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ORIGINAL ARTICLE

Reevaluation of the Japanese guideline for healthcare-associated pneumonia in a medium-sized community hospital in Japan

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Abstract The Japanese guidelines for nursing- and healthcare-associated pneumonia (NHCAP) categorize patients by risk of resistant bacteria and defined antimicrobials to be used, similar to the healthcare-associated pneumonia (HCAP) guidelines of the United States. The data were collected in large-scale hospitals, possibly a cause of inconsistency with everyday practice in medium-sized community hospitals. To test the feasibility of this guideline based on a retrospective study performed in a medium-sized community hospital in Japan, the medical records of pneumonia patients were retrospectively studied [718 patients: NHCAP, 477, 66.4 %; community-acquired pneumonia (CAP), 241, 33.4 %). Factors related to patients' background, clinical and laboratory findings, treatment, and outcome were compared between NHCAP and CAP. The A-DROP system, scored by age, dehydration, respiratory failure, disorientation, and low blood pressure, evaluated the severity of pneumonia. In contrast to CAP patients, NHCAP patients included more elderly patients requiring nursing care and revealed higher rates of poor nutrition, dementia, aspiration, severe cases, detection of drug-resistant bacteria, and mortality. For NHCAP, the success rate did not differ between those receiving and not receiving proper initial treatment (76.9 vs. 78.5 %) nor did mortality rate within 30 days differ (13.1 vs. 13.8 %). Risk factors for mortality within 30 days for NHCAP were diabetes [adjusted odds ratio (AOR) 2.394, $p = 0.009$], albumin <2.5 g/dl (AOR 2.766, $p = 0.002$), A-DROP very severe (AOR 1.930, $p = 0.021$), and imaging showing extensive pneumonia (AOR 2.541, $p = 0.002$). The severity of pneumonia rather than risk of resistant bacteria should be considered, in addition to ethical concerns, in initial treatment strategy in NHCAP to avoid excessive use of broad-spectrum antimicrobials.

Keywords: Severity of pneumonia · Drug-resistant bacteria · Performance status · Healthcare-associated pneumonia · Nursing and healthcare-associated pneumonia

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Introduction

Healthcare-associated pneumonia (HCAP) is considered to fall between community-acquired pneumonia (CAP) and hospital-acquired pneumonia (HAP) [1, 2]. It has a poor prognosis and a high rate of detection of drug-resistant bacteria, as does HAP, according to reports from the United States [3, 4]. In contrast, the British Thoracic Society guidelines have documented that patients with nursing home-acquired pneumonia (NHAP), which is considered as a counterpart of HCAP, should be treated in the same way as CAP [5, 6]. In addition, a report from Spain indicated that HCAP more closely resembled CAP [7]. Differences in results might be derived from the differences in medical and healthcare systems among countries. In Japan, one report stated that more drug-resistant bacteria were detected as causative organisms for HCAP compared to CAP [8], whereas another report found that HCAP was pneumonia with a poor prognosis in the elderly rather than pneumonia caused by drug-resistant bacteria, and therefore closer to CAP [9].

The healthcare system differs greatly between Japan and the United States, and it is difficult to apply the same definitions and analyses for HCAP. In Japan, many elderly and physically handicapped people receive care at home [10]. In addition, nursing homes are not yet popular, so a great many elderly patients are admitted to general hospitals and tend to stay longer [11]. Because more than half of cases referred to as HCAP in the United States would be defined as HAP in Japan, a divergence between actual medical practice and HAP guidelines has been observed. Taking those backgrounds into account, HCAP guidelines [called nursing- and healthcare-associated pneumonia (NHCAP) guidelines] were formulated in Japan based on data extracted on HAP patients in long-term convalescent or psychiatric wards and CAP patients who were elderly and physically handicapped, requiring nursing care or receiving intravascular treatment continuously on an outpatient basis.

There were only a few reports on HCAP in Japan [8, 9]; reports on HCAP in the United States were mainly analyses of severely ill patients in intensive care units (ICU) or in large hospitals. Therefore, sufficient data from medium-sized or smaller community hospitals were lacking. The present study was conducted to address the following two points in a medium-sized community hospital: first, to study clinical differences between NHCAP and CAP; and second, to determine which is more important, severity or resistant bacteria, to the prognosis of NHCAP.

Patients and methods

Patient data

Data were collected and analyzed retrospectively on pneumonia patients admitted between January 2008 and June 2010 to Sekishinkai Sayama Hospital, which is a community hospital designated as a secondary emergency hospital with 350 beds in Sayama City, Saitama Prefecture, Japan.

Pneumonia cases were divided into two groups according to guidelines from the Japanese Respiratory Society: NHCAP [12] and CAP. HAP and cases diagnosed as diseases other than infectious pneumonia during the course of the study were excluded.

For eligible patients, information on patients' background, clinical findings and laboratory data on admission, severity of pneumonia, detected bacteria, initial antibiotics administered and outcome were collected. The antibiotics were selected by the attending physicians, generally, but not strictly, based on the CAP guidelines. Failure of the initial treatment was defined as escalation of antibiotics within 48–72 h of hospitalization, poor clinical improvement (no defervescence, start of mechanical ventilation, use of vasopressor), or death. Adequacy of the initial treatment was determined such that, when the bacteria detected before treatment were sensitive to the initial antibiotics, the treatment was defined as appropriate and when not sensitive, the treatment was defined as inappropriate. For outcome, mortality within 30 days and total hospital mortality were examined.

Use of data for this study was permitted by the Information Systems Division of Sekishinkai Sayama Hospital. Also, this study was approved by the institutional review board of the National Hospital Organization Tokyo National Hospital.

Criteria for NHCAP and CAP

Patients in the NHCAP group met one or more of the following criteria: (1) admitted to long-term convalescent ward or nursing home (including psychiatric wards); (2) discharged from hospital within preceding 90 days; (3) elderly and physically handicapped, requiring nursing care; or (4) receiving continuous intravascular treatment on an outpatient basis (dialysis, antibiotics, chemotherapy, immunosuppressive agents). The CAP was defined as pneumonia other than NHCAP (defined above) or HAP, which was defined as pneumonia occurring more than 48 h after admission to a hospital. Within these categories, patients requiring nursing care were higher than grade 3 performance status (PS) of the Eastern Cooperative Oncology Group (ECOG).

Microbiological evaluation

Microbiological diagnosis was performed by cultures (sputum, blood, bronchial wash, pleural effusion) and Gram stain. Indigenous bacteria were excluded from culture-positive cases. We diagnosed pneumococcal pneumonia when *Streptococcus pneumoniae* was isolated from the sputum or urine antigen test was positive. *Mycoplasma* pneumonia (caused by *Mycoplasma pneumoniae*) and *Chlamydophila* pneumonia (*Chlamydophila pneumoniae*) were diagnosed only when there were significant findings in a single serum or paired serum test. *Legionella* pneumonia was diagnosed by a urinary antigen test that detects only serotype 1. Drug-resistant bacteria in NHCAP were defined as *Pseudomonas aeruginosa*, methicillin-resistant *Staphylococcus aureus* (MRSA), *Acinetobacter* spp., and extended-spectrum β-lactamase-producing *Enterobacteriaceae*, which have a risk of drug resistance according to the guidelines [12].

Evaluation of severity

Severity of pneumonia was evaluated by the A-DROP system (old age, dehydration, respiratory failure, orientation