

Hospital Admissions Patterns in Adult Patients With Community-Acquired Bacterial Pneumonia (CABP): Identification of Potentially Avoidable Hospital Admissions Through a Retrospective Database Analysis

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ABSTRACT

Objectives: Studies demonstrate that Community-Acquired Bacterial Pneumonia (CABP) patients without major comorbidities and limited disease severity can be successfully managed in the outpatient setting. This study described hospitalization patterns among adult patients with CABP relative to disease severity using U.S. hospital data.

Methods: A retrospective study of hospitalized patients or patients seen in the ER with a primary diagnosis of CABP in the MedAssets hospital data (2012-2015) was performed. Hospitalized CABP patients meeting inclusion criteria (age ≥ 18 years; CABP as primary diagnosis; and receipt of [ceftriaxone IV with macrolide] or fluoroquinolone IV on day 1 or 2 of hospitalization and continued for ≥ 2 days as per the treatment guideline) were assembled into a subgroup for analysis. Hospitalized CABP patients with potentially avoidable hospital admissions were categorized using the calculated Charlson Comorbidity Index (CCI) score.

Results: During the study period, 284,549 patients were either hospitalized or seen in the ER. In total, 132,473 (46.6%) of these patients were hospitalized. Among 132,473 hospitalized patients, 68,254 (52%) received [ceftriaxone with macrolide] or a fluoroquinolone on day 1 or 2. Nearly half (48.5%) of these patients had a CCI score ≤ 1. No CCI baseline comorbid condition was present in 25% who were admitted with a CCI score ≤ 1. There was also a low occurrence of acute disease severity indicators among hospitalized patients who received guideline concordant therapy with a CCI score ≤ 1.

Conclusions: Nearly half of CABP patients in this study were hospitalized. Most hospitalized patients had no or few comorbid conditions. Given costs associated with managing hospitalized CABP patients, these findings highlight the need for healthcare systems to adopt well-defined criteria for hospital admission based on presence of comorbidities and acute disease severity. These results demonstrate the need to better delineate patient populations that may be safely and effectively treated in the outpatient setting.

RESULTS

- A total of 284,549 patients were either hospitalized or seen in the ER during the study period. Of those, 132,473 (46.6%) were hospitalized, 208,550 (73.3%) had CCI ≤ 1 and 75,999 (26.7%) had CCI ≥ 2.
- Among 132,473 hospitalized patients:
 - 64,183 (48.5%) patients had CCI ≤ 1 and 32,159 (24.3%) had CCI = 0.
 - Among 68,254 (52%) receiving ceftriaxone with macrolide or a fluoroquinolone on day 1 or 2 and continued for > 2 days:
 - The median age was 72 years.
 - The geometric mean (SD) for length of stay was 5.4 (1.7) with median 5.0 days.
 - 36,133 (52.9%) had CCI ≥ 2.
 - In-hospital mortality proportions (95% CI) were 2.0% (1.9%-2.1%) for overall, 1% (0.9%-1.1%) for CCI ≤ 1 and 2.9% (2.7%- 3.1%) for CCI ≥ 2.

Table 1. Demographic and clinical characteristics of 284,549 CABP patients with either hospitalization or ER visits at index date

Characteristics	ALL		Index Hospitalization		Index ER Visit only	
	n/mean	%/SD	n/mean	%/SD	n/mean	%/SD
All patients	284,549	100.0	132,473	100.0	152,076	100.0
Gender						
Female	151,434	53.2	69,802	52.7	81,632	53.7
Male	133,115	46.8	62,671	47.3	70,444	46.3
Age group (years)						
Age mean (SD)	60.1	20.1	68.8	16.7	52.6	19.7
18-64	154,896	54.4	47,534	35.9	107,362	70.6
65+	129,653	45.6	84,939	64.1	44,714	29.4
Charlson Comorbidity Index (CCI) score						
Mean (SD)	1.1	1.9	2.16	2.2	0.24	0.8
CCI = 0	161,429	56.7	32,159	24.3	129,270	85.0
CCI = 1	47,121	16.6	32,024	24.2	15,097	9.9
CCI = 2	29,041	10.2	24,402	18.4	4,639	3.1
CCI = 3+	46,958	16.5	43,888	33.1	3,070	2.0

Table 2. Baseline demographic and clinical characteristics of 68,254 hospitalized CABP patients receiving [ceftriaxone IV with macrolide] or a fluoroquinolone IV on hospitalization day 1 or 2 and continued for ≥ 2 days by Charlson Comorbidity Index (CCI) Score

Characteristics	ALL		CCI ≤ 1		CCI ≥ 2	
	n	%	n	%	n	%
Overall	68,254	100.0	32,121	47.1	36,133	52.9
Gender						
Female	35,920	52.6	17,907	55.7	18,013	49.9
Male	32,334	47.4	14,214	44.3	18,120	50.1
Age group						
18-64	24,268	35.6	14,186	44.2	10,082	27.9
65+	43,986	64.4	17,935	55.8	26,051	72.1
Comorbidities						
Prior CABP	4,868	7.1	1,066	3.3	3,802	10.5
Burn	197	0.3	70	0.2	127	0.4
Cancer	7,710	11.3	452	1.4	7,258	20.1
Cerebrovascular diseases	1,638	2.4	126	0.4	1,512	4.2
Congestive heart failure	10,221	15.0	878	2.7	9,343	25.9
Chronic pulmonary disease	15,742	23.1	5,578	17.4	10,164	28.1
Other chronic pulmonary disease	14,311	21.0	5,375	16.7	8,936	24.7
Acute respiratory failure	13,780	20.2	4,721	14.7	9,059	25.1
Clostridium difficile	98	0.1	11	0	87	0.2
Coronary heart disease	30,748	45.0	7,847	24.4	22,901	63.4
Myocardial infarction	1,395	2.0	76	0.2	1,319	3.7
Unstable cardiac disease	27,285	40.0	6,498	20.2	20,787	57.5
Other coronary heart disease	17,113	25.1	4,054	12.6	13,059	36.1
Dementia	5,835	8.5	2,039	6.3	3,796	10.5
Hemiplegia/ Paraplegia	962	1.4	101	0.3	861	2.4
Immunocompromising conditions	11,993	17.6	2,011	6.3	9,982	27.6
HIV/AIDS	985	1.4	180	0.6	805	2.2
Other immunocompromising conditions	4,509	6.6	1,445	4.5	3,064	8.5
Neutropenia/ Leukocytopenia	1,383	2.0	382	1.2	1,001	2.8
Liver disease	2,017	3.0	436	1.4	1,581	4.4
Non-severe liver disease	1,224	1.8	357	1.1	867	2.4
End Stage liver disease	793	1.2	79	0.2	714	2.0
Malnutrition	140	0.2	73	0.2	67	0.2
Rheumatoid arthritis	56	0.1	15	0	41	0.1
Peptic ulcer disease	556	0.8	67	0.2	489	1.4
Peripheral vascular disease	3,108	4.6	167	0.5	2,941	8.1
Acute renal failure	10,140	14.9	2,484	7.7	7,656	21.2
Hemodialysis and peritoneal dialysis	1,490	2.2	29	0.1	1,461	4.0
Severe renal disease	4,367	6.4	33	0.1	4,334	12.0
Diabetes	19,838	29.1	3,401	10.6	16,437	45.5
Diabetes with chronic complications	565	0.8	15	0	550	1.5
Diabetes without chronic complications	19,273	28.2	3,386	10.5	15,887	44.0
Empyema	570	0.8	330	1.0	240	0.7
Bursitis	39	0.1	10	0	29	0.1
Infections of the musculoskeletal system	13	0	5	0	8	0
Pancreatitis	277	0.4	80	0.2	197	0.5
Pseudotumor cerebri	63	0.1	8	0	55	0.2
Seizure	2,380	3.5	986	3.1	1,394	3.9
Systemic Lung Lupus Erythematosus or Lupus like syndrome	518	0.8	137	0.4	381	1.1
Bronchiectasis or severe Chronic Obstructive Pulmonary Disease	9,534	14.0	787	2.5	765	2.1
Bacteremia	7,103	10.4	2,371	7.4	7,163	19.8
Urinary tract infection	6,293	9.2	3,107	9.7	3,996	11.1
Visceral abscess, intra-abdominal infection	874	1.3	2,390	7.4	3,903	10.8
12-month pre-index hospital based inpatient visit	4,477	6.6	698	2.2	3,779	10.5
6-month pre-index hospital based inpatient visit	3,048	4.5	446	1.4	2,602	7.2
3-month pre-index hospital based inpatient visit	1,925	2.8	284	0.9	1,641	4.5
1-month pre-index hospital based inpatient visit	875	1.3	133	0.4	742	2.1
12-month pre-index ER visit	3,459	5.1	686	2.1	2,773	7.7
6-month pre-index ER visit	2,331	3.4	442	1.4	1,889	5.2
3-month pre-index ER visit	1,450	2.1	285	0.9	1,165	3.2
1-month pre-index ER visit	652	1.0	131	0.4	521	1.4
12-month pre-index hospital based outpatient visits	1,066	1.6	190	0.6	876	2.4
Antibiotic resistance identified	1,726	2.5	529	1.6	1,197	3.3
Index culture drawn in ER	37,794	55.4	16,961	52.8	20,833	57.7
Transplant	911	1.3	160	0.5	751	2.1
Surgery without implant	11,545	16.9	3,576	11.1	7,969	22.1
Switch from IV Ceftriaxone to IV Vancomycin	623	0.9	281	0.9	342	0.9

RESULTS

Figure 1. Distributions of clinical characteristics of 68,254 hospitalized CABP patients who received ceftriaxone IV with macrolide or a fluoroquinolone IV on hospitalization day 1 or 2 and continued for ≥ 2 days by 12-month baseline Charlson Comorbidity Index Score (%)

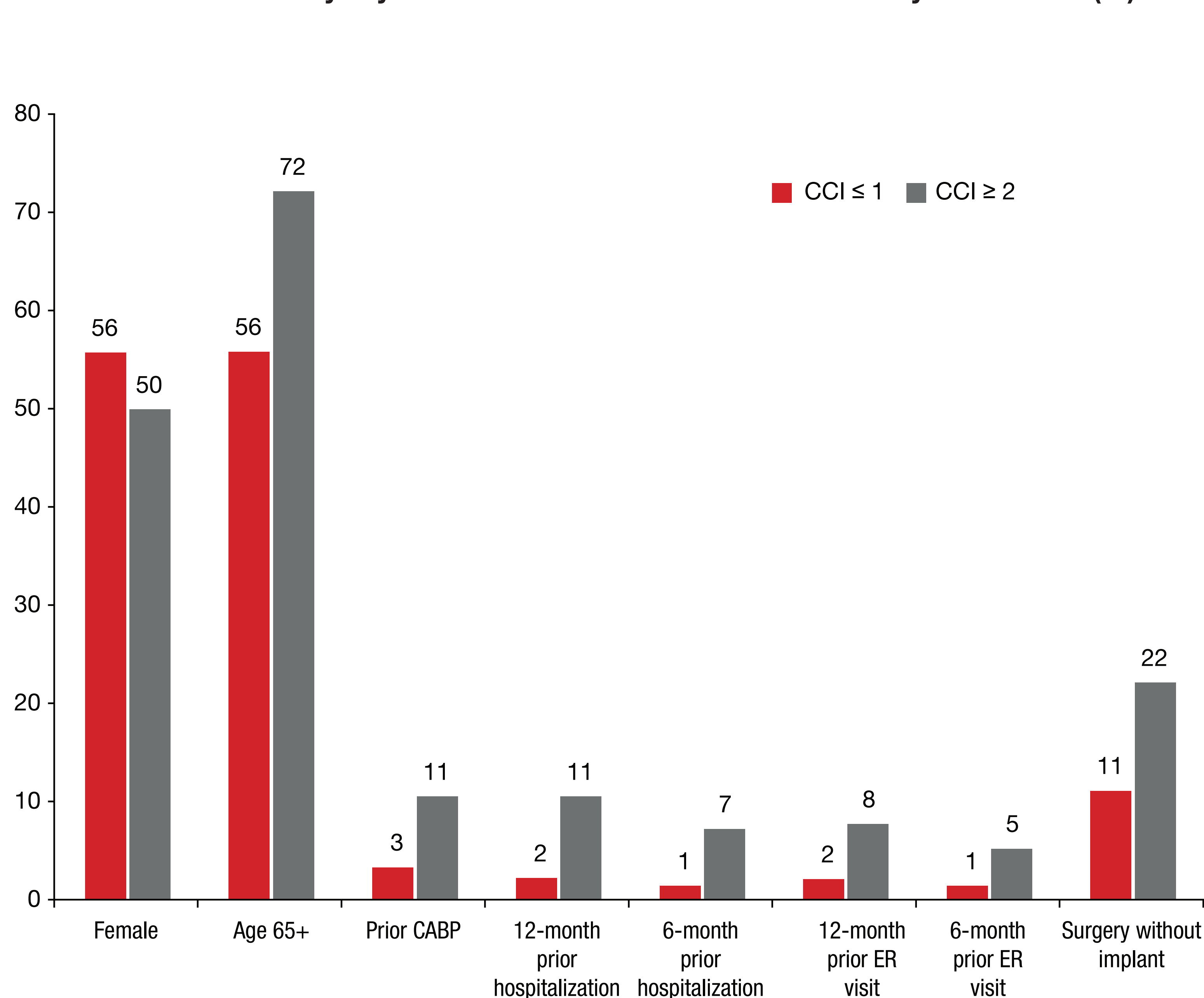


Figure 2. Distributions of demographic and clinical characteristics of 68,254 hospitalized CABP patients who received ceftriaxone IV with macrolide or a fluoroquinolone IV on hospitalization day 1 or 2 and continued for ≥ 2 days by 12-month baseline Charlson Comorbidity Index Score (%)

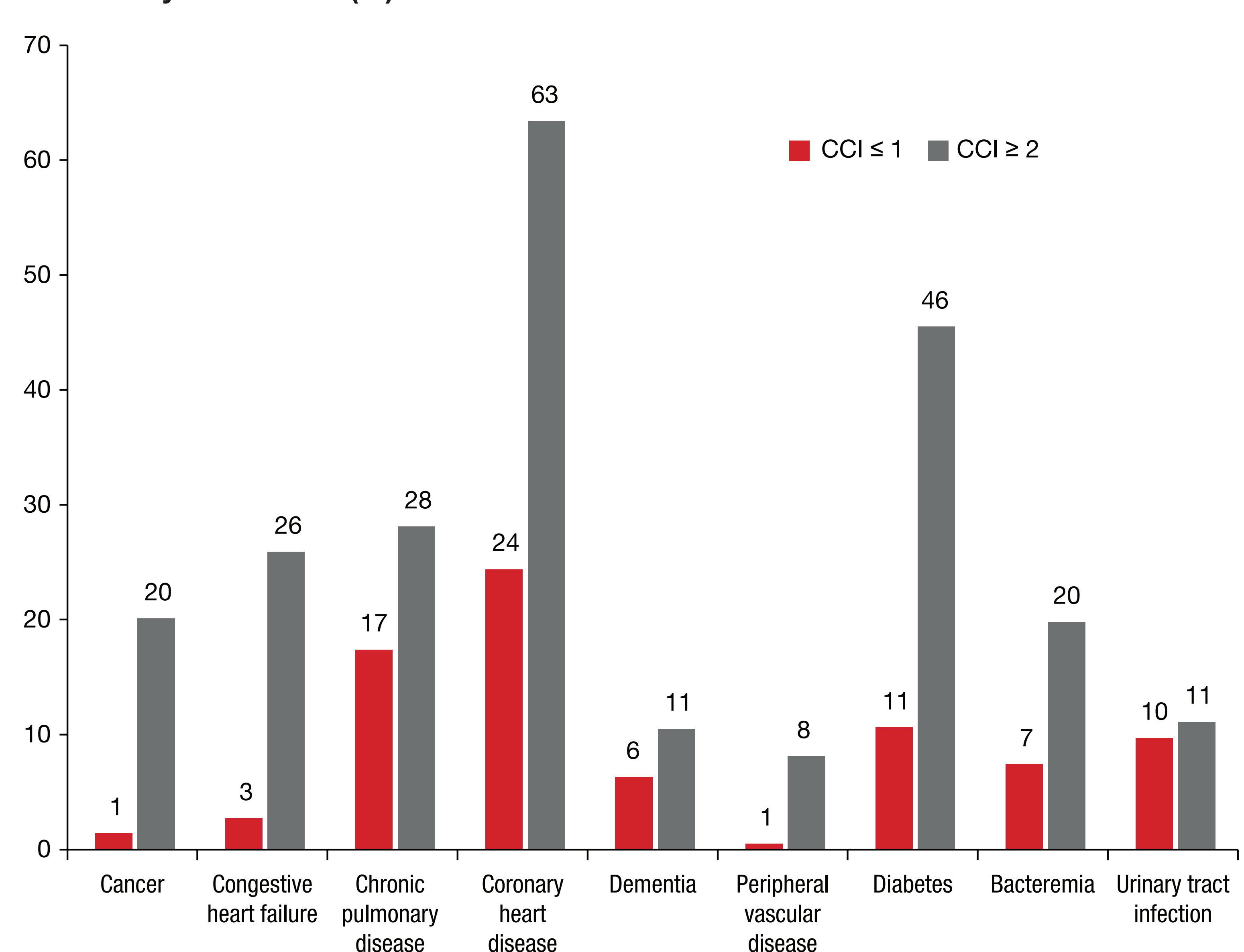
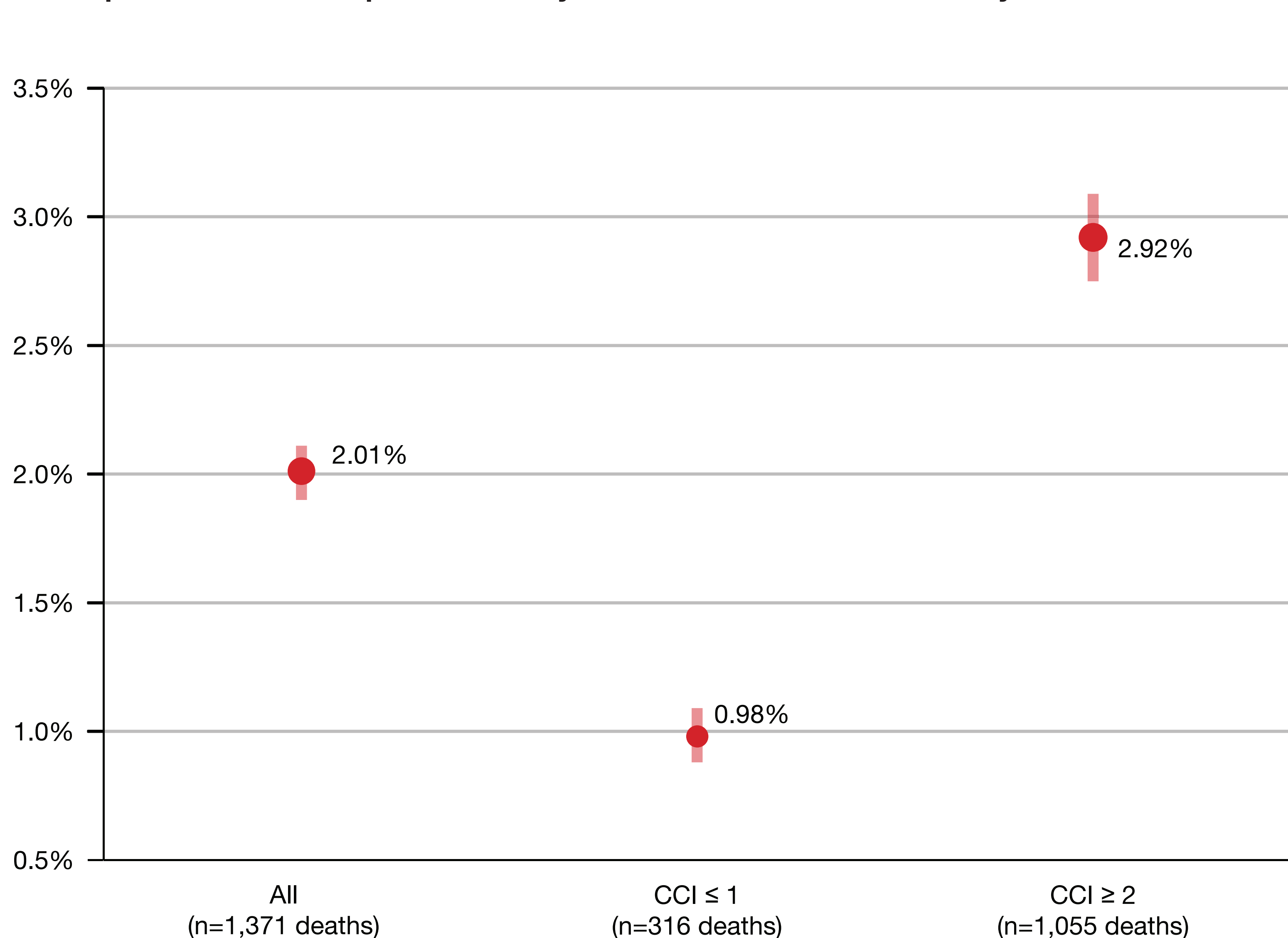


Figure 3. In-hospital mortality proportions for all patients and by CCI ≤ 1 and CCI ≥ 2 among 68,254 hospitalized CABP patients who received ceftriaxone IV with macrolide or a fluoroquinolone IV on hospitalization day 1 or 2 and continued for ≥ 2 days



CONCLUSIONS

- Nearly half of CABP patients in this study were hospitalized.
- Most CABP patients who were hospitalized had no or few comorbid conditions and few indicators of acute disease severity.
- Given costs associated with managing hospitalized CABP patients, these findings highlight the need for healthcare systems to adopt well-defined criteria for hospital admission based on presence of comorbidities and acute disease severity.
- These results demonstrate the need to better delineate patient populations that may be safely and effectively treated in the outpatient setting.

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