Prognostication during Critical Illness: Moving the Field Forward

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Major decisions about goals of care and life-sustaining treatment are made every day in the intensive care unit (ICU) through shared decision-making, a process that incorporates the available scientific evidence and the patient's values, goals, and preferences (1). An important part of this collaborative process is ensuring that prognostic information is understandable and accurate. Unfortunately, clinicians do not always present prognostic information clearly (2), and patients and surrogates often have an overly optimistic view of prognosis (3). It is therefore not surprising that discordant expectations between physicians and surrogate decision-makers occur about half the time, with nearly one-third of these discordant episodes attributable to a misunderstanding about prognosis (4).

Although some of this discordance may be improved with communication training, a critical part of prognostication is the accuracy and applicability of the prognostic information itself. Historically, prognostic models in the ICU have focused on short-term mortality (5), but we now know that information about post-ICU functional outcomes is as important to patients as information about survival (6). We in critical care must challenge ourselves to capture the scope of patient-centered outcomes in our prognoses; at the same time, we must continuously strive to improve the accuracy of the prognostic information we provide in the ICU.

Two studies in this issue of *AnnalsATS* take on this challenge. The first, by Detsky

and colleagues (pp. 1562–1570), sought to predict “return to baseline status” at 6 months among medical and surgical ICU patients who had spent 3 or more days in the ICU and used life-sustaining therapy (7). The investigators assessed functional status 1 month before admission by asking about two activities: ambulating up 10 stairs and toileting independently. In addition, one component of the Health Utilities Index was administered to assess cognitive function (8). Six months after the critical illness, the investigators reassessed vital status, residential status, and the functional questions. “Return to baseline,” the composite primary outcome, was defined as the participant being alive, in their baseline residence, and with the same (or better) level of function in the three functional domains compared with the month before ICU admission. Of the 303 participants, 91 had returned to baseline at 6 months. Independent predictors of not returning to baseline included older age, being a medical patient, non-white race, higher Acute Physiology and Chronic Health Evaluation (APACHE) III score, hospitalization in the prior year, and certain prior conditions. The area under the curve was fair (0.778; 95% confidence interval, 0.72–0.832), with good calibration. The findings were reproducible with internal cross-validation techniques.

This study represents an important step in prognosticating patient-centered outcomes in the ICU, as the composite outcome encompasses several domains that are valued by patients. Nevertheless,

the outcome is a relatively crude measure of recovery. Ambulating up 10 stairs independently is an advanced mobility activity (9), whereas toileting represents one of the most basic activities of daily living (ADLs) and is often one of the last activities lost in the natural progression of disability (10). The range of function between these two activities is broad and includes more advanced ADLs, instrumental activities of daily living (IADLs), and basic mobility (11). This has important implications for the measure's clinical applicability. It is not difficult to imagine a situation where an ICU survivor returns to baseline in all ADLs, IADLs, and basic mobility but is unable to climb 10 stairs independently. In the current study, this person would be classified as not returning to baseline, and the family would be counseled as such in the ICU. However, it seems likely that many patients would find this recovery experience acceptable, despite not being an exact return to baseline. Health status preferences may change over time, and many patients find declines in health status acceptable after experiencing one (12). Incorporating the patient's values and preferences, and presenting the spectrum of recovery to the patient, will be critical to the use of this measure in clinical practice.

Because accurate estimates of short- and long-term mortality remain an important part of ICU prognostication, Hadique and colleagues (pp. 1556–1561) developed a prognostic model for 6-month mortality among medical ICU patients (13). The authors include the response of the

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ICU physician to the “surprise question” (Would I be surprised if this patient died within 6 months?) as a potential variable in the model. In the derivation cohort (n = 500), 180 patients (36%) had died by 6 months of follow-up. The final model included the Charlson comorbidity index, APACHE III score, and an answer of “no” to the surprise question, which notably had the highest odds ratio of the three variables. The area under the curve was good (0.832), and the model was validated in an external cohort.

A novel strength of this study is the use of the surprise question, which has been tested in other populations with varying results (14) but had not yet been evaluated among the critically ill. Wisely, the authors do not use the surprise

question alone but incorporate it as one of many factors to improve the discriminative accuracy of the model. This is important, because the surprise question is essentially quantifying overall clinical intuition, and the discriminative accuracy of clinical intuition alone in the ICU is variable (15). Nevertheless, when tested in the validation cohort, the positive predictive value of the model was only 68.1% (calculated from Table 4 in Reference 13), meaning that nearly one-third of patients predicted to die within 6 months were still alive. Although the negative predictive value was better (85.6%), these numbers suggest that further refinement of the model is warranted before it can be incorporated into clinical practice. Overall, however, these findings clearly support further evaluation of the surprise

question in the ICU as a predictor of long-term mortality, ideally as one factor within a more comprehensive model.

With the gravity of the decisions made every day in the ICU, prognostic information is invaluable to patients, families, and clinicians. As the two studies in this issue of *AnnalsATS* have illustrated, future work in ICU prognostication must focus on accurately predicting the scope of patient-centered outcomes without losing sight of the higher mortality risk faced by ICU patients and survivors (7, 13). With this approach, we can truly move the field forward. ■

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