Costs and Complications of Hospitalization Among Survivors of *S. aureus* Bacteremia in the US: A Multicenter Retrospective Cohort Study, 2020-2022

CO111

Marya Zilberberg, MD, MPH,[1] Brian Nathanson, PhD,[2] Rolf Wagenaar, MS,[3] Jan Posthumus, PhD, MBA[3] Andrew Shorr, MD, MPH, MBA, MA[4]

Affiliations; [1]EviMed Research Group, LLC, Goshen, MA, USA, [2]OptiStatim, LLC, Longmeadow, MA, USA, [3]Basilea Pharmaceutica International Ltd, Allschwil, Switzerland, [4]Washington Hospital Center, Washington, DC, USA

ABSTRACT

Objectives: Patients with *S. aureus* (SA) infection comprise nearly 1% of all hospitalizations in the US and incur 3x the length of stay (LOS) and hospital costs of those without this infection. SA bacteremia (SAB) in particular is common, with an incidence approaching 50 cases/100,000 population. While mortality and rehospitalization rates for SAB have been well studied, the incidence and costs associated with other complications arising during SAB hospitalizations remain unclear.

Methods: To determine index SAB hospitalization-associated complication (C+) rates and costs, we analyzed outcomes for adult patients in a US database (~300 hospitals, 2020-2022) who survived an index hospitalization with >/=1 positive blood culture (BC) for *S. aureus*. We defined complications as >/=1 of the following: antibiotic escalation; persistently positive blood culture (BC); incident vasopressors, ICU, mechanical ventilation (MV), or dialysis; prolonged post-infection LOS [defined as LOS> median LOS]; or readmission within 30 days after discharge. We used descriptive statistics to compare patients with C+ to C-.

Results: Among 3,956 surviving patients, 2,303 (58.2%) had C+ during their index SAB hospitalization. In both groups, the majority of SABs were community-onset (86.9% C+ vs. 85.7% C-, p=0.251), while patients with C+ more commonly than C- suffered from methicillin-resistant SA (44.3% vs. 33.7%, p<0.001). The most common complication was 30-day readmission (42.0%), followed by: antimicrobial escalation (38.6%); vasopressor use (32.4%); prolonged LOS (20.3%); dialysis (10.6%); ICU admission (10.0%); MV (5.0%); and persistent BC+ (3.9%). The mean [SD] post-infection onset LOS (15.7 [14.4] vs. 9.2 [3.7] days) and hospital costs ($37,468 [$56,973] vs. $18,371 [$11,249]) were higher in C+ vs the C- cohort (p<0.001 for both).

Conclusions: Complications occur frequently in hospitalized patients with SABs. They result in excessive costs and contribute to a considerable strain on hospital resources. Further research needs to explore elements of management that may reduce this burden.

INTRODUCTION

- Patients with *S. aureus* (SA) infection comprise nearly 1% of all hospitalizations in the US and incur 3x the length of stay (LOS) and hospital costs of those without this infection.[1]
- SA bacteremia (SAB) in particular is common, with an incidence approaching 50 cases/100,000 population.[2]
- While mortality and rehospitalization rates for SAB have been well studied, the incidence and costs associated with other complications arising during SAB hospitalizations remain unclear.

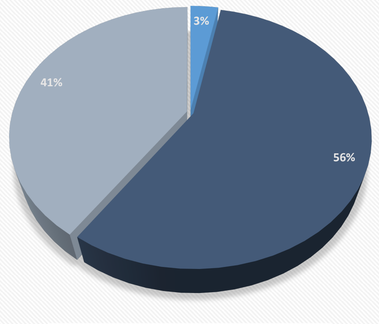
METHODS

- Study design: Multicenter retrospective cohort
- Data source: PINC AI (formerly Premier) Healthcare Database
- Time frame: 2020-2022
- Setting: US acute care hospitals
- Population: SAB survivors of an index hospitalization with ≥1 positive blood culture (BC)
- Outcomes: complications defined as as ≥1 of the following occurring after infection onset:
  - Antibiotic escalation
  - Persistently positive blood culture
  - Incident ICU, mechanical ventilation (MV), vasopressors, or dialysis
  - Prolonged post-infection LOS (longer than median LOS)
  - Readmission within 30 days after discharge
- Statistical analyses
  - Descriptive statistics to compare patients with C+ to C-

RESULTS

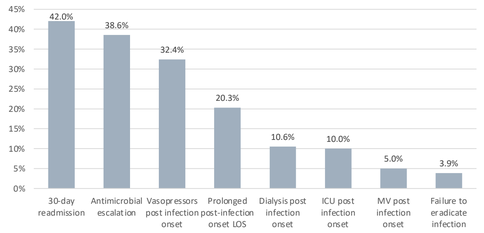
- Among 4,080 patients with SAB, 3,956 (97.0%) survived the index hospitalization, of whom 2,303 (58.2%) had C+ during their index SAB hospitalization (Figure 1).
  - The most common complication was 30-day readmission (42.0%), followed by: antimicrobial escalation (38.6%); vasopressor use (32.4%); prolonged LOS (20.3%); dialysis (10.6%); ICU admission (10.0%); MV (5.0%); and failure to eradicate (3.9%) (Figure 2).

Figure 1. Study population



RESULTS

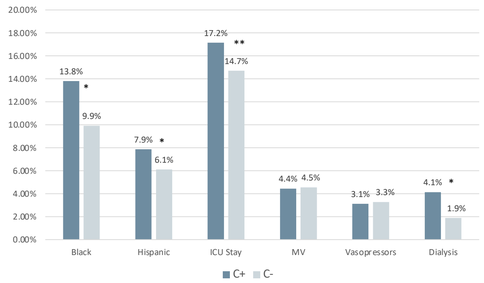
Figure 2. Individual complications*



*Complications prevalence among patients with at least one complication; all are post-infection onset
LOS = length of stay; ICU = intensive care unit; MV = mechanical ventilation; BC = blood culture

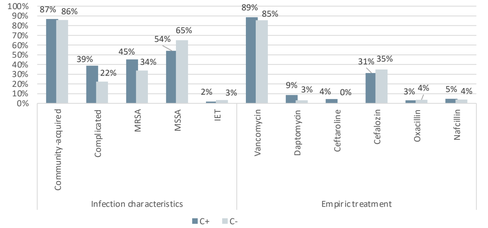
- Compared to those with C-, patient with C+ were
  - Similar in age (mean [SD] 59.6 (16.2) vs 60.8 [17.0] years, p=0.021)
  - More likely black (13.8% vs. 9.9%, p=0.001) or Hispanic (7.9% vs. 6.1%, p=0.035)
  - More chronically ill (mean [SD] Charleston Index (3.1 [2.3] vs. 2.6 [2.3], p<0.001)
  - More likely in large (500+ beds, 43.2% vs. 34.1%) urban (84.5% vs. 79.7%) teaching (58.3% vs. 48.8%) hospitals (p<0.001 for each)
- Other baseline and pre-SAB onset characteristics in Figure 3

Figure 3. Baseline and pre-SAB clinical characteristics



*p≤0.001; **p<0.05; ICU = intensive care unit; MV = mechanical ventilation

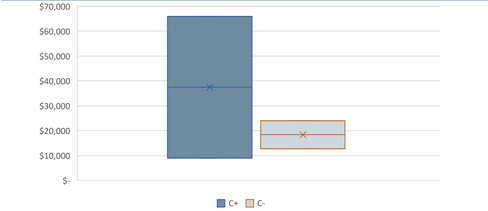
Figure 4. Infection and treatment*



*p<0.001 for complicated, MRSA, daptomycin, ceftaroline; p<0.05 for IET, vancomycin, cefazolin
SD = standard deviation; MRSA = methicillin-resistant *S. aureus*; IET = inappropriate empiric treatment

- Infection characteristics (Figure 4):
  - The majority of SABs were community-onset, and similarly distributed in the groups.
  - Patients with C+ more commonly than C- suffered from MRSA (44.3% vs. 33.7%), and the reverse was true for MSSA.
  - Vancomycin was the leading empiric drug administered, followed by cefazolin.
  - Daptomycin was used infrequently, and the rate of delayed therapy was low.

Figure 5. Post-infection hospital costs



- The mean post-infection onset LOS and hospital costs were higher in C+ vs the C- group (p<0.001 for both).
  - Mean [SD] LOS (15.7 [14.4] vs. 9.2 [3.7] days)
  - Mean [SD] hospital costs ($37,468 [$56,973] vs. $18,371 [$11,249]) (Figure 5)

STRENGTHS & LIMITATIONS

- Large multicenter cohort study
  - Representative of US institutions
  - Broad generalizability
- Misclassification due to administrative nature
  - Many prior studies have used this database for similar explorations
  - Microbiology data reduces the risk
- Selection bias
  - Reduced via prospective protocol and definitions
- Confounding
  - The study was purely descriptive, and no modeling was undertaken.

CONCLUSIONS

- Complications occur frequently in hospitalized patients with SABs, and more so in the setting of MRSA than MSSA.
- They result in excessive costs and contribute to a considerable strain on hospital resources.
- Further research needs to explore SAB's impacts on quality of life, as well as identify innovative elements of management, in addition to those available currently, that may reduce this burden.

REFERENCES

1. Klevens RM et al. Invasive methicillin-resistant Staphylococcus aureus infections in the United States. JAMA 2007;298: 1763–71
2. Kourtis AP et al. Vital Signs: Epidemiology and Recent Trends in Methicillin-Resistant and in Methicillin-SusceptibleStaphylococcus aureusBloodstream Infections—United States. *Morb. Mortal. Wkly. Rep.* **2019**, *68*, 214–219

ACKNOWLEDGMENT

Study supported by a grant from Basilea Pharmaceutica International Ltd, Allschwil, Switzerland

Presented at ISPOR, May 15, 2025, Montreal, Canada