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1763. Estimating Median Survival Time to Central Line-Associated Bloodstream Infection (CLABSI) Among Patients in Intensive Care Units Reported to National Healthcare Safety Network (NHSN)

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Background. Duration free of central line–associated bloodstream infection (CLABSI) in a hospital may vary by type of patient population. We estimated patients’ median time to CLABSI by intensive care unit (ICU) type among acute care hospitals.

Methods. The study population was ICU patients whose CLABSI data were reported to the National Healthcare Safety Network (NHSN) in 2016. The unit of analysis was ICU location, not an individual patient. We conducted a Cox proportional hazards model with time to CLABSI as the dependent variable. We estimated the median survival time to CLABSI in each ICU type.

Results. In 2016, 6,935 ICUs at 3,384 hospitals reported CLABSI data to NHSN, with a total of 10,985 CLABSIs and 2,449,361 follow-up time in days. Factors associated with an increased daily hazard of CLABSI were the following: admission to a hospital with a large bed size, large teaching status, and admission to a patient care location with a higher device utilization ratio (Table 1). Adjusted survival curves showed that median time to event (median CLABSI-free time) among ICUs ranged from 66 days (level III neonatal ICU) to 90 days (burn units) to 275 days (oncology units), and 284 days (cardiothoracic units) (Table 2, Figure 1).

Conclusion. The study demonstrated that ICUs with level III care for neonatal patients and ICUs with burn patients were least likely to achieve the target of “zero” infection in a defined period and may warrant further targeted interventions. Similar research to investigate infection control performance through estimating median infection-free time is needed beyond ICUs and across multiple ICU types and facility settings.

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Table 1: Facility and location-level characteristics associated with daily hazard of CLABSI in ICUs that reported data from 2016 to NHSN

| Facility and location characteristics | Percent Estimate | p-value | Hazard Ratio | 95% CI |
|-------------------------------------|-----------------|---------|--------------|-------|
| ICU Location type                    |                 |         |              |       |
| Burn unit                           | 0.111           | <0.001  | 1.066        | (2.459, 4.475) |
| Centers unit                        | 0.849           | <0.001  | 1.751        | (1.576, 1.952) |
| Cardiac/Intensive care unit         | 0.621           | <0.001  | 2.124        | (1.991, 2.259) |
| Medical                             | 0.691           | <0.001  | 1.990        | (1.833, 2.174) |
| Med/Neurological                    | 0.617           | <0.001  | 1.961        | (1.805, 2.122) |
| Neurological                        | 0.619           | <0.001  | 1.952        | (1.819, 2.102) |
| Obstetric                           | 0.527           | <0.001  | 1.785        | (1.618, 1.976) |
| Neonatal (textile ICU)              | 0.489           | <0.001  | 1.467        | (1.003, 2.148) |
| Oncology unit                       | 0.623           | 0.5000   | 1.020        | (0.734, 1.466) |
| Ortho/Neurological                  | 0.887           | <0.001  | 2.229        | (1.681, 2.970) |
| Respiratory                         | 0.544           | <0.001  | 2.374        | (1.742, 3.289) |
| Surgical                            | 0.597           | <0.001  | 1.617        | (1.031, 2.597) |
| Surgical (textile ICU)              | 0.619           | <0.001  | 1.558        | (1.078, 2.269) |
| Trauma                              | 0.628           | <0.001  | 2.228        | (1.790, 2.879) |
| Cardiothoracic                      | 0.695           | <0.001  | 2.197        | (1.740, 2.809) |

*Based on 2012 Clinical Laboratory Standards Institute (CLSI) MIC breakpoints

1762. The Adjusted Ranking Metric (ARM) and Its Use in Composite Measures for HAI Prevention in the National Healthcare Safety Network (NHSN)

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Background. The National Healthcare Safety Network (NHSN), developed and used by the Centers for Disease Control and Prevention (CDC) for surveillance of healthcare-associated infections (HAIs), provides benchmark measures, such as standardized infection ratio (SIRs), that CDC and its partners in healthcare and public health use for prevention purposes. NHSN provides benchmarks for each HAI measure separately, but a composite HAI measure could provide a more rounded assessment of HAI problems and prevention opportunities.

Methods. Several issues must be addressed to produce a sound HAI composite measure, the most of which is that the SIR can be inaccurate for facilities with low HAI exposure (e.g., low device days, operative procedure volume). We remedy this issue with the Adjusted Ranking Metric (ARM), a new measure that reliability-adjusts the SIR using a Bayesian mixed effects model. The ARM is particularly useful in the production of a composite measure because ARMs are well suited to comparison between facilities. The composite was therefore produced by applying adjustments to the ARMs to account for (1) differences between exposure to separate HAI types within facilities and (2) differences in frequency and severity between HAIs. The composite is calculated for 6 HAIs based on 2015 data.

Results. Case studies of 3 facilities (Table 2) showed that the new composite measure provides a meaningful measure of overall facility performance that is less prone to the biases that afflict simple combinations of SIRs.

Conclusion. We introduce a framework for calculating a composite HAI measure that is flexible, customizable, and transparent. The current implementation of the framework is intended to assist in prevention efforts and can be easily modified to include cost weights, if desired. Flexibility in weighting the HAIs provides an opportunity for different stakeholders to customize the composite measure to their own needs.

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