

# Seasonal variation in incidence and outcomes of hospitalizations with severe community-acquired bacterial pneumonia in the US, 2018-2022

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## ABSTRACT

**INTRODUCTION:** Community-acquired bacterial pneumonia (CABP) is a frequent cause of hospitalization and results in a range of disease severity. The incidence and outcomes of this syndrome generally vary by season. However, it is unclear if this holds true for patients with severe CABP (sCABP).

**METHODS:** We conducted a retrospective single-group cohort study using IQVIA's hospital charge data master database (2018-2022) of adults hospitalized with sCABP (an episode of CABP requiring ICU admission). We quantified seasonal variation in its incidence and outcomes (hospital mortality, length of stay [LOS], costs, 30-day readmissions and attendant costs and LOS) related to sCABP. We report mean costs and LOS.

**RESULTS:** Among 24,422 sCABP patients, overall mortality was 15.9%, hospital LOS 13.6 days, cost \$91,965. The 30-day readmission rate was 19.9% (LOS 11.5 days, cost of \$61,072). A plurality of sCABP hospitalizations occurred in the winter (29.3%), followed by spring (27.9%), with summer and fall at 22.3% and 20.5%, respectively. Hospital mortality was lowest in the spring (14.6%) and highest in the winter (17.0%). Hospital LOS ranged from 13.5 days in the winter to 14.0 days in the summer, with the lowest costs in the spring (\$87,880) and highest in the summer (\$96,612). There was minimal variation in the rate (19.5% -20.4%) or LOS (9.9-10.3 days) of 30-day readmissions among survivors, while costs of these readmissions ranged from \$48,697 (winter), and \$49,934 (spring) to \$53,252 (summer), and \$53,460 (fall).

**CONCLUSIONS:** Seasonal variation in sCABP admissions mirrors that reported in CABP overall, with the highest rates observed during the winter. Contrary to prior reports, hospital mortality is highest in the winter. Interestingly, while the incidence and LOS of readmissions do not vary substantively by season, the attendant costs in the summer and fall are higher than in the winter and spring.

## INTRODUCTION

- Community-acquired pneumonia (CAP) is one of the most common and costly causes of hospitalization, engendering ~1.5 million annual hospitalizations in the US<sup>1</sup>
- Seasonal variations in its incidence, hospitalizations, and outcomes, have been documented<sup>2</sup>
- Severe CAP represents up to 25% of all pneumonia admitted to the hospital<sup>3</sup>
- We explored seasonal variations in sCABP-associated hospitalizations and outcomes

## METHODS

- Study design: Single-group cohort
- Data source: IQVIA charge data master database
- Time frame: 2018-2022
- Setting: US acute care hospitals
- Population: Hospitalized adults with sCABP
- Outcomes definitions
  - Seasonal differences in
    - Incidence
    - Hospital mortality
    - Hospital length of stay (LOS)
    - Hospital costs
    - 30-day readmission incidence
    - 30-day readmission LOS
    - 30-day readmission costs
- Statistical analyses
  - Descriptive statistics
  - Report means for LOS and costs

## RESULTS

- Among 24,422 patients with sCABP, overall index hospital
  - mortality 15.9%
  - LOS 13.6 days
  - Costs \$91,965
- A plurality of sCABP hospitalizations occurred in the winter, followed by spring, summer, and fall (Figure 1)
- Hospital mortality was lowest in the spring and highest in the winter (Figure 2)
- Hospital LOS ranged from 13.5 days in the winter to 14.0 days in the summer (Figure 3)
- Hospital costs were lowest in the spring (\$87,880) and highest in the summer (\$96,612) (Figure 4)
- 30-day readmission among survivors was 19.9%
  - Overall LOS was 11.5 days
  - Overall hospital costs were \$61,072
  - Minimal seasonal variation in (Table 1)
    - Rate (19.5% -20.4%)
    - LOS (9.9-10.3 days)
    - Readmission costs highest in the fall (Table 1)

## RESULTS

Figure 1. Seasonal distribution of sCABP admissions

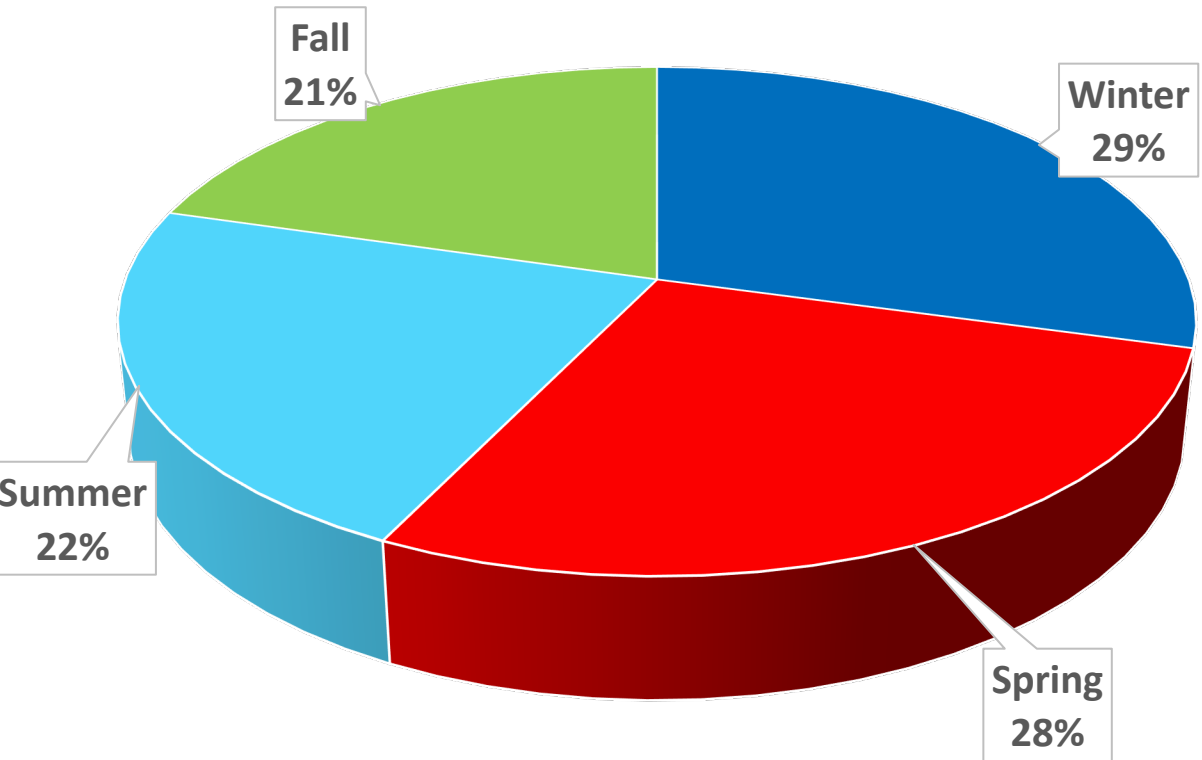


Figure 2. Hospital mortality by season

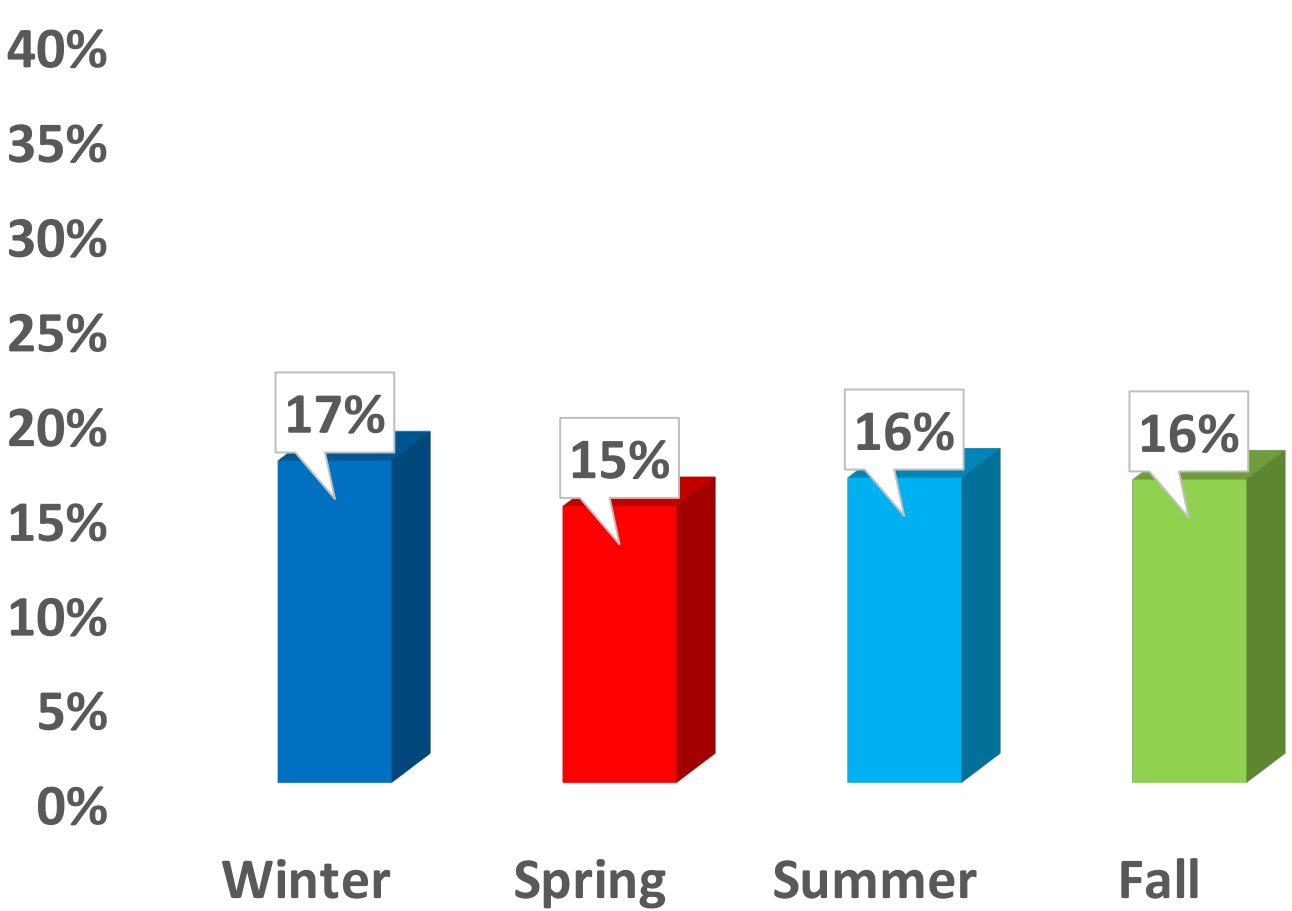


Figure 3. Mean hospital LOS by season, days

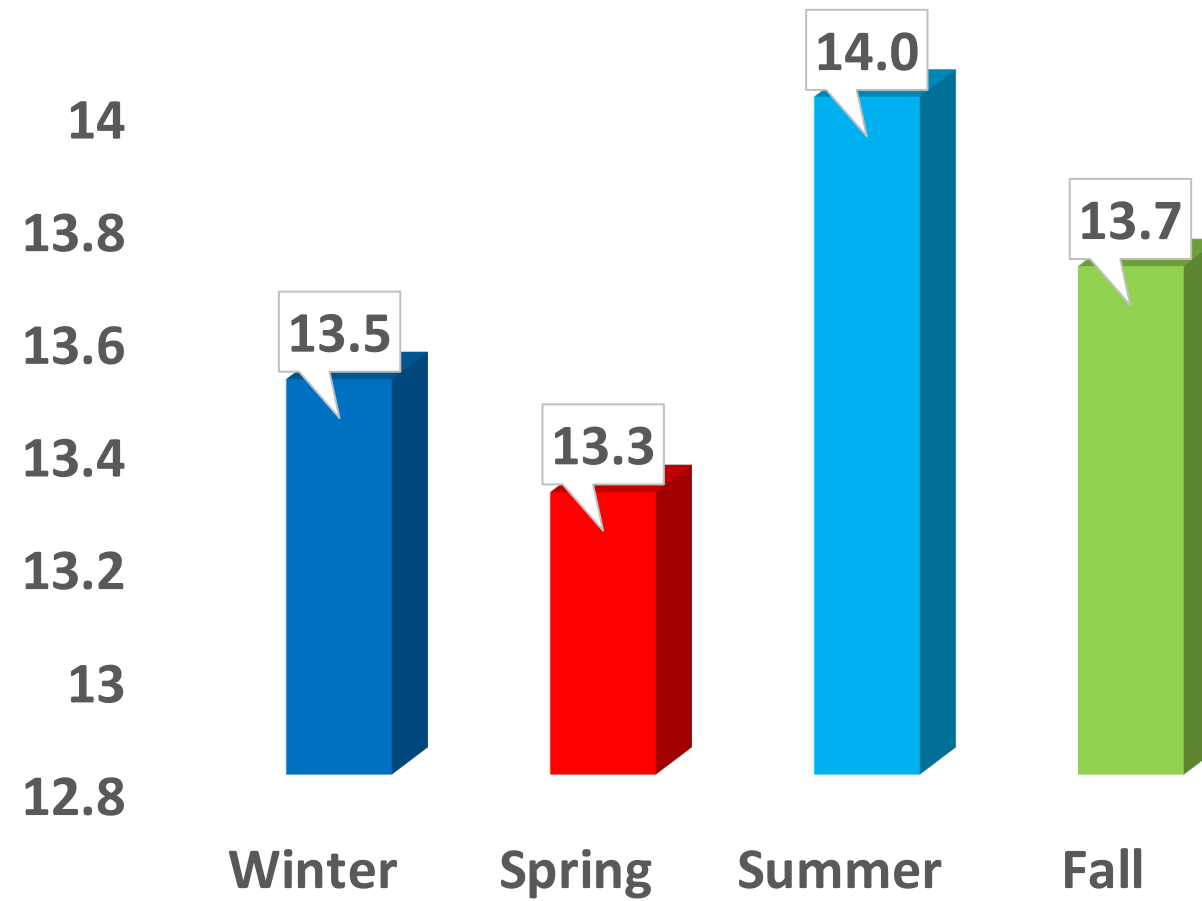
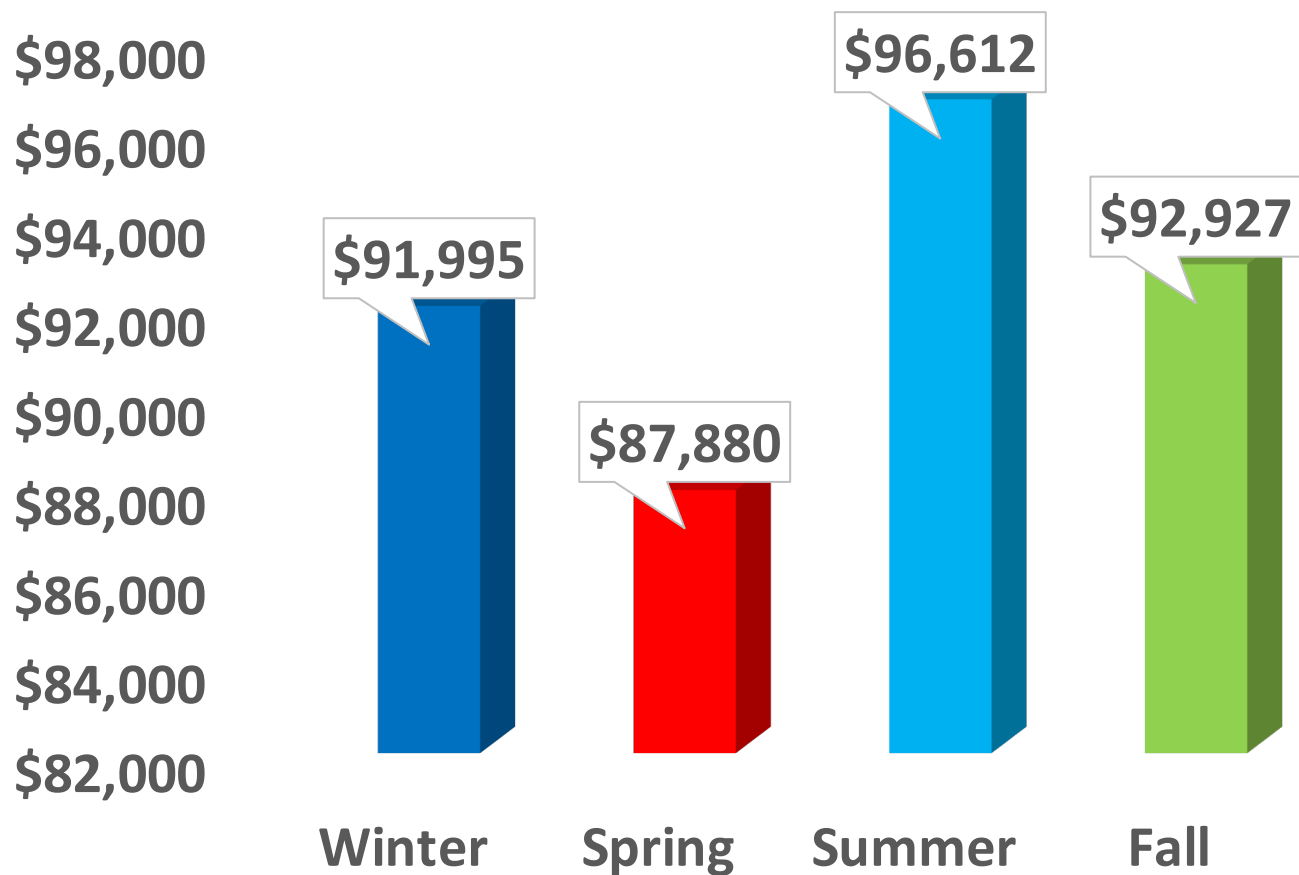


Figure 4. Hospital costs by season



sCABP = Severe Community-Acquired Bacterial Pneumonia; LOS = Length of Stay

## RESULTS

Table 1. 30-day readmissions

	Winter	Spring	Summer	Fall
30-day readmission rate	19.7%	19.5%	19.6%	20.4%
Mean 1st 30-day readmission cost, \$	\$48,696.72	\$49,934.05	\$53,251.64	\$53,459.72
Mean 1st 30-day readmission LOS, days	9.9	10.0	10.3	10.0

## STRENGTHS AND LIMITATIONS

- Large multicenter study, broadly generalizable
- Possible misclassification due to administrative nature of case selection
  - Has been used in similar studies
- Selection bias
  - Reduced with a prospective protocol
- Confounding
  - Aim of study descriptive

## CONCLUSION

- Seasonal variation in sCABP admissions mirrors that reported in CABP overall
  - Highest rates observed during the winter and spring
- Hospital mortality is highest in the winter
- While the incidence and LOS of 30-day readmissions do not vary substantively by season, the attendant costs in the summer and fall are higher than in the winter and spring.

## REFERENCES

- Ramirez JA et al. Clin Infect Dis 2017;65:1806-12
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## ACKNOWLEDGEMENT

Study funded by Eagle Pharmaceuticals, Inc., Woodcliff Lake, NJ, USA. We thank IQVIA (Falls Church, Virginia) for data acquisition and statistical analysis.