Intensive care units (ICUs) specialize in the care of critically ill. One important decision faced by ICU physicians is when to transfer patients from their unit to a more richly staffed or equipped ICU. When faced with such scenarios, physicians need to act quickly to minimize the time to appropriate care, and thus reduce the patient's risk for organ failure or death. Unnecessary transfers, however, may not benefit all patients, can strain expensive and scare resources of an already busy receiving ICU, delay care for patients who do require more specialized care, or cause unnecessary stress to the patient and staff.

To address these tradeoffs, we present a systematic framework for making ICU transfer decisions. We use Generalized Estimating Equations and binary logistic regression to estimate each patient's need to transfer. We then evaluate threshold-based policies that balance the need to correctly transfer patients that need to be transferred and the need to avoid unnecessary transfers. Our model is calibrated and validated on 646 pediatric patients seen at pediatric ICU units in Michigan. We show that, by using this framework, it is possible to significantly reduce transfer delays.

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