

Poster Presentations — B15

Unexplained Variation in Hospital ICU Utilization

Michael J Breslow MD*, Robert Herbert, Peter Pronovost MD and David Foster, VISICU, Inc., Baltimore, MD, United States.

Introduction: ICU admission is associated with an increased use of hospital resources. As the ICU population in the United States grows, the need for efficient use of ICU facilities will increase. Our anecdotal experience suggests that physicians' decisions regarding the need for ICU admission vary widely. Therefore, we sought to evaluate the variability of ICU admission rate for common medical conditions, hospital characteristics associated with ICU admission, and whether ICU admission is associated with hospital mortality.

Methods: Using data contained in the 1998 and 1999 MedPAR database, hospital ICU utilization was examined for four medical conditions that frequently result in ICU admission: cardiac arrhythmia (ICD9 427), congestive heart failure (CHF - 4280), myocardial infarction (MI - 410), and cerebral vascular accident (CVA - 43, excluding TIA). To evaluate whether hospital teaching status affected ICU utilization, hospitals were assigned to one of three groups: advanced teaching (presence of a fellowship training program), teaching (presence of residents), and non-teaching. Hospitals had to have at least 50 patients with each diagnosis to be included in the analysis. Descriptive statistics (median, inter-quartile range [ICQ]) for ICU admission rate were generated for each diagnosis. Linear regression analysis was used to assess the relationship between hospital ICU utilization and mortality rate for the entire hospital population and the ICU population for each diagnosis. Multivariate analysis was used to adjust for other contributors to mortality (age, common comorbid diseases).

Results: ICU utilization varied widely amongst hospitals. Median rates for ICU utilization were 39.4% (ICQ 15.3-93.1), 35% (ICQ 19.5-76.2), 86.5% (ICQ 67.7-96.4), and 26.2% (ICQ 16.4-46.1) for arrhythmia, CHF, MI and CVA, respectively. Hospital characteristics affected ICU utilization – advanced teaching hospitals had the lowest rate of ICU utilization and non-teaching hospitals the highest – e.g., median utilization rates for arrhythmia were 19.1%, 31.7% and 59.2%, respectively. However, variances were similar for all hospital types. Hospital population mortality rates were 2.2%, 6.1%, 14.2% and 8.6%, while mortality rates for the subset of patients with an ICU admission were 3.2%, 8.1%, 14.4% and 15.3%, for arrhythmia, CHF, MI and CVA, respectively. There was no correlation between mortality for the hospital population and ICU utilization. However, mortality rates in the ICU population were inversely associated with ICU utilization (correlations were .47, .68, .25 and .63, respectively). This strong relationship persisted after adjusting for other contributors to mortality.

Conclusions: There is wide variability in how physicians use their ICUs. Although physicians in teaching hospitals tend to be more restrictive in ICU use, considerable variability exists across all hospital types. Increased ICU use does not affect mortality rate for the entire cohort of patients hospitalized with a medical diagnosis. However, ICU population mortality is higher where physicians are more selective in admitting patients to the ICU – an expected finding given the probability of higher severity of illness with a more restrictive approach to ICU utilization. Given the high cost structure of the ICU and the expected need for more ICU bed capacity, we need to better understand factors affecting physician decision-making, with the ultimate goal of developing strategies to standardize ICU admission criteria and reduce variability.