

## Cohort study

# Patients with hospital-onset sepsis are less likely to receive sepsis bundle care than those with community-onset sepsis

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**Commentary on:** Baghdadi JD, Wong MD, Uslan DZ *et al.* Adherence to the SEP-1 Sepsis Bundle in Hospital-Onset v. Community-Onset Sepsis: a Multicenter Retrospective Cohort Study. *J Gen Intern Med* 2020; Feb 10. doi: 10.1007/s11606-020-05653-0. [Epub ahead of print]

## Implications for practice and research

- ▶ Patients with hospital-onset sepsis are less likely to receive sepsis bundle adherent care compared with community-onset sepsis, reasons for which are multifactorial.
- ▶ High-quality prospective cohort studies are needed to explore disparities in adherence, factors affecting non-adherence and its effect on mortality.

## Context

Adherence to sepsis bundles is associated with good outcomes in community-onset sepsis.<sup>1</sup> Although evidence for similar benefit is lacking in hospital-onset sepsis, a uniform protocol such as SEP-1 (Severe Sepsis and Septic Shock Early Management Bundle-1) is recommended for all types of sepsis. Limited data suggest disparity in adherence to SEP-1 between community-onset sepsis and hospital-onset sepsis, with potential implications for the quality of care provided to patients with hospital-onset sepsis.

## Methods

The study<sup>2</sup> used a retrospective cohort design to determine adherence to SEP-1 in hospital-onset sepsis versus community-onset sepsis and to identify the potential determinants of this difference. Data were obtained from electronic health records of patients of four hospitals in California with a diagnosis of sepsis using the sepsis-3 definition. 'Time zero' was identified by a validated automated algorithm. Fulfilment of four components of SEP-1 (blood cultures before antibiotics, broad-spectrum antibiotics, serum lactate and intravenous crystalloid for hypotension or elevated lactate) within 3 hours and completion of two other components (repeat lactate if originally abnormal and vasopressors for hypotension refractory to crystalloids) within 6 hours of time 0 were the primary outcomes.

## Findings

The overall adherence to SEP-1 was 30.9%. Hospital-onset sepsis tended to occur in younger, immunosuppressed and postoperative patients. Of patients who had hospital-onset sepsis, 12.7% received SEP-1 adherent management compared with 45.9% of patients who had community-onset sepsis (RR 0.33). Factors associated with non-adherence included postoperative status

(RR 0.59) and a greater number of comorbidities. However, fever (RR 1.37) and bacteraemia (RR 1.2) were associated with higher levels of adherence. Association of non-adherence with hospital-onset sepsis was consistent despite stratified and sensitivity analysis. Hospital-onset sepsis cases arising in the intensive care unit (ICU) were more likely to receive SEP-1 adherent care than those in wards. Further, cases arising in ICU had a higher chance of receiving vasopressors and lower chance of receiving intravenous fluids.

## Commentary

This study identified a significant difference in adherence to SEP-1 between community-onset sepsis and hospital-onset sepsis. The findings are based on a relatively large sample and a robust statistical analysis, including mixed effects regression and survival analysis. While the retrospective design appears to be the major drawback of the study, difficulties in conducting a large prospective cohort study to determine adherence must also be considered. While several confounders might influence these findings, authors used established statistical techniques for adjustment. The difference persisted after stratified analysis based on hospital and admitting specialty. One major limitation relates to estimation of time lapse from time 0 to complete SEP-1, despite automated algorithms due to the retrospective nature of data. A sensitivity analysis using 48 hours of postarrival window for time 0 addresses this, although partially.

Nevertheless, findings of this study reflect lower quality of protocol-adherent care in a subgroup known to carry excess mortality.<sup>3</sup> Potential reasons for this include the highly protocolised emergency department (ED) setting that facilitates swifter responses to patients attending from the community, logistical differences between wards and ED, and diagnostic errors due to differences in contextual information available across care settings.

Whether non-adherence contributes to excess mortality is debatable; one retrospective study found an increase in crude mortality in non-adherent cases that was statistically insignificant when adjusted for severity of illness,<sup>4</sup> while another reported lower mortality, particularly for ICU-onset sepsis.<sup>5</sup> This study did not examine mortality outcomes.<sup>2</sup>

Findings of this study imply the need for prospective cohort studies to explore non-adherence to sepsis bundles in hospital-onset sepsis, the factors responsible and the effect of such disparity on mortality. Answering these questions will also help decide whether adherence to sepsis bundles is a valid quality indicator in sepsis care.

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Competing interests None declared.

Patient consent for publication Not required.

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