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Original article

Increased rates of intensive care unit admission in patients with *Mycoplasma pneumoniae*: a retrospective study

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ABSTRACT

Mycoplasma pneumoniae is a leading cause of respiratory disease. In the Intensive Care Unit (ICU) setting *M. pneumoniae* is not considered a common pathogen. In 2010–13 an epidemic of *M. pneumoniae*-associated infections was reported and we observed an increase of *M. pneumoniae* patients admitted to ICU. We analysed the cohort of all *M. pneumoniae*-positive patients' admissions during 2007 to 2012 at the Hadassah-Hebrew University Medical Centre (a 1100-bed tertiary medical centre). *Mycoplasma pneumoniae* diagnosis was made routinely using PCR on throat swabs and other respiratory samples. Clinical parameters were retrospectively extracted. We identified 416 *M. pneumoniae*-infected patients; of which 68 (16.3%) were admitted to ICU. Of these, 48% (173/416) were paediatric patients with ICU admission rate of 4.6% (8/173). In the 19- to 65-year age group ICU admission rate rose to 18% (32/171), and to 38.8% (28/72) for patients older than 65 years. The mean APACHE II score on ICU admission was 20, with a median ICU stay of 7 days, and median hospital stay of 11.5 days. Of the ICU-admitted patients, 54.4% (37/68) were mechanically ventilated upon ICU admission. In 38.2% (26/68), additional pathogens were identified mostly later as secondary pathogens. A concomitant cardiac manifestation occurred in up to 36.8% (25/68) of patients. The in-hospital mortality was 29.4% (20/68) and correlated with APACHE II score. Contrary to previous reports, a substantial proportion (16.3%) of our *M. pneumoniae*-infected patients required ICU admission, especially in the adult population, with significant morbidity and mortality. **T. Khoury, CMI 2016;22:711**

Introduction

Almost 20%–30% of cases of community-acquired pneumonia (CAP) are secondary to *Mycoplasma pneumoniae* [1,2]. Generally, *M. pneumoniae* causes mild respiratory infection, usually managed by primary-care physicians. However, 25% of patients with *M. pneumoniae* may require hospitalization.

Symptomatic *M. pneumoniae* pneumonia can affect all age groups [1]; however, a carrier state is more common in the paediatric population [3]. The common perception is that this pathogen usually causes a relatively mild respiratory disease and is rarely a cause of admission to the intensive care unit (ICU). However, recent studies have suggested that some patients with *M. pneumoniae* may develop severe respiratory manifestations requiring ICU admission [4], and *M. pneumoniae* has been incriminated as a cause of ventilator-associated pneumonia [5–7]. Additionally, *M. pneumoniae* may cause necrotizing pneumonitis in children [8].

The role of *M. pneumoniae* in severe infections might be underestimated because of the cyclic nature of epidemics and the lack of availability or use of efficient nucleic acid amplification-based diagnostics methods. Taking into account the emerging macrolide resistance in *M. pneumoniae* [9–12], it is clear that if indeed *M. pneumoniae* is a substantial cause of CAP, then the common practice of combination therapy with a β-lactam and macrolides may not offer adequate antimicrobial coverage for CAP.

Here, we set out to evaluate the ICU admission rate and profile in the cohort of *M. pneumoniae* patients admitted to the Hadassah-Hebrew University Medical Centre (HHUMC). We studied patients

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admitted mainly during epidemic years in which a surge in *M. pneumoniae* infections was noticed in Israel, Europe and Japan [13–15]. We also wanted to assess the possible role of *M. pneumoniae* as a cause of respiratory failure in the ICU population.

Methods

We performed a retrospective case analysis in all *M. pneumoniae*-positive patients presenting to the HHUMC, Jerusalem, Israel from January 2007 to December 2012. HHUMC is a tertiary medical centre providing service to the Greater Jerusalem area in two campuses (a total of 1100 admission beds). All patients who were positive for *M. pneumoniae* by PCR from throat swabs [9] during this time-period were identified from the laboratory database and were recruited for the study. Patients were then screened for ICU admission.

The clinical and demographic data were collected and recorded for each patient. Variables recorded included: age, gender and ethnicity, length of admission, fever, respiratory rate, peripheral oxygen saturation (Spo_2), and clinical findings on physical examination. In addition, we collected data on laboratory testing, radiological findings, complications and antibiotic treatment before ICU admission. CURB-65 pneumonia severity score for patients older than 18 years [16] and the ICU APACHE II severity score [17] were calculated from data on charts if they were available.

The *M. pneumoniae* PCR was performed for all patients as previously described [9]. Real-time PCR testing of throat swabs is performed on a daily basis in the Microbiology Laboratory of our hospital. Community acquisition of *M. pneumoniae* was defined if the PCR was found to be positive up to 14 days from admission due to the long incubation period until symptoms occur [1].

Statistical analysis

Continuous variables were compared using the Mann–Whitney *U*-test, whereas categorical data were compared using the chi-square test or the Fisher's exact test, where appropriate. All comparisons were performed using the IBM SPSS statistics package version 22. Differences were considered statistically significant when p was <0.05.

The study was approved by the HHUMC Institutional Review Board. (HMO13-300)

Results

During the study period (January 2007 to December 2012), 416 patients were found to be positive for *M. pneumoniae* of the 2652 tested. Out of the 416 positive patients, 68 (16.3%) were admitted to an ICU, 266 were admitted to regular wards and 82 were outpatients. The average age of ICU-admitted patients was 58.5 years (range 2–90 years). The ICU admission rate was low in the paediatric population (Fig. 1), rose to above 18% (32 out 171) in the 19- to 65-year age group, and was 38.8% (28/72) for patients older than 65. Characteristics of ICU patients are shown in Table 1. Sixty-two per cent of patients were admitted directly to the ICU from the Emergency Room due to respiratory distress, before an aetiological diagnosis was made. Only five were immuno-compromised at the time of ICU admission. Ten out of 68 patients received β-lactam

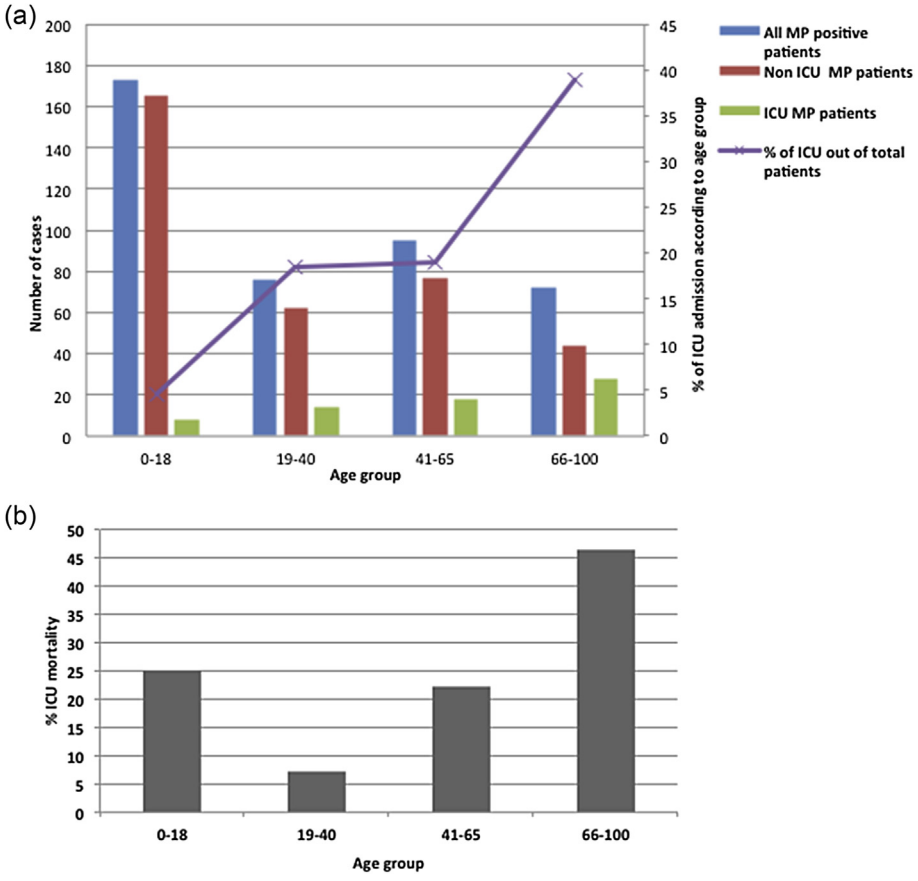

Fig. 1. (a) Age-related admission to intensive care unit (ICU) in all *Mycoplasma pneumoniae* cases. ICU admission was 4.6% in patients ≤18 years old; rose to 18.4% in the 19–40 age group and 18.9% in the 41–65 age group; and increased to 38.8% for those aged >65 years. (b) Age-related mortality among ICU admitted *M. pneumoniae*–infected patients. Mortality was commonest among patients >65 years of age, reaching 46.4%