Table of Contents

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Discriminatory performance of commonly used risk triage tools in hospitalized recipients of hematopoietic stem cell transplantation

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Keywords

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Abstract

Rationale:

Hematopoietic cell transplantation (HCT) recipients frequently experience clinical deterioration. Risk triage tools used to identify hospitalized patients at risk of clinical deterioration may perform differently in special populations due to vital signs and laboratory values differing from the general population. We aimed to determine the discriminatory performance of five commonly used risk triage tools among hospitalized HCT recipients.

Methods:

Hospitalizations of adult HCT recipients were identified at OHSU between 1/1/2019 and 12/31/2022. A composite of ward to ICU transfer, discharge to hospice, or ward death was the primary outcome. The Epic Deterioration Index (EDI) was extracted from the electronic health record (EHR), and EHR data were used to calculate Systemic Inflammatory Response Syndrome (SIRS), quick Sepsis Related Organ Failure Assessment, (qSOFA), Modified Early Warning Score (MEWS) and National Early Warning Score (NEWS) scores from presentation until first observed outcome or discharge. Each tool's hospitalization-level area under the receiver-operating characteristic (AUROC) was calculated based on the maximum score prior to the first outcome or discharge. Commonly used thresholds were used to determine the cumulative incidence of positive cases (EDI >= 37.4, SIRS >=2, qSOFA >=2, MEWS >= 5, NEWS >= 8). Performance was compared between autologous and allogenic transplant recipients.

Results:

The composite outcome occurred in 159 of the 1390 hospitalizations (11%), 155 of which were ICU transfers. Among the ICU transfers, 63 (41%) ultimately died and 5 were discharged to hospice (3%). Allogenic HCT recipients (overall n = 785) were significantly more likely to experience the primary outcome (14% vs 8%, $p < 0.01$) than recipients of

autologous HCTs (overall n = 605). The EDI showed the highest hospitalization-level discrimination in both transplant groups (AUROC 0.88, 95% CI 0.84-0.91), followed by MEWS (0.84, 95% CI 0.80-0.88, NEWS (0.83, 95% CI 0.79-0.86), qSOFA (0.77, 95% CI 0.74-0.81), and SIRS (0.72, 95% CI 0.68-0.76)). An EDI of 37.4 provided sensitivity of 0.55 and specificity of 0.92. In this cohort, 12 encounters involved deterioration without EDI values ever reaching 37.4.

Conclusions:

The EDI showed high hospitalization-level discrimination for clinical deterioration among HCT recipients during hospitalization, aligned with its performance in general populations. Next steps will focus on comparing EDI predictive values and pre-deterioration lead times across alert thresholds.

Figure: