

ECONOMIC OUTCOMES OF PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA (CAP) HOSPITALIZATIONS IN THE US: A RETROSPECTIVE COHORT STUDY, 2012–2017



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INTRODUCTION

- Community-acquired pneumonia (CAP) is associated with considerable morbidity, mortality and cost in the United States (US)¹
- CAP is the 8th most costly condition for hospitalizations; the cost of CAP in the hospital setting is \$9.5 billion and results in 961,000 stays annually²
- Treatment guidelines from the Infectious Diseases Society of America and American Thoracic Society recommend empiric treatment which targets likely pathogens based on epidemiologic risk factors³
- Hospitalization costs account for the majority of CAP total treatment costs⁴

OBJECTIVE

- This real-world study assessed 1-year healthcare resource utilization (HCRU) and costs among US patients hospitalized with CAP and treated with empiric antimicrobial therapy as monotherapy (EM) or combination therapy (EC)

METHODS

Study Design

- Retrospective cohort study using linked administrative claims and hospital charge data

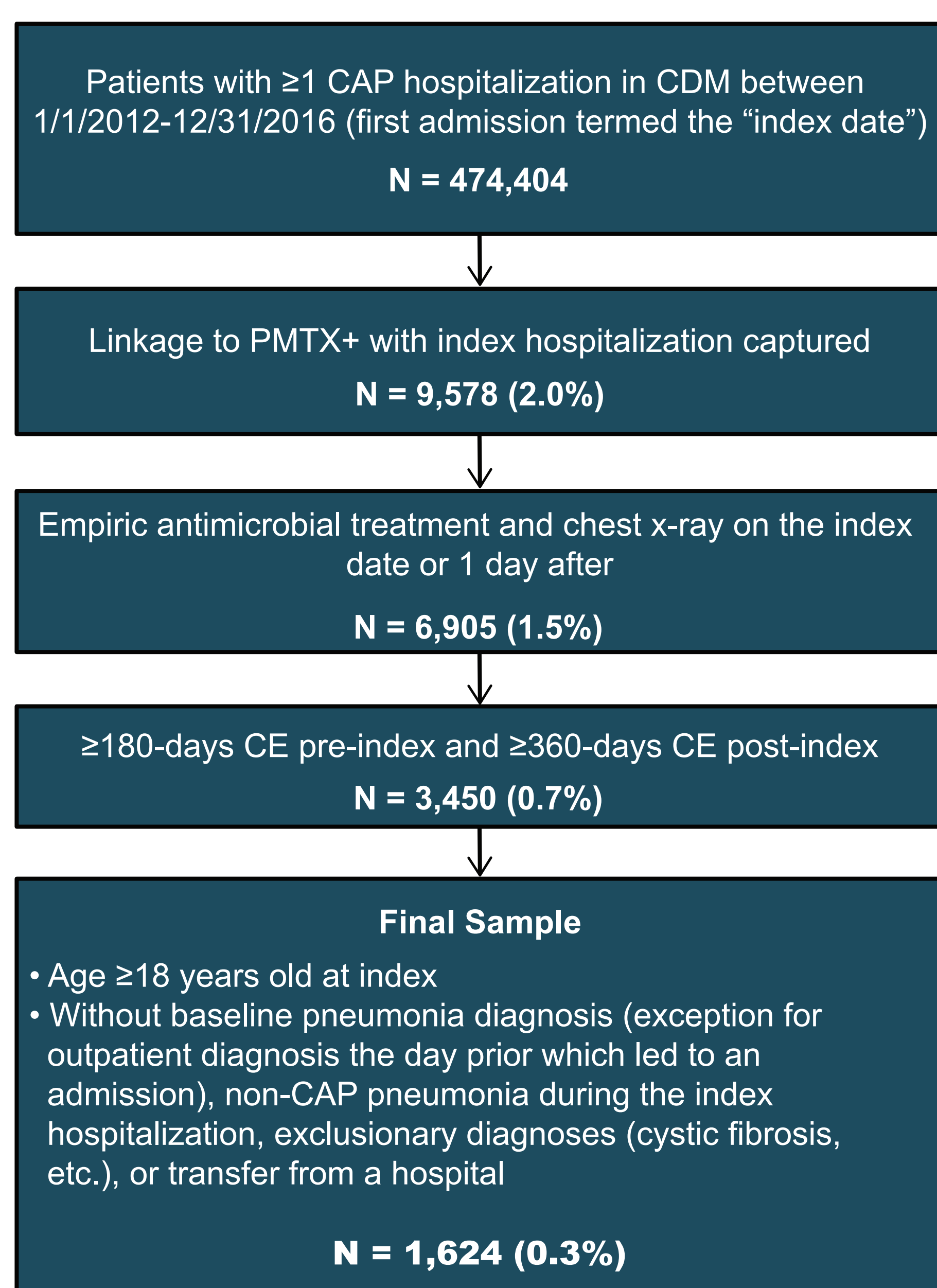
Data Sources

- IQVIA Real-World Data Adjudicated Claims – US Database (PMTX+)
 - Adjudicated, longitudinal medical and pharmacy claims for >150 million enrollees; representative of the US commercially-insured population
- IQVIA hospital charge data master (CDM)
 - Hospital-based operational records from >450 US hospitals providing detailed information on hospital encounters

Patient Selection

- Adult patients (≥18 years) were identified in CDM with a CAP-related hospitalization between 1/1/2012 and 12/31/2016; first admission termed the index hospitalization (**Figure 1**)
 - CAP-related hospitalization defined by a) an admitting or primary discharge diagnosis of CAP or b) a secondary diagnosis of CAP if the primary diagnosis was for sepsis or respiratory failure
 - CAP diagnosis codes included diagnoses for pneumonia caused by bacterial, viral and unspecified organisms, but did not include ventilator-associated pneumonia
 - Patients were treated with EM or EC, and had continuous health plan enrollment (CE) 180-days pre- (baseline) and 360-days post-index (follow-up)

Figure 1. Patient Selection



Study Measures

- Baseline demographic and clinical characteristics in the 6-month pre-index and characteristics of the index hospitalization
- All-cause and CAP-related HCRU and costs over the 1-year follow-up:
 - CAP-related: a) CAP-related hospitalization, b) outpatient claims with a CAP diagnosis, or c) CAP-related therapy claims
 - HCRU and cost calculated on a per patient basis, averaged across the cohort
 - Cost (allowed amount) converted to 2017 US dollars using the medical component of the Consumer Price Index

Analyses

- Descriptive summary statistics
 - Frequency (n and %) for categorical variables
 - Mean, standard deviation (SD) and median for continuous and count variables
- Unadjusted statistical comparisons conducted between EM and EC patients using the parametric t-test and the chi-square test
- Generalized linear models (GLMs) to calculate adjusted mean all-cause costs
 - Baseline characteristics included in the model in a stepwise approach (p<0.10 for inclusion and retention)

RESULTS

- The cohort comprised 1,624 patients (**Figure 1, Table 1**), of whom 78.2% were treated with EC
 - EM and EC patients were generally similar; however, more EM patients had baseline respiratory acute infection (39.0% vs. 28.1%, p<0.0001)

Table 1. Baseline Patient Characteristics

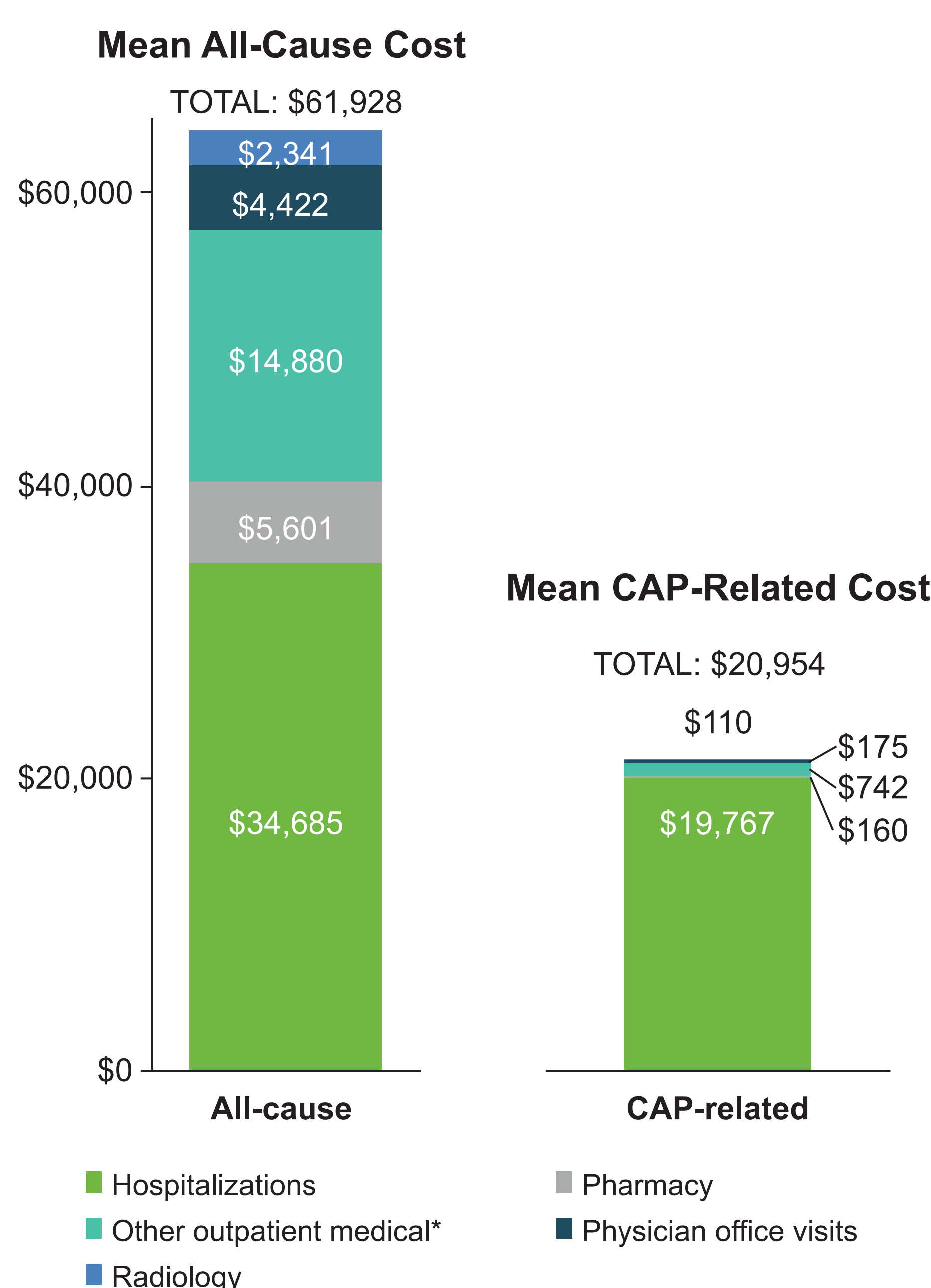
Characteristic	Overall (N = 1,624)
Mean (SD) age, y	50.3 (12.1)
Female (n, %)	858 (52.8%)
Geographic region (n, %)	
Northeast	246 (15.1%)
Midwest	267 (16.4%)
South	894 (55.0%)
West	217 (13.4%)
Payer type (n, %)	
Commercial	800 (49.3%)
Self-insured	597 (36.8%)
Medicaid/Medicare risk	227 (14.0%)
Mean (SD) total pre-index costs	\$15,523 (\$37,955)
Mean (SD) CCI	1.4 (1.9)
Monotherapy (n, %)	354 (21.8%)
Fluoroquinolones	281 (17.3%)
Combination therapy (n, %)	1,270 (78.2%)
Beta-lactams + macrolides	494 (30.4%)
Beta-lactams + fluoroquinolones	160 (9.9%)
Respiratory acute infection (n, %)	495 (30.5%)
Baseline comorbidities (n, %)	
Asthma	219 (13.5%)
COPD	224 (13.8%)
Diabetes	323 (19.9%)
Dyslipidemia	438 (27.0%)
Hypertension	637 (39.2%)
Smoking	235 (14.5%)
Pre-index medications (n, %)	
Inhalers for lung disease	493 (30.4%)
Beta-lactams	461 (28.4%)
Fluoroquinolones	308 (19.0%)
Macrolides	338 (20.8%)
CAP type (n, %)	
Community-onset	710 (43.7%)
Healthcare-associated*	914 (56.3%)
90-day pre-index hospitalization	577 (35.5%)
Pre-index corticosteroid use	648 (39.9%)
ER admitting source (n, %)	1,330 (81.9%)

CCI=Charlson Comorbidity Index.

*Healthcare-associated pneumonia defined based on prior hospitalization in the 90-days pre-index, or pre-index hemodialysis or immune suppression (chemotherapy, immunotherapy, radiation, transplant, corticosteroids).

- The index hospitalization was associated with a mean length of stay (LOS) of 5.7 days and mean cost of \$17,736; 81.9% were admitted from the emergency room (ER) and 22.7% had a transfer to the intensive care unit (ICU)
 - EC patients had significantly higher average LOS (6.0 vs. 4.8 days, p<0.0001) and inpatient cost (\$18,830 vs. \$13,813, p=0.0008) vs. EM patients
- The rates of 30-day and 180-day readmissions were 8.8% and 20.1%, respectively
- Over the 1-year follow-up, patients had a mean of 1.7 hospitalizations, 11.9 total days in hospital and 19.0 physician office visits; 58.0% had ≥1 ER visit
- Average annual all-cause total cost was \$61,928 (**Figure 2**). The primary cost component was inpatient care (56.0%). One-third (33.8%) of the total cost was related to CAP
 - EC patients had significantly higher total inpatient cost vs. EM patients (\$37,106 vs. \$25,999, p=0.0399)

Figure 2. Unadjusted Mean Costs

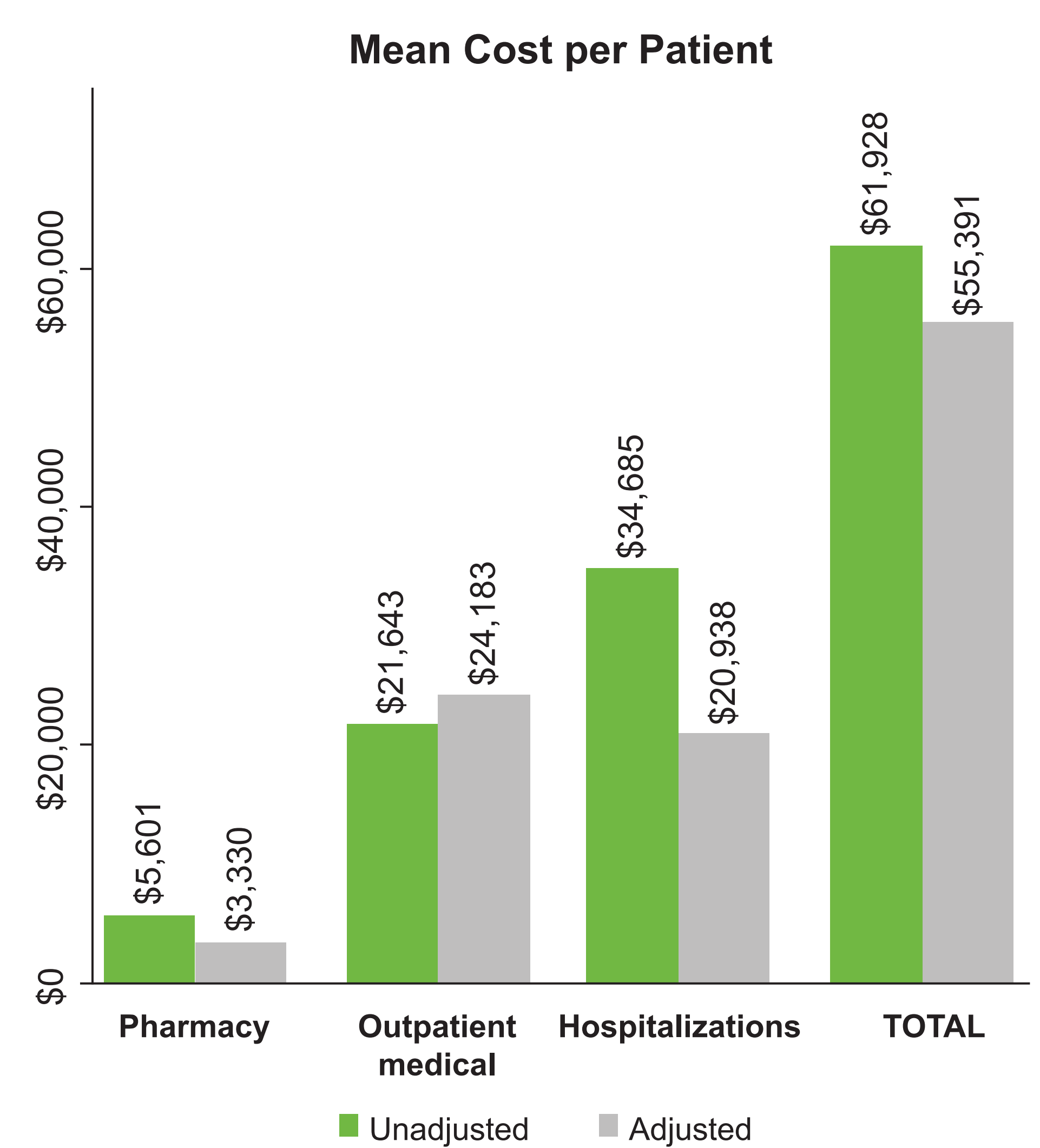


*Other outpatient medical: ER, outpatient surgery, lab/pathology, Healthcare Common Procedure Coding System (HCPCS) drugs, outpatient ancillary.

RESULTS (continued)

- Adjusted mean total cost was \$55,391 (**Figure 3**)

Figure 3. Adjusted All-Cause Mean Costs



CONCLUSIONS

- Patients hospitalized for CAP incurred significant costs over the 1-year follow-up in both unadjusted and adjusted analyses
- A third (34%) of the total cost was specific to CAP
- The primary cost driver was inpatient care, which accounted for more than half (56%) of total all-cause costs and 94% of CAP-related total costs
- Inpatient costs were significantly higher among patients receiving EC vs. EM
- The vast majority (78%) of patients were treated with EC and over half (56%) of inpatient CAP was healthcare-associated

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Disclosures

VD and MD are employees of IQVIA, which received funding for this study from Nabriva Therapeutics. MJ was an employee of IQVIA at the time of the study. JS is an employee of and holds stock in Nabriva Therapeutics plc. HS is president and founder of Value Matters, LLC. MZ is president and CEO of EviMed Research Group, LLC. HS and MZ received consulting fees from Nabriva Therapeutics for this study.

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