0196-0644/$-see front matter

Off the CURB and Quickly Onto the SOFA

To the Editor:

Ilg et al[1] performed a retrospective analysis to assess the predictive performance of the confusion, uremia, respiratory rate, blood pressure, and aged 65 years or older (CURB-65) score on the need for critical care interventions in emergency department (ED) patients admitted with community-acquired pneumonia. The authors suggest clinicians should exercise caution when using CURB-65 to guide disposition. We agree but offer alternative explanations for the findings and suggest a better-validated tool for risk stratification and triage in this population.

First, the CURB-65 score was derived and validated in a European population of nonimmunocompromised and non–nursing home residents with community-acquired pneumonia to evaluate 30-day mortality.[2] Ilg et al tested the CURB-65 score in a population that included nursing home residents and evaluated the need for critical care intervention. Triage from an ED depends on numerous factors, such as patient condition, availability of resources, provider comfort, and inherent biases directing an ICU admission. Not surprisingly, the CURB-65 score lacked specificity for predicting the need for critical care interventions.[1] Just over half of patients with a CURB-65 score greater than or equal to 3 required a critical care intervention. And for scores of 1 and 2, likelihood ratios for needing critical care intervention are underwhelming, at 1.23 and 1.73, respectively. Therefore, we suspect an indication bias may be in effect for critical care admission and use of resources. Furthermore, inhospital mortality was 7.7% for patients with a CURB-65 score greater than 2.[1] We speculate 30-day mortality was even lower. Regardless, 30-day mortality was much lower than predicted by the original CURB-65 derivation, which exceeded 20% in patients with a score greater than 2.[3]

Second, confusion was defined in the original CURB-65 derivation by a Mental Test Score of 8 or less in the UK and New Zealand population or a new disorientation in person, place, or time in the Netherlands cohort.[1] The Mental Test Score was developed and validated in institutionalized elderly persons and extrapolated into the original CURB-65 derivation.[4] The Mental Test Score is not commonly used in acute care settings nor correctly applied because the CURB-65 derivation excluded nursing home (institutionalized) patients. How did the authors identify confusion? Our concerns are that the CURB-65 score was not applied to an equivalent population and did not evaluate the same outcome as the original derivation, and that the confusion component was discordantly applied, limiting inferences from study results.

When ICU admission for an ED patient with pneumonia is being deliberated, we suggest using the quick Sequential [Sepsis-related] Organ Failure Assessment (qSOFA) score, whose variables include altered mental status, as defined by any change in Glasgow Coma Scale score; hypotension, defined by systolic blood pressure 100 mm Hg or less; and respiratory rate of 22 breaths/min or greater.[5] In an ED patient with infectious pneumonia, the presence of 2 of 3 qSOFA variables indicates a poor outcome, and the score is meant to prompt clinicians to further investigate for organ dysfunction, escalate therapies,

and consider critical care admission.[5] Even though qSOFA and CURB-65 variables overlap, the qSOFA score was derived and validated with multiple national and international databases, respectively, and does not require laboratory data, which lends credibility and simplicity for use in the ED population.

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https://doi.org/10.1016/j.annemergmed.2018.10.036

Funding and support: By *Annals* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The authors have stated that no such relationships exist.

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In reply:

We appreciate the insightful comments by Patel et al[1] in regard to our study[2] exploring the performance of the confusion, uremia, respiratory rate, blood pressure, and aged 65 years or older (CURB-65) score in predicting critical care interventions in patients admitted to the hospital with community-acquired pneumonia.

Patel et al suggest that the quick Sequential [Sepsis-related] Organ Failure Assessment (qSOFA) may be superior to CURB-65 in assigning disposition to community-acquired pneumonia patients in the emergency department (ED). Much like CURB-65, however, qSOFA is limited because of its calibration to the outcome of mortality.[3] As we have demonstrated here with respect to CURB-65[2] and previously with qSOFA,[4] patients triaged to lower levels of care by low predicted mortality have unacceptably high rates of receiving critical care interventions. This was highlighted in our previous study describing the relationship of qSOFA to critical care intervention and mortality in patients with acute infection, in which 23.5% of patients with a qSOFA score of 1 received a critical care intervention, although only 6.1% died. This problem is endemic to the derivation methodology used for CURB-65 and qSOFA and is not ameliorated by a large derivation or validation cohort.

In addition, qSOFA has a low sensitivity in predicting mortality in community-acquired pneumonia. This is problematic for a score used to triage patients, in which timely intervention and appropriate disposition are vital. Recent investigations comparing CURB-65 with qSOFA in community-acquired pneumonia have found that a qSOFA score greater than or equal to 2 has a substantially lower sensitivity for predicting mortality than CURB-65 score greater than or equal to 2, despite a similar overall discrimination.[5,6] We agree that the need for laboratory testing adds to the complexity of CURB-65; however, it is an unlikely barrier in most EDs, where measuring chemistries is commonplace. In resource-limited settings, this is certainly a consideration and may limit CURB-65 utility.

We agree with Patel et al that the decision to admit to the ICU depends on multiple factors. We addressed this issue by using critical care intervention as the outcome, which we believe is more independent of nonpatient-related factors than ICU admission. In fact, only 54.4% of patients admitted to the ICU received a critical care intervention within 48 hours.[2] Although an imperfect solution, critical care intervention provides both a proximal and objective endpoint. That the CURB-65 score is not more predictive of critical care intervention reflects the need for new prediction tools calibrated to proximal endpoints.

There were a number of limitations, as outlined by Patel et al and acknowledged in the article. Given data set constraints, we were unable to exclude patients presenting from nursing facilities. Although this may have resulted in a population with data skewed toward greater illness, our mortality rates were far lower than those in the original CURB-65 derivation cohort. Similarly, given our low inhospital mortality rates compared with the original 30-day mortality rates, it is unlikely that including 30-day mortality would have