Rapid selection and initiation of appropriate antibiotic therapy is crucial for the treatment of community-acquired pneumonia (CAP). However, treatment decisions are complicated by the difficulty of obtaining timely microbiological diagnosis, antibiotic resistance and the need to consider the severity of illness.

### Materials and Methods

#### Data Sources
- This retrospective cohort observational study was conducted using the Truven Health MarketScan Hospital Drug Database.
- Coverage January 2007 through December 2012.
- Includes data from all U.S.-based hospitals (teaching and non-teaching).
- Captures all patient identification in patient demographics, clinical characteristics, medication and pharmacy utilization, as well as hospitalization costs.

#### Study Population
- **Inclusion criteria:**
  - Patients treated with antibiotic therapy within 48 hours of hospital admission.
  - Patients admitted to the ICU (ICU) or CCM within the first 24 hours.
  - Patients > 18 years of age.
- **Exclusion criteria:**
  - Patients with tuberculosis (196.xx, 197.xx, 198.xx, 199.zz).
  - Patients with HIV/AIDS (042.xx, 043.xx, 044.zz).
  - Patients with cancer (140.xx, 141.xx, 142.xx, 143.xx).
  - Patients with peripheral arterial disease (440.xx).
  - Patients with peripheral arterial disease (440.xx).
  - Patients with acute renal failure (N08.xx).

#### Index hospitalization was defined as initial CAP hospitalization observed in the data.

### Results

#### Study Descriptive Statistics

**Outcome Descriptions**
- Patients demographic and clinical characteristics (age, gender, race, insurance status, comorbidities).
- Description of initial antibiotic therapy administered.
- Hospitalization in the ICU or CCM.
- Rate of CAP-related readmissions at 30 days post index CAP episode.
- In-hospital rate of adverse events. Adverse events reported included:
  - Clostridium difficile infection.
  - Peripheral neuropathy.
  - Hematologic toxicity.
  - Hepatotoxicity.
- Length of hospital stay.

#### Statistical Analysis
- Frequency counts and percentages were used to summarize categorical variables, and mean and standard deviations were reported for continuous variables.
- Univariate analysis was conducted to examine the association between the outcome and each explanatory variable. Variables of interest (age, gender, health index) were selected using forward selection procedures.
- Data were analyzed using the R statistical software.

#### Table 1: Key patient demographic and clinical characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N=38,449</th>
<th>Mean±SD</th>
<th>Median±Q25-Q75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>70.1±16.0</td>
<td>68.5±16.9</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18,824</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>19,625</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Health Index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicare</td>
<td>8,764</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>7,565</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>11,806</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>9,374</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>25,192</td>
<td>65%</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>7,562</td>
<td>20%</td>
<td></td>
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<tr>
<td>Hispanic</td>
<td>3,011</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>1,684</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Diabetes</td>
<td>7,533</td>
<td>20%</td>
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<tr>
<td>Hypertension</td>
<td>15,177</td>
<td>40%</td>
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<tr>
<td>Heart disease</td>
<td>7,427</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>7,264</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>7,427</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Renal disease</td>
<td>3,812</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>944</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Hematologic toxicity</td>
<td>813</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Hepatotoxicity</td>
<td>696</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>
| Age (yrs), Gender, Race, Health Index, and comorbidities were associated with differences in patient characteristics.

#### Rates of adverse events, mortality, and readmission

- **In-hospital rate of adverse events:**
  - There was a 67% increased risk of mortality in the F/BL group compared to the M/BL group (OR=1.65, 95% CI: 1.06–2.56, p-value=0.04).
  - There was a 67% increased risk of mortality in the F/BL group compared to the M/BL group (OR=1.65, 95% CI: 1.06–2.56, p-value=0.04).
- **Rate of CABP related re-hospitalisation at 30 days post index hospitalization:**
  - There was a 67% increased risk of mortality in the F/BL group compared to the M/BL group (OR=1.65, 95% CI: 1.06–2.56, p-value=0.04).
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#### Conclusions

- This study provides descriptive, comprehensive data for examining hospital care, including drug utilization among hospitalized CAP patients.
- 41% of the patients prescribed antibiotics including the three major classes of antibiotic therapy at the start of the treatment period.
- The cohort receiving other treatments contained a mix including ICU, IM, immunotherapy, and anacast in various combinations.
- In the guideline-indicated cohort, common use of CAP therapy regimens for CABP and multidrug resistance are observed.

#### Acknowledgments

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- The content of this material is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

#### References