

# GÖĞÜS HASTALIKLARI HASTANESİNDE SAĞLIK BAKIMI İLİŞKİLİ PNÖMONİ HASTALARININ DEĞERLENDİRİLMESİ

## Assessment of Patients with Healthcare Associated Pneumonia in Chest Diseases Hospital

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### ÖZET

**Amaç:** Sağlık Bakımı ile ilişkili Pnömoniler (SBİP), sağlık hizmetlerinin yaygınlaşması ile önemi gittikçe artan, yüksek mortalite ve morbiditeye sahip hasta grubudur. Çalışmamızın amacı, göğüs hastanesinde SBİP tanısı ile tedavi edilmiş ve solunum örneklerinde etken üretilebilmiş hastaların yaş, cinsiyet, etken spektrumu, yatış süresi, yoğun bakım gereksinimi, tedaviye yanıt ve ölüm oranları yönünden SBİP kriterlerini göz önüne alınarak değerlendirilmesidir.

**Gereç ve Yöntemler:** Ocak 2013-Temmuz 2014 tarihleri arasında Çorum Göğüs Hastalıkları Hastanesi'nde yatarak tedavi edilen Sağlık Bakımı ilişkili Pnömoni hastalarından, balgam/solunum yolu örneklerinde etken üretilebilmiş olan 52 olgu; yaş, cinsiyet, eşlik eden kronik hastalıklar, etken spektrumu, yatış süreleri, yoğun bakım ihtiyacı, başlangıç tedavisinin yanıt ve ölüm oranı açısından retrospektif olarak incelendi.

**Bulgular:** Toplam 52 olgu; 35 erkek (%67), 17 kadın (%33) hastadan oluşuyordu. Yaş ortalaması 71.87 bulundu. En sık görülen ek hastalık 42 (%81) olgu ile KOAH'tı. Yirmialtı hastada (%50) yoğun bakım gereksinimi ortaya çıktı. Nörolojik komorbidite YBÜ ihtiyacı (%88) ve mortalite (%77) için anlamlı risk faktörü olarak saptandı. Toplam 22 hasta (%42) kaybedildi. Başlangıç ampirik antibiyotik tedavisine göre takipte antibiyotik değişikliği gereksiniminde ve mortalitede anlamlı farklılık saptanmadı. Etkenlere göre mortalite oranında 13 hasta ile (%65) A. Baumanii ilk sırada yer aldı.

**Sonuç:** Sağlık bakımı ilişkili pnömoni hastalarında tedavi başlangıcında seçilen antibiyotik rejiminin daha geniş spektrumlu tercih edilmesi ile mortalite ve yoğun bakım gereksiniminde azalma saptanmamıştır.

**Anahtar Sözcükler:** Pnömoni; Sağlık bakımı; Epidemioloji

### ABSTRACT

**Objective:** Healthcare-associated Pneumonia (HCAP) gaining importance as healthcare services getting more accessible. In recent studies, suspicion started to rise about the benefits of broad spectrum antibiotics applied empirically because of healthcare related pneumonia criteria. The aim of this study is to assess HCAP patients to see the difference between broad spectrum antibiotic therapy against narrow spectrum.

**Method:** Having been treated in a chest diseases hospital between January 2013 and July 2014, 52 cases of healthcare-associated pneumonia who had positive cultures for sputum/respiratory tract samples were retrospectively examined in age, sex, comorbid diseases, isolated agent, length of hospitalization, intensive care requirement, need for a change in antibiotics depending on the first line treatment and mortality rate.

**Results:** Thirty-five men (67%) and 17 women (33%) were evaluated. The mean age was 71.87 years. Most common comorbidity was COPD (81%). Twenty-six patients (50%) were in need of intensive care. Neurological diseases were found to be most related with intensive care requirement (88%). Twenty-two patients (42%) were died. A. Baumanii ranked the first with 13 patients (65%) for mortality rate according to agents.

**Conclusion:** In our study, no significant difference found between broad spectrum antibiotics group and the others in terms of mortality and need for ICU.

**Keywords:** Pneumonia; Healthcare related pneumonia; Epidemiology; Antibiotics

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## INTRODUCTION AND OBJECTIVES

Pneumonia has been traditionally categorized as either community-acquired pneumonia (CAP), hospital-acquired pneumonia (NP), or ventilator-associated pneumonia (VAP). However, in recent years, an increase has been noted in the number of patients presenting to the outpatient units with pneumonia caused by multiple-drug resistant (MDR) pathogens [1]. This new group of patients with increased occurrence of MDR microorganisms were first categorized under the term "Healthcare Associated Pneumonia" (HCAP) in 2005 ATS/IDSA pneumonia treatment guidelines as an effort to describe those patients with a high risk of being infected with pathogens with multiple drug resistance (MDR) [2]. Accordingly, HCAP describes a patient group with increasing medical significance resulting from more widespread availability of healthcare in whom MDR pathogens are identified more frequently than before with a consequent increase in the morbidity and mortality. Patients who develop pneumonia during the healthcare process but who are not hospitalized at the time of the development of pneumonia represent a high-risk group. The definition criteria for HCAP include intravenous treatment (including antibiotics) within the past 30 days, receiving wound-care at home within the past 30 days, receiving long-term nursing care, attending to a hemodialysis center within the past 30 day period, and receiving hospitalized treatment for  $\geq 2$  days within the past 90 days [2].

The controversies surrounding HCAP include the claims regarding the possibility that not all HCAP patients may have a high risk of MDR pathogens and also regarding the importance of the correct identification of actual HCAP patients who would benefit from wide-spectrum antibiotic therapy.

In this study, we aimed to assess whether the choice of drugs for empiric antibiotic treatment at the beginning could change the treatment success for healthcare associated pneumonia. We also assess several patient characteristics such as the age, gender, spectrum of causative organisms, duration of hospital stay, the need for change in the initial antibiotic, the need for intensive care, and mortality rates among HCAP patients, who were admitted to Chest Diseases Hospital; in order to compare our results with previously published data and to document management strategies for HCAP.

## MATERIALS AND METHODS

Age, gender, spectrum of causative organisms, duration of hospital stay, the need for change in the initial antibiotic, the need for intensive care, and mortality rates were retrospectively evaluated among a total of microbiologically-confirmed 52 HCAP patients who were admitted to Chest Diseases Hospital, a 130-patient and 10 ICU-bed facility, between January 2013 and July 2014. Also data on previous hospital visits, previous admissions, medical prescriptions, residential address, and previously established diagnoses were examined and recorded as appropriately. All patients, who had been included to the study, were called by phone from the numbers found at hospital admission records; written consent were taken from the patients who could be reached by phone. As this study conducted retrospectively, permission was taken only from the local ethics committee (Public Hospitals Corporation).

All patients with pneumonia admitted according to CURB-65 [3] scoring system after being referred from the emergency or outpatient units were screened. Pneumonia diagnosis was proved by radiological infiltration, increased white blood cell count and increased C-reactive protein levels. Sputum samples were collected by expectoration from conscious patients and by deep tracheal aspiration from unconscious patients. Blood culture samples were collected from venous blood with antiseptic precautions. Patients who had microbiological growth in sputum or respiratory secretion samples or in blood cultures (provided that it was consistent with the clinical picture) were included in the study. Seven patients were referred from another medical facility after identification of the organism by microbiological culture. Of these patients three were excluded due to the fact that they had been on mechanical ventilation; also four patients referred from other centers after having been admitted to and treated in internal medicine, orthopedics, nephrology, or infectious diseases wards were excluded.

### Statistical analysis

Data were analyzed with SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA; license, Hitit University, Turkey). Distributions of the groups were evaluated with Kolmogorov-Smirnov tests. Descriptive statistics with a normal distribution are presented as mean  $\pm$  standard deviation and nominal variables are presented as number of

cases and percentage (%). The significances of the difference between the two groups were evaluated with Mann–Whitney U-test since data were not normally distributed. Nominal variables were evaluated using the Pearson’s Chi-square or Fisher’s exact test. P value < 0.05 was considered statistically significant.

The study protocol was approved by the Secretary General of the Turkish Institution of State Hospitals.

## RESULTS

Among the 52 patients included, 35 (67%) were male and 17 (33%) were female. The mean age in the overall patient group, male patients, and female patients was 71, 70 and 74 years, respectively. The average age in

patients who died during the follow-up was 75 years, while the corresponding value among those who were discharged was 69 years ( $p=0.101$ ).

A total of 33 patients (63.5%) had a history hospitalization within the past 90 days (Figure 1), with a median duration of hospitalization of 20 days. Patients with respiratory system conditions, chronic renal failure, bronchial carcinoma, and other cancers had a higher median duration of hospitalization (Figure 2), as well as in those who received infusion therapy at home and in those undergoing hemodialysis. In comparison with other criteria, patients with decubitus ulcers had significantly higher rate of mortality ( $p=0.029$ ).

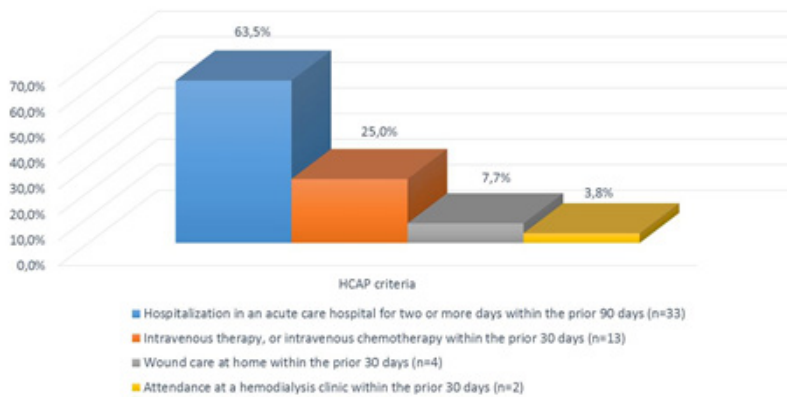


Figure 1: Distribution of healthcare-associated pneumonia criteria

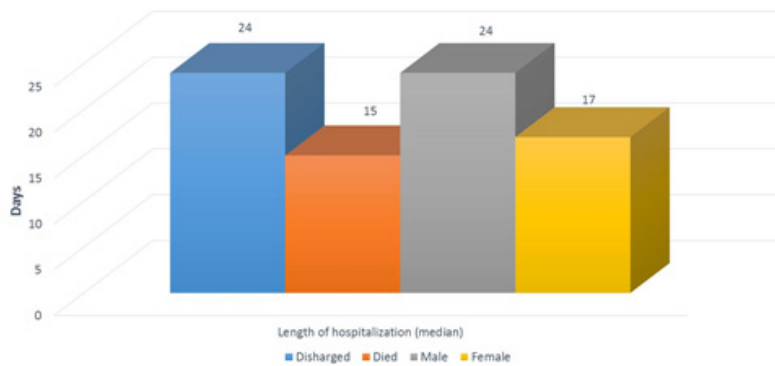
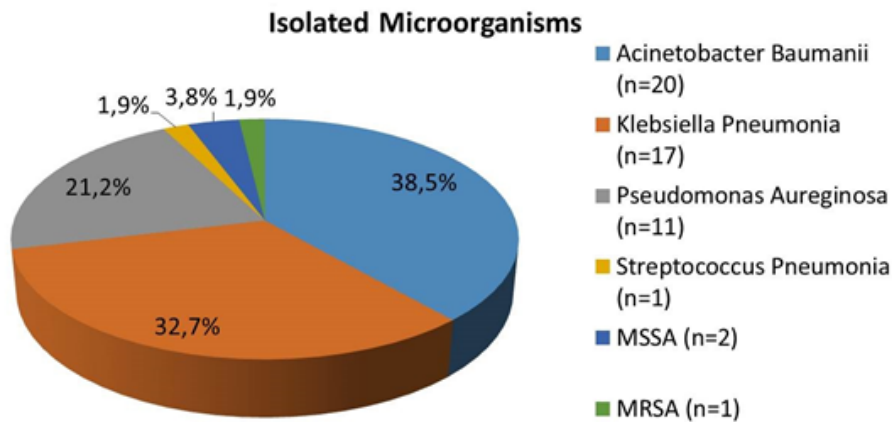


Figure 2: Length of hospitalization (Median)

Nine patients (17.3%) had a history of aspiration. Patients with or without a history of aspiration did not differ significantly in terms of the need for intensive care or duration of hospital stay ( $p=0.140$  and  $p=0.552$ , respectively). However patients with a history of aspiration had significantly higher rate of mortality ( $p < 0.05$ ). The most frequent concomitant condition was COPD, which was present in 42 patients (81%). The median duration of hospital stay in those with chronic renal fa-

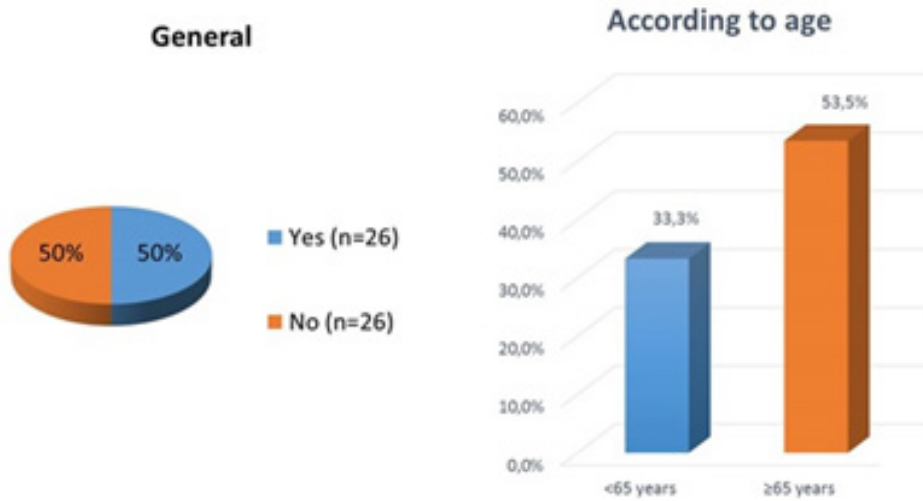
ilure or bronchial carcinoma was longer than 20 days, although the difference was not significantly different from those with other concomitant conditions. Concomitant neurological conditions represented the leading cause of ICU admissions with 88% of the patients requiring intensive care. In this regard, patients with neurological comorbidities had significantly higher need for intensive care ( $p=0.024$ ) and mortality ( $p=0.027$ ).



**Figure 3:** Distribution of agents isolated in cultures

The most frequently isolated organism in microbiological cultures was *Acinetobacter baumannii* ( $n=20$ ; 38.5%) followed by *Klebsiella pneumonia* ( $n=17$ ; 32.7%). *Pseudomonas aeruginosa* was isolated in 11 cases (21.2%) (Figure 3). Of the 20 patients with *A. baumannii* isolated in sputum cultures, 17 (85%) required intensive care, followed by 4 of the 11 patients (36.4%) with *P. aeruginosa*. A significant association between the growth of *A. baumannii* and ICU admission was noted ( $p < 0.001$ ). There were no mortality differences with respect to the organisms isolated.

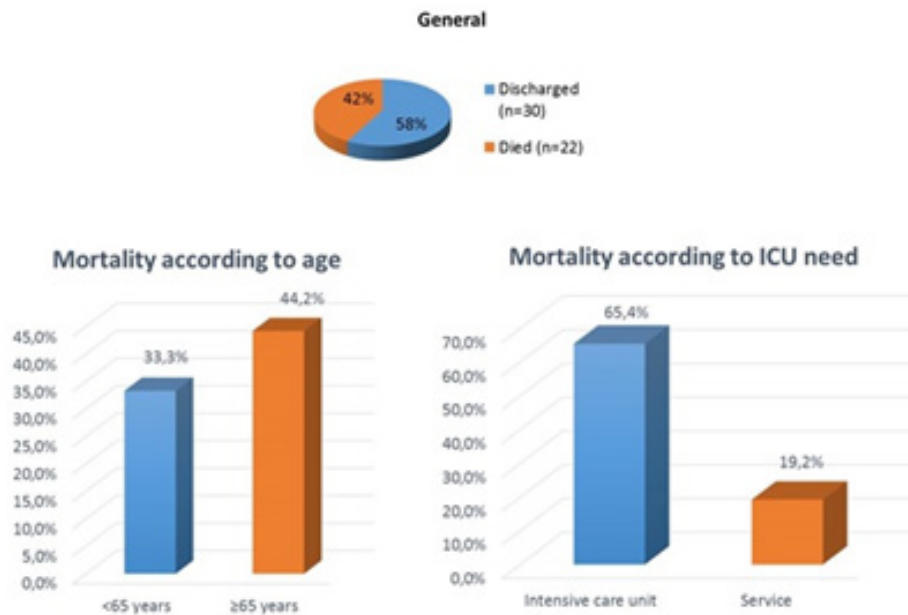
Twenty-six patients (50%) required intensive care unit admission. The need for intensive care admission occurred in 33.3% of the patients under 65 years of age, while this figure was 53.3% among those over 65 years of age ( $p=0.237$ ) (Figure 4). All patients who received wound care for decubitus ulcers required ICU admission, while 69% of those receiving infusion therapy at home required such care; however no significant associations between SBIP criteria and intensive care requirement were found.



**Figure 4:** The age-dependent need for intensive care

There were a total of 22 deaths (42%) in the overall patient group. The highest mortality rate (i.e., 65%, 13 patients) was observed among patients who had A. ba-

umannii (p=0.080). The rate of mortality in patients < 65 and ≥ 65 years of age were 33.3% and 44.2%, respectively (p=0.717) (Figure 5).



**Figure 5:** Mortality rates

The initial therapeutic regimen consisted of CAP therapy in 17 patients (32.7%) and HAP in 35 (67.3%). A change in the antibiotic therapy was required during the course of the treatment in 70.5% (12/17) and 45.7% (16/35) of the patients with an initial CAP or HAP regimen, respectively ( $p=0.391$ ).

Mortality rates did not differ according to antibiotics chosen at the beginning of therapy. Six patients of 17 (35.3%) in CAP treatment group have died and 16 of 35 patients in HAP treatment group died ( $p=0.558$ ).

## DISCUSSION

In our study, presence of decubitus ulcers, which is one of the criteria for HCAP, was found to be associated with a significantly higher risk of mortality than other criteria ( $p=0.029$ ). In a study by Seong et al. involving a total of 483 subjects, a comparison between CAP and HCAP patients showed higher mortality rates among the latter group. However, in that study age and clinical signs and symptoms at presentation were significantly associated with mortality, while the type of pneumonia and the combination therapy at the onset of treatment were not [4]. Patients with decubitus ulcers who receive wound care at home generally have multiple coexistent conditions and poor health status. Thus, it is not surprising to observe an increased mortality in patients with decubitus ulcers. On the other hand, since all 4 patients who had decubitus ulcers died during their hospital stay, the statistical significance of this finding may be somewhat questionable.

The recently introduced diagnostic category of healthcare associated pneumonia refers to a subgroup of patients with pneumonia who have a higher risk being infected by MDR pathogens due to the presence of a variety of risk factors in addition to a clinically more severe course as compared to the community acquired pneumonia [1, 2]. Thus, it has been proposed that in contrast with CAP patients, those with HCAP may require treatment with wide spectrum antibiotics similar to HAP. On the other hand, the value of certain diagnostic criteria proposed for HCAP has also been recently questioned by some authors, who claim that the morbidity and mortality difference may not justify the administration wide spectrum antibiotics, which are given unnecessarily. Kollef et al. [1] in their retrospective study, reported that methicillin-resistant

*Staphylococcus aureus* (MRSA) or *P. aeruginosa* were isolated in approximately 50% of their HAP patients, with an overall mortality similar to that of CAP. These results have been corroborated by those of Micek et al. [5] and Schreiber et al. [6]. On the other hand, in some other reports, the incidence of MDR pathogens among HCAP patients was more similar to that reported for CAP [4, 7, 8].

Also, patients with a history of aspiration had significantly higher mortality as compared to those without such a history ( $p < 0.05$ ). Seong et al. [9] reported significantly higher rates of aspiration pneumonia among those with HCAP than those with CAP, while no mortality data has been presented. Co-existence of aspiration with pneumonia increases the severity of the disease [10], and as expected, patients with a history of aspiration had higher mortality in our study.

In this study, most common isolated microorganism was *Acinetobacter baumannii*; which was different from Erben et al [11] study conducted also in Turkey. According to Erben et al, the most common isolated microorganism at healthcare associated pneumonia patients was *Staphylococcus aureus*. It can be said that, to know the microorganism profile for each city and also for each hospital is very important for antibiotic choose.

In our study, isolation of *Acinetobacter baumannii* was significantly associated with the need for intensive care unit admission ( $p < 0.001$ ). Since *Streptococcus pneumoniae* and methicillin-resistant *Staphylococcus aureus* were isolated in only two patients (one each), the statistical significance of the observed association may not be reliable. Also, in patients hospitalized for more than 5 days as well as in those with a history of antibiotic use prior to admission or in those with previous admissions, MDR pathogens are more likely to be isolated [12].

Although the most common comorbid condition among our study subjects was COPD (81%), the highest proportion of patients requiring intensive care unit admission was observed in those with concomitant neurological conditions ( $p=0.024$ ). Additionally, presence of neurological comorbid conditions was associated with significantly increased risk of death as compared to other comorbidities ( $p=0.027$ ). Neurological conditions are known to be associated with increased risk of aspiration [13, 14]. Also, there is an increased risk for



the development of additional pathological conditions in patients with a poor status after a cerebrovascular accident due to risk factors such as immobility. In the light of these considerations, neurological comorbid conditions may be suggested to increase the rate of mortality and need for intensive care unit admission in patients with pneumonia.

In our study, no association between advanced age or any of the criteria for HCAP and the need for intensive care could be detected. Also, age and causative organism did not show a significant association with mortality.

A comparison between patients undergoing initial empiric therapy for CAP and patients undergoing initial combination antibiotic therapy on the basis of potential MDR pathogens demonstrated no significant differences in terms of mortality or in terms of a need for treatment change in the course of the condition, consistent with previously reported data. Accordingly, recent publications have generally underscored the significance of disease severity and initial assessment of MDR risk in the management of pneumonia. In severe cases of pneumonia requiring intensive care admission or mechanical ventilation, if none of the MDR risk factors exist (antibiotic use within the past 30 days, poor functional status, history of hospital admission within the past 30 days, residing in a nursing home, nutrition with a feeding tube, aspiration, hemodialysis, immunosuppression) then the empiric therapy with a beta-lactam and macrolide combination is recommended; if at least one risk factor is present, then antibiotic therapy covering MDR pathogens also may be initiated as is the case with HAP. Conversely, in patients without signs of severe disease, if none of the MDR risk factors is present or if there is only one risk factor, empiric therapy may be initiated as with CAP. In patients with  $\geq 2$  risk factors for MDR, a recommendation is made to admit the patient and to initiate empiric therapy to cover MDR organisms, similar to the management for HAP [4-8].

Limitations of our study include our inability to identify patients referred from a nursing home, which is a HCAP criteria, small sample size, and exclusion of pneumonia patients in whom a causative agent could not be isolated in microbiological cultures.

On the other hand, the strengths of our study lies in the fact that the frequency of the pathogens responsible for pneumonia in Eastern Middle Anatolia region and its neighborhoods has been documented for the

first time, pioneering the establishment of a regional database.

## CONCLUSIONS

No any difference has been found for mortality, between the single empiric antibiotic treatment and combined empiric antibiotic treatment groups at healthcare associated pneumonia. A thorough assessment of MDR risk factors for appropriate empiric therapy is required for the prevention of antibiotic resistance. Further prospective studies in larger populations are warranted to re-evaluate the risk factors associated with the development of healthcare associated pneumonia in order to better define its differences from community acquired pneumonia. Such studies will also have to take local microbiological data into account.

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