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LETTER

Predictive validity of the qSOFA criteria for sepsis in non-ICU inpatients

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Dear Editor,

Systemic Inflammatory Response Syndrome (SIRS) criteria for sepsis have low specificity and been superseded by the Sepsis-3 definition of sepsis which incorporates the Sepsis-related Organ Failure Assessment (SOFA) score. The 3-point quick-SOFA (qSOFA) score has been recommended for screening patients at high risk of death outside the intensive care unit (ICU) [1–3]. The qSOFA criteria have been externally validated in the emergency department setting, but not yet for inpatients [4]. In Australia, the New South Wales Clinical Excellence Committee rolled out the "Sepsis Kills" (SK) program for inpatients in 2014, which includes diagnostic criteria for sepsis (see in [5]). The common feature of qSOFA, SK and SIRS definitions is that sepsis as a diagnosis is considered if a set of physiological criteria are met in the presence of suspected or proven infection and irrespective of organ dysfunction status [Electronic Supplementary Material (ESM) Table 1]. In the study reported here, the specificity and sensitivity of qSOFA criteria for predicting inpatient sepsis, in-hospital mortality, ICU admission and blood culture positivity, using consensus expert opinion as the gold standard, was compared with the SIRS and SK criteria.

In a 600 bed tertiary referral hospital in Sydney, Australia, treating teams identified 161 consecutive, adult non-ICU inpatients from May to August 2015 who triggered the hospital SK pathway with acute deterioration and suspected or proven infection. This resulted in automatic review within 24 h of deterioration by an Infectious Disease (ID) fellow who determined if sepsis was present based on clinical, microbiological, biochemical and radiological evidence of infection and acute organ dysfunction. The diagnosis of sepsis was confirmed subsequently from blinded, independent assessment by two ID physicians.

Sepsis was diagnosed in 90 of the 161 (56%) patients. The inter-observer reliability for the diagnosis of sepsis by expert opinion was high (89% by kappa statistic). Overall, of the 161 patients, 24 (15%) required ICU admission, 32 (20%) had positive blood cultures, and 25 died (16%). Outcomes were similar in patients with sepsis (ESM Table 2). There was substantial overlap of scoring system criteria (ESM Table 3). The only missing data were data on white cell counts for 18 patients. In terms of diagnosing sepsis, the specificity of qSOFA—87% (62/71)—was superior to that of SIRS and SK—39% (28/71) and 34% (24/71), respectively. The sensitivity of qSOFA criteria of 90% (81/90) was comparable to that of SIRS (92%; 83/90) and SK (99%; 89/90) (Table 1). Similarly, qSOFA had notably higher specificity than both SIRS and SK scores for in-hospital mortality, ICU admission and positive blood cultures.

This is the first report on the validity of qSOFA in assessing deteriorating ward patients with clinically suspected infection. The high sensitivity and superior specificity of qSOFA, as well as its non-reliance on laboratory diagnostics, support the role of qSOFA as a bedside sepsis evaluation tool for inpatients that may be particularly useful in low-income settings [3]. Diagnostic specificity is important since misdiagnosis may detract from investigating alternative etiologies for deteriorating inpatients and may be associated with antibiotic overuse. qSOFA-specific training may enhance sensitivity. The single-center study design and small sample size are important limitations to the study, although real-time

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Table 1 Performance of the three sepsis scoring systems in predicting primary and secondary outcomes

Sepsis scoring system	Outcomes[a]							
	Sepsis		In-hospital death		Intensive care unit admission		Positive blood cultures	
	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity
qSOFA	90% [81/90] (81–95)	87% [62/71] (77–94)	68% [17/25] (46–84)	46% [63/136] (81–95)	71% [17/24] (49–87)	47% [64/137] (38–55)	91% [29/32] (74–98)	53% [69/129] (44–62)
SIRS	92% [83/90] (84–97)	39% [28/71] (28–52)	72% [18/25] (50–87)	21% [28/136] (14–29)	79% [19/24] (57–92)	22% [30/137] (16–30)	91% [29/32] (74–98)	25% [32/129] (18–33)
SK	99% [89/90] (93–100)	33% [24/71] (23–46)	96% [24/25] (78–100)	18% [25/136] (12–25)	92% [22/24] (72–99)	17% [23/137] (11–24)	100% [32/32] (87–100)	19% [25/129] (13–28)

qSOFA Quick sequential organ failure assessment, *SIRS* systemic inflammatory response syndrome, *SK* clinical excellence committee "Sepsis Kills" program

[a] Data on outcomes are presented as a percentage with the number of patients in square brackets and the 95% confidence interval in parenthesis

determination of the sepsis diagnosis by the ID fellow within 24 h of deterioration, supported by consensus ID expert opinion, is a strength.

Electronic supplementary material
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Compliance with ethical standards

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Ethical approval
This study was approved by the South Eastern Sydney Local District Ethics Committee (HREC ref no: 16/184).
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflicts of interest
On behalf of all authors, the corresponding author states that there is no conflict of interest.

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