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ABSTRACT

Introduction: Community-acquired pneumonia (CAP) is one of the leading causes of death due to infection worldwide. National and international organizations have developed guidelines for the management of CAP with the goal to improve management and decrease mortality. We hypothesize that, over time, with implementation of these guidelines, we will observe a decrease in mortality in hospitalized patients with CAP.

Objective: The objective of this study was to evaluate trends in mortality rates in hospitalized patients with CAP over time.

Methods: This was a secondary data analysis of the Community-Acquired Pneumonia Organization (CAPO) International Cohort Study database. Three time periods were compared with respect to mortality rates, 2002-2005, 2006-2010, and 2011-2014. The Chi-squared test was used to determine statistical differences in mortality rates.

Results: A total of 7,948 patients were included in the study. Mortality rates were: 8.4%, 9.9%, and 6.1% for each of the three time periods, respectively, (P=0.001).

Conclusions: This study documented a significant decrease in mortality for hospitalized patients with CAP in 2011-2014 compared to prior time periods.

The development and implementation of guidelines for the management of hospitalized patients with CAP are the likely explanation for this decrease in mortality.

INTRODUCTION

Community-acquired pneumonia (CAP) is one of the leading causes of death due to infection worldwide. National and international organizations have developed guidelines for the management of CAP with the goal to improve management and decrease mortality.

Previous studies suggest that the rates of hospitalization for CAP may be increasing among US adults, particularly among the older population (patients aged ≥ 65 years) as well as the number of comorbidities among these patients. Factors that increase the risk for pneumonia include the presence of underlying medical conditions, advanced age, functional disability and residency in long-term care facilities. We hypothesize that, over time, with the implementation of guidelines for management of pneumonia we will observe a decrease in mortality in hospitalized patients with CAP.

The primary objective of this study was to evaluate trends in mortality rates in hospitalized patients with CAP over time. The secondary objective was to evaluate time to clinical stability and length of stay in the hospital over time.

STUDY DESIGN

This was a secondary data analysis of the Community-Acquired Pneumonia Organization (CAPO) International Cohort Study database. Data were collected between 2002 and 2014. In each participating center, non-consecutive medical records of hospitalized patients with the diagnosis of CAP were reviewed. A sample of the data collection form is available at the study website (www.capsole.com). Validation of data quality was performed at the study center before the case was entered into the CAPO database. Institutional Review Board approval was obtained by each participating center.

STUDY METHODS

Study definitions

CAP: Diagnosis of CAP required the presence of criterion A, B, and C:

A. New pulmonary infiltrate on imaging (CT scan or chest x-ray) at the time of admission to the hospital.

B. Signs and Symptoms of CAP (at least one of the following):

1. New or increased cough (per the patient)

2. Fever ≥ 38.0°C (100.8°F) or hypothermia <35.6°C (96.0°F).

3. Changes in WBC (leukocytosis >11,000 cells/ml), left shift (≥10% band-form neutrophils) or leukopenia <4,000 cells/mm3.

C. Working diagnosis of CAP at the time of hospital admission with antimicrobial therapy given within 24 hours of admission.

Study outcomes

In-hospital mortality: defined as death by any cause during hospitalization. Time to clinical stability (TCS): A patient was defined as clinically stable the day that the following four criteria were met: a) improved cough and shortness of breath, b) lack of fever for at least 8 hours, c) improving leukocytosis (decreased at least 10% from the previous day), and d) tolerating oral intake with adequate gastrointestinal absorption. Patients were evaluated daily within the first 7 days of hospitalization to determine if the day when clinical stability was reached. Length of stay (LOS): defined in days and calculated for each patient as the day of discharge minus the day of admission. Patients hospitalized for more than 14 days were censored at 15 days in an effort to capture LOS data related only to bacterial CAP.

STATISTICAL ANALYSIS

Three time periods were compared with respect to mortality rates, 2002-2005, 2006-2010, and 2011-2014. Baseline categorical explanatory variables were summarized as frequencies and percentages and differences between both groups of patients were analyzed using a chi-square test or Fisher’s exact test when appropriate and warranted. Continuous variables were summarized as frequencies and interquartile range and differences between groups were analyzed by Mann-Whitney U test. The Chi-squared test was used to determine statistical differences in mortality rates. Kruskal-Wallis one way ANOVA was used to determine statistical differences in TCS and LOS. P-values ≤ 0.05 were considered statistically significant.

RESULTS

• A total of 7,948 patients were included in the study.

• Patients’ characteristics are shown in Table 1.

• Mortality rates were: 8.4%, 9.9%, and 6.1% for each of the three periods, respectively, (P=0.001). This is shown in Figure 1.

• Time to Clinical Stability for the three study periods is shown in Figure 2.

• Length Of Stay in the hospital for the three study periods is shown in Figure 3.

CONCLUSIONS

• This study documented a significant decrease in mortality for hospitalized patients with CAP in 2011-2014 compared to prior time periods.

• The development and implementation of guidelines for the management of hospitalized patients with CAP are the likely explanation for this decrease in mortality.

• Improvements in critical care have likely affected pneumonia outcomes.

• Improvement in antibiotic therapies such as the use of combination therapy may have also decreased mortality.

• We didn’t document any clinically significant decrease in time to clinical stability or length of stay during the study period.

• Our data emphasizes the importance of developing national guidelines and the need of educating and implementing the guidelines at the local hospital level.

REFERENCES


Figure 1: Mortality Rates for the Three Study Periods

Figure 2: Clinical Stability for the Three Study Periods

Figure 3: Length of Stay for the Three Study Periods