hyperoxemia. Residual bias, in specific informative censoring bias following death or rapid recovery, may have prevented included patients from longer exposure times. The authors made effort to minimize immortal time bias by only including patients with more than 24 hours of invasive ventilation, and by adjusting the models for mechanical ventilation time. However, the exact cause of death was not determined and can in general not be linked to oxygen directly. Predisposing lung injury and other co-morbidity may also impact the outcomes, even when the analyses are adjusted for illness severity or co-existing disease scores such as SOFA (sequential organ failure assessment) and Elixhauser.

The next steps in the field should be aimed at exploring the causal pathways, characterizing potential mechanisms, and identifying safe oxygen margins for individual patients. Until then, an attentive, tailored and goal-directed approach by titrating supplemental oxygen remains a safe and balanced strategy for oxygen therapy in the ICU. ■

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Toward Tailored Care for Sepsis Survivors

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The heterogeneity of sepsis is well recognized. With that, much work has been done to identify subgroups of patients based on clinical characteristics, biomarkers, and healthcare utilization. The goal of such classification strategies is to improve recognition and treatment, optimize resource allocation, and enhance and refine enrollment into clinical studies.

In this issue of *AnnalsATS*, Taylor and colleagues (pp. 1355–1363) classified sepsis survivors into subgroups and measured the association between subgroup type and 30-day rehospitalization and mortality (1). The goal of this analysis was to categorize sepsis survivors into clinically distinct subgroups, with the ultimate goal that these groups would allow for better prediction of outcomes, understanding of the pathophysiology, and guidance in treatment. Using readily available electronic health record data, they identified five distinct patient subgroups: *1*) low risk, barriers to care; *2*) previously healthy, severe illness, and complex needs after discharge; barriers to care; *3*) multimorbidity; *4*) poor functional status; and *5*) existing poor health with severe illness and complex needs after discharge. Both 30-day rehospitalizations and mortality were highest among the fifth subgroup (existing poor health with severe illness and complex needs after discharge), occurring in 35% and 8%, respectively. Conversely, patients in the first subgroup (low risk, barriers to care) had the lowest readmissions (9%) and mortality (0.1%). However, patients in the fourth subgroup (poor functional status) had the highest rate of ambulatory care–sensitive condition readmissions.

Although there are many methods to identify high-risk patients, such as traditional regression models, Taylor and colleagues applied latent class analysis (LCA) to cluster patients into distinct subtypes. Recognizing the outcomes after sepsis (or many other health events, for that

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matter) are likely due to several interrelated factors, this approach moves beyond stratifying patients by risk to identifying distinct subgroups of patients based on specific characteristics that may confer higher risk. LCA considers combinations of risk factors, which are not treated as interchangeable, and ultimately identifies distinct, nonoverlapping groups (2).

The authors should be commended for considering characteristics not only based on their association with sepsis outcomes but also related to potential intervention strategies. For example, polypharmacy (i.e., five or more medications prescribed at discharge) may be amenable to tailored medication reconciliation practices, whereas delay in antibiotics could be addressed via a hospital-level quality improvement approach. In addition, all characteristics were readily available in the electronic health record (e.g., length of hospital stay, new medical device needs, healthcare insurance status), improving the ease of application in a clinical environment. The 14 characteristics included in the LCA spanned the clinical trajectory from prior health status, to the acute sepsis hospitalization, and finally at discharge and beyond, including baseline comorbidity status, need for mechanical ventilation, and access to care. Practices to reduce long-term morbidity and mortality include early sepsis care (e.g., early antibiotics and source control), critical care management (e.g., delirium prevention and treatment, early mobility), discharge planning (e.g., medication review), and appropriate follow-up—many of which are considered in this study (3, 4).

As patient characteristics considered for inclusion in the LCA model were identified at hospital discharge, it is important to consider how these patient groups can be supported during this care transition and in the period after discharge. Patients may have new medical diagnoses, medications, or technology dependence; functional or cognitive decline; or social or emotional challenges. Although the challenges facing sepsis survivors are increasingly recognized, adherence to postsepsis care recommendations are variable (5).

Recently, the 2021 Surviving Sepsis Campaign Guideline provided both specific guidance and best practice suggestions surrounding postsepsis care (3). These include medication reconciliation; assessment for physical, cognitive, and emotional problems; and referral to posthospital rehabilitation programs, among others. The Guideline also suggests referral to a post–intensive care unit follow-up clinic where available (3). However, such programs are not ubiquitous, and they are challenged by a lack of funding, lack of space, and lack of staff (6).

Identifying which patient is more likely to benefit from a specific screening or intervention is one potential strategy to improve the adherence and efficiency of postsepsis care. Interventional studies to improve long-term sepsis outcomes have been limited in their success. This is likely due to the enrollment of a heterogeneous patient population, whereby some patients are likely to improve and others are unlikely to recover, regardless of the intervention (7, 8). Thus, we should strive to identify patients who will have enhanced recovery because of the treatment intervention. In a recently published randomized controlled trial, Taylor and colleagues compared a structured postsepsis follow-up program to usual care, enriching the cohort to patients at high risk for mortality and readmission (9). The follow-up program reduced 30-day mortality and readmission; however, patients in the highest quartile of risk did not benefit—indicating that even among an enriched cohort, variability in treatment effect exists, suggesting that subgroup identification and further targeting or tailoring of interventions has the potential to improve outcomes.

Patient-centered sepsis care after hospital discharge necessitates recognition of the heterogeneity among sepsis survivors in terms of baseline health, treatment course, and potential sequelae. Moving from a universal treatment strategy to a tailored treatment approach has the potential to improve patient outcomes while also considering resource limitations. Dr. Taylor and colleagues have taken a large step in this direction through their identification of patient subtypes using readily available health data. ■

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