 30–60 hours following ICU discharge for both medical and surgical patients, supporting the use of a definition utilizing shorter time intervals for research or benchmarking purposes. We found that 2 full calendar days strikes the optimal balance between capturing ICU readmissions that may be due to ICU discharge decisions, minimizing ICU readmissions due to patient factors, and avoiding the creation of artificial associations between nighttime ICU discharges and readmissions.

Variables recorded at ICU admission became stronger predictors of ICU readmission after intervals following ICU discharge to define readmissions. The variables exhibiting this pattern, including comorbidities and functional status, largely reflected chronic patient characteristics. This supports the use of a definition of ICU readmission < 60 hours, as readmissions after longer durations of time may be more attributable to the recrudescence of chronic disease processes rather than to ICU care. However, the observation that chronic diseases are strongly associated with ICU readmission defined using any time period raises questions about even this optimal definition's use as a quality indicator.

Patient variables recorded during the ICU stay and at discharge, which may reflect clinical decisions resulting from acute disease processes, were associated with increased odds for early readmissions that abated to steady state 36 hours following discharge. Together with the observation that day of discharge ICU capacity strain (e.g., census and number of new admissions) showed similar relationships, these findings suggest that effects of "premature" ICU discharges on readmissions manifest soon after ICU discharge. Our data suggest that defining ICU readmissions as those that occur after 36 hours will capture most of these effects.

It is important to note however, that "premature" discharges may or may not represent suboptimal ICU care; we have recently shown, for example, that although patients discharged quickly are more commonly readmitted, their total hospital length of stay, subsequent in-hospital mortality, and probability of ultimately being discharged home remain unaffected (46).

Finally, we found a sinusoidal pattern between the time of ICU discharge and the odds of ICU readmission, which occurred because roughly 60% of all ICU readmissions occur during the afternoon and evening. This finding is likely attributable to greater ICU bed availability during these times, making readmissions possible. Defining ICU readmissions to negate the effects of ICU bed availability using full calendar days is optimal if the goal is to measure the quality of care provided during the initial ICU stay. Defining readmissions this way reveals that nocturnal ICU discharges are not independent risks for ICU readmission. Prior studies suggesting that night discharges are risky for patients (11, 13, 14, 49, 50) used fixed hourly timepoints for ICU readmissions (typically 48 or 72 hours) yielding conclusions that likely reflected artifacts of typical patient flow patterns.

Because normal hospital flow patterns are not directly under an ICU's control, these data suggests that *any* potential ICU quality metric counting events within a specific amount of time following ICU discharge could produce biased conclusions. Use of full calendar day periods may also produce less biased results for other outcome measures, such as risk-adjusted ICU length of stay.

This study has limitations. First, because we could not assess outcomes following hospital discharge, patients discharged from the hospital, but subsequently readmitted to the same ICU within 7 days of ICU discharge were not captured as readmissions. However, such cases are rare and unlikely to have influenced our results. Second, ICU readmission rates may be influenced by transfers of patients to long-term acute-care hospitals or skilled nursing facilities, or by the inability to rescue patients who become critically ill on hospital floors. However, our findings appear to be robust to these phenomena given that results did not change in sensitivity analyses that (1) grouped post-ICU discharge deaths and hospital transfers, and (2) included admissions to other ICUs as ICU readmissions.

Third, although this dataset permitted examination of many patient characteristics and ICU discharge circumstances, there may be other important variables that display different relationships with ICU readmission as time to ICU readmission increases. Nonetheless, the consistency of our findings within types of exposures, and differences across types of exposure, support the generalizability of the relationships we describe.

Finally, this study does not settle whether reducing ICU readmissions would result in higher quality patient care. Conceivably, the use of ICU readmissions as a quality indicator could result in perverse incentives, causing excessively long ICU stays, or rewarding ICUs whose patients die before they have the opportunity to be readmitted. Future research should explore whether ICU readmissions possess features of good quality indicators.

Thus, this study establishes the proper definition of ICU readmissions for use in future studies assessing the use of ICU readmission as a potential ICU quality measure. This remains a source of considerable debate (1, 2, 29–31). However, by pinpointing the optimal interval to use in defining an ICU readmission for ICU quality assessment, this study takes an important step toward allowing that debate to be informed by a stronger and more uniform evidence base. Specifically, two full calendar days after the day of discharge is the optimal definition, such that a patient discharged at either 8AM or 8PM on a Tuesday would be eligible for ICU readmission through 11:59PM the following Thursday.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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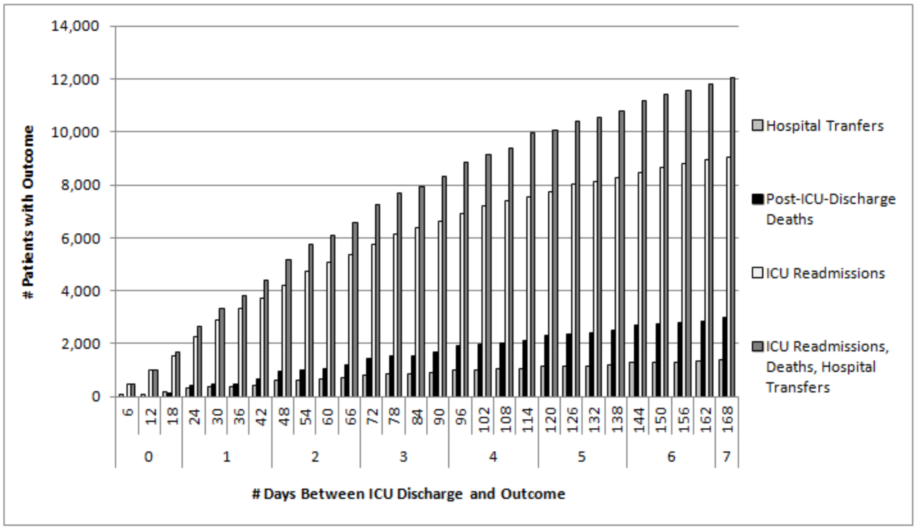

Figure 1.
Cumulative Events 24–168 hours post-ICU discharge

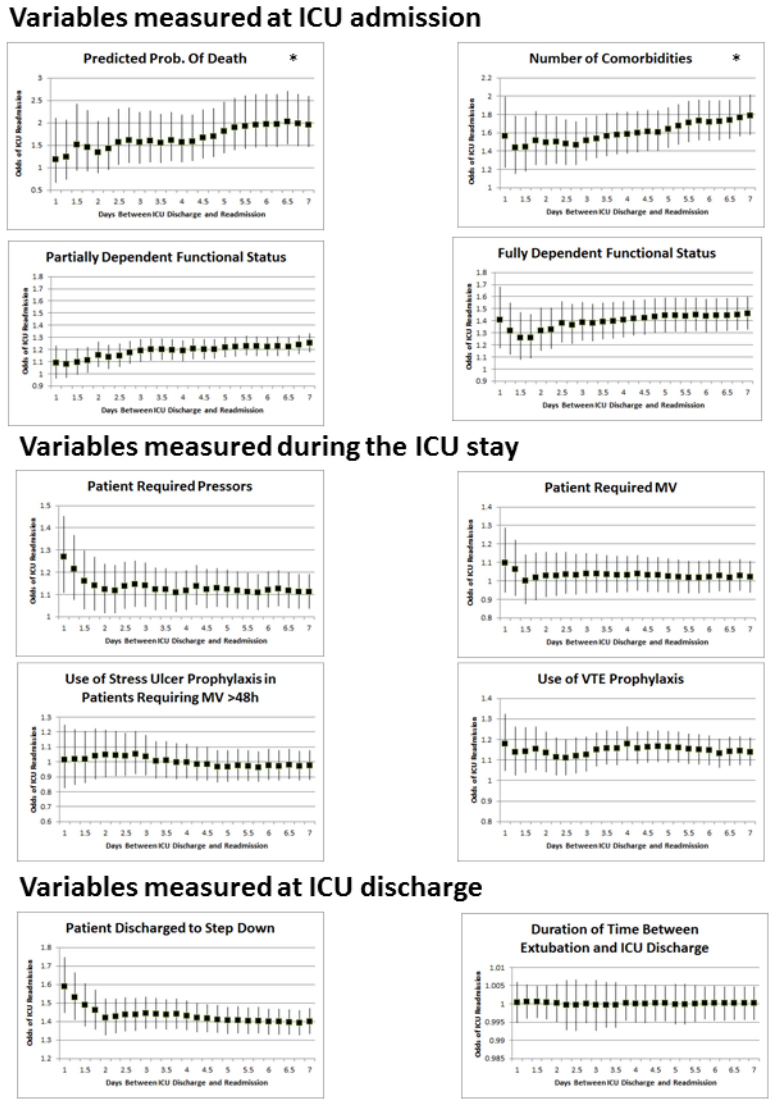

Figure 2. Patient Variables

All models adjusted for year of ICU admission, whether patient received a critical care consult, patient race (black, white, other), ICU admission location (Emergency Department, Another Hospital, General Care Floor, Step Down, Procedure, SNF, Rehab or LTAC, Another ICU, Other) discharge from the ICU to a general care floor or step down unit, DNR status at the time of ICU discharge, duration of mechanical ventilation, receipt of mechanical ventilation, receipt of vasopressors while in the ICU, functional status at the time of ICU admission (independent, partially dependent, fully dependent), patient insurance status (private, medicare, Medicaid, self pay, other) patient age (<65, 65–74, 75–84, 85+), admission to the ICU for treatment vs. monitoring, MPM, ICU length of stay, number of comorbidities, and the presence of chronic respiratory or cardiovascular illness, chronic renal failure, requiring of dialysis, solid organ cancer in the past 5 years, and proven metastatic cancer, % new ICU admissions, ICU census, and acuity of other patients in the ICU on the day of ICU discharge, duration of time between extubation or pressor discontinuation and ICU discharge.

*Log transformed exposure

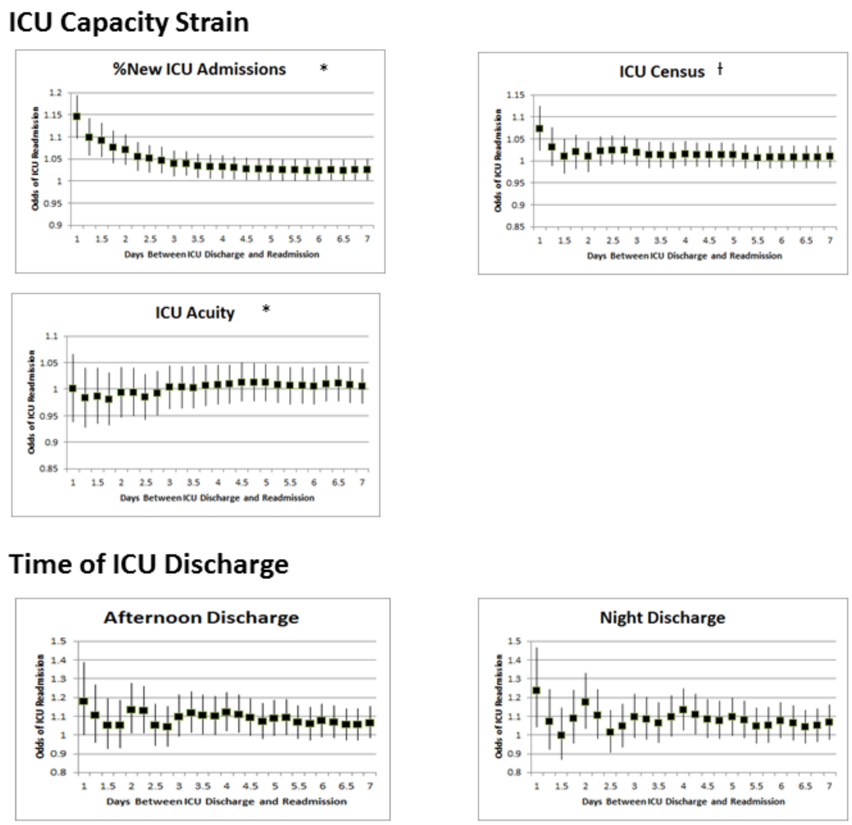

Figure 3. ICU Discharge Circumstance Variables

All models adjusted for year of ICU admission, whether patient received a critical care consult, patient race (black, white, other), ICU admission location (Emergency Department, Another Hospital, General Care Floor, Step Down, Procedure, SNF, Rehab or LTAC, Another ICU, Other) discharge from the ICU to a general care floor or step down unit, DNR status at the time of ICU discharge, duration of mechanical ventilation, receipt of mechanical ventilation, receipt of vasopressors while in the ICU, functional status at the time of ICU admission (independent, partially dependent, fully dependent), patient insurance status (private, medicare, Medicaid, self pay, other) patient age (<65, 65–74, 75–84, 85+), admission to the ICU for treatment vs. monitoring, MPM, ICU length of stay, number of comorbidities, and the presence of chronic respiratory or cardiovascular illness, chronic renal failure, requiring of dialysis, solid organ cancer in the past 5 years, and proven metastatic cancer, % new ICU admissions, ICU census, and acuity of other patients in the ICU on the day of ICU discharge, duration of time between extubation or pressor discontinuation and ICU discharge.

*Odds ratios for a 10% change in the exposure

†ICU census is standardized and normalized

Table 1

Univariable Statistics

Patient Variables	
Variables Recorded at Index ICU Admission	
	% or Median (IQR)
Admission Reason	
Treatment	51.6
Monitoring	48.4
Predicted Probability of Death (MPM-III)	0.07 (0.03, 0.14)
Functional Status	
Independent	78.8
Partially Dependent	15.5
Completely Dependent	5.6
Number of Comorbidities	0.0 (0.0,1.0)
Specific Comorbidities	
Chronic Respiratory Disease	6.2
Chronic Cardiovascular Disease	4.6
Chronic Hemo/Peritoneal Dialysis	4.3
Baseline Serum Creatinine >2mg/dL	7.8
Solid Organ Tumor	7.8
Proven Metastasis	4.1
ICU Length of Stay	1.94 (1.05, 3.73)
Variables Recorded During the ICU Stay	
	% or Median (IQR)
Patient Required Mechanical Ventilation	
Yes	30.7
No	69.3
Duration of Mechanical Ventilation (days)	1.67 (0.64, 4.98)
Patient Required Pressors	
Yes	15.5
No	84.5
Patient Received Stress Ulcer Prophylaxis*	
Yes	70.4
No	29.6
Patient Received VTE Prophylaxis*	

Patient Variables	
Yes	70.7
No	29.3
Variables Recorded at ICU Discharge	
	% or Median (IQR)
ICU Discharge Destination	
General Care Floor	60.3
Step Down	39.7
Time between Extubation and ICU Discharge	1.34 (0.93, 2.47)
Time between Pressor D/C and ICU Discharge *	2.0 (1.0, 5.0)
ICU Discharge Circumstance Variables	
Variables Representing Day of ICU Discharge ICU Capacity Strain	
	Median (IQR)
Proportion of New Admissions	0.21 (0.14, 0.29)
ICU Census	0.39 (−0.26, 0.96)
Average Acuity of Other ICU patients	0.14 (0.10, 0.20)
Time of ICU Discharge	
	%
Morning (6AM – 12PM)	10.4
Afternoon (12PM – 6PM)	59.5
Night (6PM – 6AM)	30.1
Other Variables Included in the Model	
	%
Year	
2001	7.9
2002	14.0
2003	14.7
2004	16.0
2005	14.5
2006	13.4
2007	11.6
2008	7.9
Race	
Black	14.7

Patient Variables	
White	76.5
Other	8.8
Source of ICU Admission	
Emergency Department	40.0
Another Hospital	5.9
General Care Floor	11.9
Step Down	2.6
Operating Room / Procedure Suite	35.8
Another ICU	1.5
Other	2.3
Full Code at ICU Discharge	
No	5.6
Yes	94.4
Insurance	
Private	30.1
Medicare	49.6
Medicaid	8.6
Self Pay	8.6
Other	3.0
Patient Required Intensivist Consult	
Yes	43.8
No	56.2
Age	
<65	55.4
65–74	19.8
75–84	18.4
85+	6.4
Patient Type	
Scheduled Surgical	24.4
Unscheduled Surgical	13.2
Medical	62.4

*Data available only on dates, not times

*Among eligible patients only

Table 2

	Readmission Time* N (%)				
Discharge	**6AM – 12PM**	**12PM – 6PM**	**6PM – 12AM**	**12AM – 6AM**	***Total***
6AM – 12PM	149 (18.4)	319 (39.5)	227 (28.1)	113 (14.0)	808
12PM – 6PM	970 (18.2)	1,931 (36.2)	1,458 (27.3)	974 (18.3)	5,333
6PM – 12AM	409 (17.6)	870 (37.4)	584 (25.1)	461 (19.8)	2,324
12AM – 6AM	98 (16.5)	226 (38.1)	151 (25.5)	118 (19.9)	593
Overall	1,626 (16.5)	3,346 (36.9)	2,420 (26.7)	1,666 (18.4)	9.058
Probability of Death	446 (27.4)	735 (22.0)	466 (19.3)	406 (24.4)	2,053 (22.7)

*Among those readmitted to an ICU within 7 days