Eurasian J Pulmonol 2014; 16: 94-8

Analysis of Advanced Age Pneumonia Cases and Factors Effective on Treatment Success

Coşkun Doğan, Önder Çetin, Nesrin Kıral, Gülşen Saraç, Banu Salepçi

Department of Chest Diseases, Dr. Lütfi Kırdar Kartal Training and Research Hospital, İstanbul, Turkey

Abstract

Objective: The aim of this study was to analyse those pneumonia patients at the age of 70 years and above, who were hospitalised in our clinic and to determine the factors affecting treatment success.

Methods: The recordings of the patients who were hospitalised in our clinic due to the diagnosis of pneumonia between January 2012 and January 2013 were retrospectively evaluated. Patients aged 70-years and older were involved in the study. Those patients who died or transferred to the intensive care unit were considered treatment failure. The data obtained for the patients with treatment failure and for the patients discharged from hospital in good health were compared.

Results: Of the cases, 55 were found to be 70 years old and above. The mean age of the patients was 79.7±6.3 years (70-97). Twenty seven patients (49.1%) were male and 28 patients (50.9%) were female. The group with treatment failure included 7 patients (12.7%) and the group with treatment success included 48 patients (87.3%). In the group with treatment failure, the mean age was 83.8±6.8 (75-97) years, the most common symptom was cough (57.1%), and the most common concurrent diseases were diabetes mellitus (42.9%) and cerebrovascular disease (42.9%). In the group with treatment success, the mean age was 79.1 ±6.0 years (70-94), the most common symptom was cough (66.7%), the most common concurrent diseases were hypertension and congestive heart failure (50%) and chronic obstructive pulmonary disease (33.3%). Treatment failure was found to be significantly higher in women (p=0.04), in individuals living in nursing homes (p=0.04), in patients with multilobar involvement (p=0.009), in the presence of pleural fluid (p=0.03) and in patients in the pneumonia Group 3 class according to the pneumonia classification system of the Turkish Thoracic Society (p=0.04). In the group with treatment success, the concentrations of serum sodium were significantly lower.

Conclusion: In advanced age pneumonia cases, living in a nursing home, being female, having a radiological presence of multilobar involvement and pleural fluid, and being in the pneumonia Group 3 class were more likely to be associated with treatment failure.

Keywords: Community-acquired pneumonia, elderly, pneumonia

INTRODUCTION

Pneumonia is responsible for a great majority of physician admissions, treatment costs, work-school day losses and deaths. Despite positive improvements in diagnosis and treatment, the common use of antibiotics and efficient vaccination, pneumonia still leads to high rate of mortality and morbidity. The studies conducted have shown that the incidence of pneumonia increases with age. Elderliness is a special period that requires evaluation from a different viewpoint due to the numerous concurrent chronic diseases and the course of acute diseases with atypical symptoms and findings and also due to physiological, psychological and socio-economic changes. Pneumonia is the primary cause of morbidity and mortality in the elderly population (1).

With advanced age, the frequency of pneumonia increases incrementally compared to younger patients. While the frequency of pneumonia is 18.2% in the 65-69 years age group, it increases almost three times in the group with patients aged 85 years and above (52.3%) (2). Although the risk factors that make the development of pneumonia easy in advanced age are not clearly known, there are many theories explaining this condition. The primary one is about the changes occurring with aging in physiological parameters such as elastic withdrawal pressure of the lung, compliance, respiratory muscle strength, mucociliary transport and cough reflex and decreased defence strength associated with this. Moreover, virulence and the amount of effective microorganisms are also important. More colonisation of the pharynx with different microorganisms in elderly individuals and micro-aspiration of these microorganisms are other facilitative factors for pneumonia (3, 4).

Received Date: 08.02.2014
Accepted Date: 14.05.2014

Address for correspondence
Coşkun Doğan, Department of Chest Diseases, Dr. Lütfi Kırdar Kartal Training and Research Hospital, İstanbul, Turkey
E-mail: coskund24@hotmail.com

Eurasian J Pulmonol 2014
DOI: 10.5152/ejp.2014.36693

• Available online at www.eurasianjpulmonol.com

This retrospective study was conducted to determine the factors affecting treatment failure in pneumonia patients who were aged 70 years and above, and who had been hospitalised for inpatient treatment.

METHODS

The recordings of the patients who were hospitalised in our clinic for the diagnosis of pneumonia between January 2012 and January 2013 were evaluated. The diagnosis of community-acquired pneumonia (CAP) was established in accordance with the Turkish Thoracic Society, The Agreement Report of the Diagnosis and Treatment for Community-Acquired Pneumonia in Adults (TTS-CAP-AR). Those cases aged 70 years and above were included in the study (1). The patients aged younger than 70 years and with the diagnosis of hospital-acquired pneumonia or pneumonia in immunocompromised patients were excluded from the study. The scores of CURB-65 and pneumonia severity index (PSI) were calculated for patients involved in the study and they were grouped in compliance with TTS-CAP-AR. Demographic features such as age, gender, history of smoking, and concurrent diseases, and symptoms, physical examination, laboratory and radiological data were recorded. Patients who died after admission to our clinic with the diagnosis of pneumonia and following the initiation of treatment according to TTS-CAP-AR, or those patients who were transferred to the intensive care unit, were considered treatment failure. The data obtained from the patients with treatment failure and from the patients discharged after treatment were compared.

Statistical Analysis

The data of the groups with treatment failure or treatment success were evaluated using SPSS 17.0 for Windows and Chi-Square, Fisher's Exact and Mann-Whitney U tests. The value of $p<0.05$ was accepted as significant.

RESULTS

Our study involved 55 patients aged 70-years-old and above, who were diagnosed with CAP and hospitalised for treatment between January 2012 and January 2013. Of the 174 pneumonia patients hospitalised in our clinic during this period, 119 were excluded from the study because they were diagnosed with non-community-acquired pneumonia or were younger than 70 years. Twenty seven (49.1%) of the cases were male, while 28 (50.9%) were female. The mean age was 79.7±6.26 (70-97) years. Demographic features of the patients are given in Table 1.

In our study, the group with treatment failure (Group 1) included 7 patients (12.7%) and the group with treatment success (Group 2) included 48 patients (87.3%). Of the cases in Group 1, 6 (85.7%) were female and 1 (14.3%) was male. The mean age of the group was 83.8±6.84 (75-97) years. Five patients (71.4%) had concurrent disease, but 2 patients (28.6%) did not. In the cases with concurrent diseases, the number of concurrent diseases was more than one and the most common concurrent diseases were diabetes mellitus (42.8%) (DM), cerebrovascular diseases (42.8%) (CVD) and cardiovascular system diseases [hypertension (HT)+congestive heart failure (CHF)] (42.8%) (Table 1). Two patients (28.6%) in this group lived in a nursing home.

Group 2 included 48 (87.3%) cases, 22 of which (45.8%) were female and 26 (54.2%) were male. The mean age was 79.1±6 (70-94) years. Thirty six patients (75%) had concurrent diseases, but 12 patients (25%) did not. The number of concurrent diseases was more than one. The most common concurrent diseases were HT + CHF (50 %) and chronic obstructive pulmonary disease (COPD) (33.3%) (Table 1). In this group, 1 patient (2.1%) lived in a nursing home. No statistically significant difference was found between the two groups in terms of age and smoking ($p>0.05$), while the group with treatment failure was markedly different in terms of being a woman, the presence of CVD and living in a nursing home ($p=0.04$).

For the patients involved in the study, the mean value of CURB-65 was 1.71±0.63 (1-3), the mean score of PSI was 110.4±23.9 (69-183) and the mean PSI stage was 4. In Group 1, the means of CURB-65, PSI score and PSI stage were 2.17±0.75, 126±26 and stage 4, respectively. On the other hand, in Group 2, these means were 1.64±0.59, 107±22 and stage 4, respectively. No statistically significant difference was available between Group 1 and Group 2 in terms of PSI, CURB-65 values. However, the values of CURB-65 were apparently higher in Group 1 ($p=0.84$).

Based on the classification system of TTS-CAP-AR, in the group with treatment success, 4 (8.3%) patients were in the pneumonia Group 1 class, 43 (89.6%) patients were in the pneumonia Group 2 class, and 1 patient (2.1%) was in the pneumonia Group 3 class. In the group with treatment failure, 5 patients (71.4%) were in the pneumonia Group 2 class and 2 patients (28.6%) were in the pneumonia Group 3 class. In comparison of the patients in both groups, a significant difference was only found for the pneumonia Group 3 class ($p=0.04$).

In Group 1, pneumonic infiltration of 4 patients (57.1%) was unilateral on chest radiography and pneumonic infiltration of 3 patients (42.9%) was bilateral. On the chest radiographies of 5 patients (71.4%), there was multilobar involvement, while 3 patients (42.9%) had pleural effusion on their chest radiographies. In Group 2, pneumonic infiltration on chest radiography was unilateral for 40 cases (83.3%) and bilateral for 8 cases (16.7%). Multilobar involvement was observed on the chest radiographies of 9 patients (18.8%) and pleural effusion was seen in 4 patients (8.3%). The presence of multilobar involvement and concurrent pleural effusion on chest radiography was statistically significant between two groups ($p=0.009$; $p=0.03$). Symptoms and radiological features of the cases are shown in Table 2.

Upon comparison of laboratory findings of the patients, no statistically significant difference was found between two groups in terms of fever, white blood cell (WBC), haemoglobin, haematocrit, thrombocyte, sedimentation, and serum C-reactive protein (CRP) values ($p>0.05$). Only in Group 1 was the concentration of sodium significantly higher ($p<0.005$). The mean value of sodium in Group 1 was 141.8±9.9 mEq/L while it was 136.0±7.1 mEq/L in other group. The contribution of the presence of hyponatraemia to treatment failure was not statistically significant between the two groups ($p=0.426$) (Table 3).

In addition, multivariate analysis was performed in order to identify the factors affecting treatment failure in patients aged 70 years and above who had been hospitalised for treatment. However, an independent factor could not be detected due to the low number of cases included ($p>0.05$).

Since the large majority of our cases were not exposed to culture study due to antibiotherapy having been initiated in the emergency department or outpatient clinic before hospitalisation in our clinic, the microbiological spectrum could not be examined.

DISCUSSION

In our study, the pneumonia patients aged 70 and over were evaluated retrospectively. Of the patients, 48 were successfully treated in the chest diseases unit and discharged from hospital in good health. On the other hand, the treatment of 7 patients was unsuccessful and

Table 1. Demographic features of the cases

	Group with treatment failure (n=7)	Group with treatment success (n=48)	p
Age(mean±SD) (year)	83.86±6.8	79.13±6	0.08
Gender (F/M)	6/1	22/26	0.04
Smoking (packs.year)	22	20	0.09
Living in nursing home (yes/no)	2/5	1/47	0.04
Concurrent disease (yes/no)	5/2	36/12	1
DM (yes/no)	3/4	9/39	0.57
COPD (yes/no)	1/6	16/32	0.29
CHF (yes/no)	1/6	8/40	0.67
HT (yes/no)	2/5	16/32	0.58
CVD (yes/no)	3/4	5/43	0.04
Renal disease (yes/no)	2/5	5/43	0.21
Malignancy (yes/no)	1/6	6/42	0.42

DM: diabetes mellitus; COPD: chronic obstructive pulmonary disease; CHF: congestive heart failure; HT: hypertension; CVD: cerebrovascular disease

Table 2. Symptoms of the cases and their radiological features

	Group with treatment failure n (%)	Group with treatment success n (%)	p
Cough	4 (57.1%)	32 (66.7%)	0.45
Sputum	3 (42.9%)	29 (60.4%)	0.31
Shortness of breath	3 (42.9%)	26 (54.2%)	0.43
Wheezing	2 (28.1%)	13 (27.1%)	0.64
Nausea-vomiting	1 (14.3%)	4 (8.4%)	0.84
Fever	0	7 (14.6%)	0.08
Consolidation on chest radiography	7 (100%)	43 (89.5%)	0.49
Unilateral involvement	4 (57.1%)	40 (83.3%)	0.13
Bilateral involvement	3 (42.0%)	8 (16.7%)	0.26
Multilobar involvement	5 (71.4%)	9 (18.8%)	0.009
Pleural fluid	3 (42.9%)	4 (8.3%)	0.03

they were transferred to the intensive care unit. Clinical, radiological and laboratory features of these cases with treatment failure were evaluated and some factors affecting this failure were detected as: the presence of concurrent CVD, female gender, multilobar involvement on chest radiography, the presence of pleural fluid, living in a nursing home and being in the pneumonia Group 3 class according to TTS-CAP-AR pneumonia classification.

Changes in the lung with elderliness influence the risk of pneumonia and the mortality rate in elderly patients. Therefore, pneumonia leads to high rates of morbidity and mortality in advanced-aged patients. In a cohort study conducted in Spain about the epidemiology of community-acquired pneumonia in elderly patients, which included 11241 cases, it was emphasised that the frequency of community-acquired pneumonia in elderly people increased with age. In this study, the frequency of community-acquired pneumonia was 10% in the age range of 65-74 years, 16.9% in the age range of 75-84 years and 29.4% in the age range of 84 years and above (4-6). In the PSI and CURB-65 scoring system defined for distinguishing the cases requiring hospitalisation and having a high risk of mortality in TTS-CAP-AR, the factor of advanced age is among the primary risk factors. Fidan et al. (7) conducted a study of 135 patients with CAP and reported that 52 of the patients (38.5%) were of advanced age (>65 years) and that this advanced age was related to increased mortality. Saltoğlu et al. (8) reported in their serial study that the rate of mortality in 130 patients with CAP was 3% and all pneumonia cases resulting in exitus were of advanced age. In our study, the mean age of the group with treatment failure was higher than that of the group with treatment success. The contribution of age alone to treatment failure was evaluated as statistically insignificant (p=0.08).

An increased number of concurrent diseases in parallel with aging is expected. The studies conducted have revealed that the rate of concurrent diseases ranges from 33.3% to 54% in cases with CAP; this rate reaches up to 79.2%-82% in the cases with CAP requiring intensive

Table 3. Laboratory values of the cases

Laboratory value	Group with treatment failure (n=7)	Group with treatment success (n=48)	p
Fever	37.1±1.1°C	36.9±0.7°C	NS
Systolic artery pressure (mmHg)	110±14	117±12	NS
Diastolic artery pressure (mmHg)	70±7	71±5	NS
Pulse (/dk)	91±10.6	89±11	NS
Respiratory rate per minute	20.5±4.9	20.4±3.7	NS
Haemoglobin (gr/dL)	10.7±1.4	12.0±2.1	NS
Haematocrit (%)	31.4±10.7	36.9±6.5	NS
White blood cell (/uL)	10538±4209	13865±5547	NS
Thrombocyte (/uL)	255571±59935	255720±48390	NS
Serum C-reactive protein (mg/L)	125.8±102.7	119.8±71.8	NS
Sedimentation (mm/hour)	66.3±14.5	76.9±33.6	NS
Fasting blood glucose (mg/dL)	155.2±69.1	146.1±55	NS
Urea (mg/dL)	93.8±97.4	66±47.6	NS
Creatinine (mg/dL)	1.77±1.74	1.15±0.56	NS
Aspartate Transaminase (U/L)	26.5±9.6	28.8±16.2	NS
Alanine Transaminase (U/L)	22±13.09	21.7±16.3	NS
Total protein (g/dL)	5.97±1.38	6.7±0.8	NS
Albumin (g/dL)	2.71±0.68	3.19±0.57	NS
Globulin (g/dL)	3.79±0.3	3.76±0.68	NS
Sodium (Na) (mEq/L)	141.8±9.9	135.4±6.4	<0.005
Potassium (K) (mEq/L)	3.96±1.1	4.3±0.6	NS

NS: Not significant

care treatment (9). In our study, this level was similar to results in the literature for the group with treatment failure who were transferred to the intensive care unit (71.4%). The clinical studies make us think that concurrent chronic diseases and the medications used for treating them (hypnotic-sedative drugs, non-steroidal anti-inflammatory drugs, etc.) have a role in the pneumonia cases among elderly people (10). Kaplan et al. (11) performed a cohort study about long-term mortality in 158,960 cases with CAP and reported the most common concurrent disease to be cardiovascular system diseases. They stated that the rate of concurrent cardiovascular system disease was 36.2%. Similarly, Koivula et al. (12) pointed out the importance of additional diseases in elderly patients with pneumonia and reported that the most common concurrent chronic diseases were HT and cardiovascular system diseases in their study. Also in our study, in line with the literature, HT+CHF was found to be one of the most frequently seen concurrent diseases in the group with treatment failure (42.9%). HT+CHF was also among the most common additional diseases in the group with treatment success (50%). CVD is very often observed in elderly patients and the risk of pneumonia is higher in patients with CVD due to dysphagia, aspiration risk of oropharyngeal content and decreased cough reflex. In the study of Karacan et al. (13) about hospital-acquired pneumonia in the patients aged 80 years and over, the most common concurrent disease was reported to be CVD. In our study, among the most common concurrent diseases in the group with treatment failure, the rate of concurrent CVD with cardiovascular system diseases was 42.9%, which was consistent with the results in the literature. The presence of concurrent CVD in patients of the group with treatment failure was found to be statistically significant (p=0.04).

Atypical presentations are more common in elderly patients. Thus, in severe infection diseases like pneumonia, usual symptoms such as fever and leucocytosis may not always be observed in elderly patients. The course of severe infection diseases in elderly people is afebrile in 10-30% of cases. Impaired mental status, concurrent diseases and the medications used for these diseases, and altered physiological response can mask the symptoms of infectious diseases like pneumonia in elderly patients (14-16). In the study of Kömürcüoğlu et al. (17) about the general features of pneumonia in elderly patients, they found that the most common symptoms in these patients were cough, sputum, fever and fatigue, respectively. They pointed out that at least one of the expected pneumonia symptoms including cough, fever, sputum and dyspnea did not exist in 40% of the patients at this age group. In our study, the symptoms in the group with treatment failure were listed as cough, sputum, dyspnea, and wheezing according to their frequency rates (57.1%, 42.9%, 42.9% and 28.1%, respectively). Especially in the group with treatment failure, there was no patient admitted with the complaint of fever. The mean fever was found as 37.1±1.1°C in the group with treatment failure. The mean fever was 36.9±0.8°C in 55 cases older than 70 years who were treated due to the diagnosis of pneumonia. The frequency of the symptom of fever was found to be

14.6% in all cases and was among the least common symptoms. This result, which was consistent with those in the literature, shows that the symptom of fever may not always be among the primary symptoms when diagnosing pneumonia in elderly patients.

In our study, the rate of the presence of multilobar involvement on chest radiography was significantly higher in the group with treatment failure (p=0.009), which was consistent with the literature. In most clinical studies, the mortality rate was found to be higher in patients with multilobar involvement and the severity of the disease increased in patients with multilobar involvement. Regueiro et al. (16) conducted a study with 66 pneumonia patients with a mean age of 82±8 years for investigating the features of pneumonia in elderly patients; they reported that 43.9% of the cases had multilobar involvement. In our study, the rate of concurrent pleural effusion on chest radiography was significantly high in the group with treatment failure. The factors such as concurrent pleural effusion, multilobar involvement and bilateral involvement, and advanced age are among the causes of increased mortality rate (18, 19).

The changes occurring in the lung with aging also lead to changes in oropharyngeal colonisation. The oropharyngeal way is the one found to be responsible for microaspiration pneumonia pathogenesis. The changes in oropharyngeal colonisation affect the incidence and course of pneumonia. Especially in patients staying in nursing homes, the rate of gram-negative bacteria colonisation was found to be almost 30% (30). The incidence of pneumonia was reported to be 365 per 1000 people in patients older than 75 years living in nursing homes, while it was 34 per 1000 people in general society (21). In cases living in nursing homes, in addition to the factors of CAP, which is observed frequently due to physiological and pathological changes occurring in the lung with aging and medical materials used commonly (style, nebulizer, catheter, etc.), gram-negative bacilli and *Staphylococcus aureus* may be common pneumonia agents (22). The pneumonic factor seen in patients living in nursing homes was examined in various ways due to the differences in prognosis, morbidity and mortality and was correlated to pneumonia associated with healthcare in the guidelines prepared by the American Thoracic Society (ATS). In our study, the history of living in a nursing home was significantly higher in the group with treatment failure, which was consistent with reports in the literature (p=0.04).

Considering that the elderly population is expected to increase in our country and worldwide within the next few years, the aim of this study was to reveal the clinical, radiological, and demographic features of pneumonia in elderly patients and to determine those factors influencing treatment failure in mortal pneumonia, particularly in cases of advanced age. One of the limitations of our study is that the multivariate analysis performed to detect factors affecting treatment failure was statistically insignificant, especially due to the low number of cases in the group with treatment success (p>0.05). Another limitation was the lack of microbiological data for the pneumonia factors of all cases. At the end of the study, living in a nursing home, the presence of multilobar involvement on chest radiography, the presence of pleural fluid on chest radiography, female gender, the presence of concurrent CVD and being in the pneumonia Group 3 class according to TTS-CAP-AR pneumonia classification were identified as the factors affecting treatment failure.

CONCLUSION

In conclusion, the rate of pneumonic morbidity and mortality is high in the elderly population. Because they have different clinical presentations, different factor pathogens and higher morbidity and mortality rates in spite of having similar features to CAP, clinicians should be more careful about nursing home-acquired pneumonia cases and further comprehensive studies are needed on this issue.

Ethics Committee Approval: Ethics committee approval was received for this study.

Informed Consent: N/A.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - C.D.; Design - Ö.Ç.; Supervision - B.S.; Resource - B.S., Ö.Ç.; Materials - N.K.; Data Collection&/or Processing - N.K., G.S.; Analysis&/or Interpretation - C.D., G.S.; Literature Search - Ö.Ç., G.S.; Writing - C.D.; Critical Reviews - B.S., N.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Diagnosis and treatment of progressing pneumonia in adults consensus report of Turkish Thoracic Society. Turk Thorac J 2009; 10: 1-12.
2. Küçükardalı Y, Öncül O, Nalbant S, Çankır Z, Top C, Ağdaş Ş, et al. Community-acquired Pneumonia in the elderly. Turkish Journal of Geriatrics 2001; 4: 59-62.
3. Stupka JE, Mortensen EM, Anzueto A, Restrepo MI. Community-acquired pneumonia in elderly patients. Aging health 2009; 5: 763-74.
4. Vila-Corcoles A, Ochoa-Gondar O, Rodriguez- Blanco T, Raga-Luria X, Gomez-Bertomeu F, EPIVAC Study Group. Epidemiology of community-acquired pneumonia in older adults: a population-based study. Respir Med 2009; 103: 309-16.
5. Öztürk ZA, Sayıner ZA, Kuyumcu ME, Yeşil Y, Kepekçi Y. Pneumococcal Vaccines and Cost-Effectiveness in Geriatric Population. Akad Geriatri 2013; 5: 1-4.
6. Mouton CP, Bazaldua OV, Pierce B, Espıno DV. Common infections in older adults. Am Fam Physician 2001; 63: 257-68.
7. Fidan A, Kıral N, Erdem İ, Eren A, Saraç G, Çağlayan B. Toplum kökenli pnömonilerde hastane mortalitesi ve ulusal pnömoni tanı ve tedavi rehberine göre değerlendirme. Turk Thorac J 2005; 6: 115-21.
8. Saltoğlu N, Taşova Y, Yılmaz G, Mıdıklı D, Köksal F, Aksu HS, et al. Community-acquired pneumonia: etiology, prognosis and therapy. Flora 1999; 4: 245-52.
9. Özlü T, Bülbül Y, Özsu S. Ulusal verilerle toplum kokenli pnomoniler. Tuberk Toraks 2007; 55: 191-212.
10. Takayasu S, Waltanabe H, Igaraschi H. Clinical study in community acquired Pneumonia. In Kyorin University Hospital. E.R.J 2000; 16: Supll 137.
11. Kaplan V, Clermont G, Griffin MF, Kasal J, Watson RS, Linde-Zwirble WT, et al. Pnemonia: Still the old man's friend? Arch Intern Med 2003; 163: 317-23.
12. Koivula I, Sten M, Makela PH. Risk factors for pneumonia in the elderly. Am J Med 1994; 96: 313-20.
13. Karacan Ö, Şimşek A, Ulubay G, Akçay Ş, Ergin F, Eyüboğlu FÖ. Seksen yaş ve üzeri olgularda hastane kökenli pnömoninin seyri. Turk Thorac J 2005; 6: 109-14.
14. Taymaz T. Atypical presentation and elderly patient. Akad Geriatri 2012; 4: 61-8.
15. Herve J, Santin A, Hinglais E, Lejonc JL, Roupie E. Urinary tract infections in t he elderly. Presse Med 2000; 29: 2137-41.
16. Regueiro M, Homar C, Ovejero R, Liu A, Pieroni T, Basilico R. Clinical characteristics and geriatric evaluation of elderly patients with pneumonia in a hospital in Buenos Aires, Argentina. Rev Peru Med Exp Salud Publica 2013; 30: 432-6.
17. Kömürcüoğlu B, Büyükşirin M, Çıkırıkçıoğlu B, Öztuna I, Perim K. Community-acquired pneumonia in the elderly. Euras J Pulm 2000; 2: 80-4.
18. Kolsuz M, Uçgun I, Metintaş M, Erginel S, Harmancı E, Alataş F. Factors Associated with Mortality in Hospitalized Patients with Community Acquired Pneumonia. Tuberk Toraks 2002; 50: 229-38.
19. Welte T, Torres A, Nathwani D. Clinical and economic burden of community-acquired pneumonia among adults in Europe. Thorax 2012; 67: 71-9.
20. Irwin RS, Whitaker S, Pratter MR, Millard CE, Tarpey JT, Corwin RV. The transiency of oropharyngeal colonization with Gram-negative bacili in resident of skilled nursing facility. Chest 1982; 81: 31-5.
21. Hiramitsu K, Niederman MS. Health care associated pneumonia. Chest 2005; 128: 3784-7.
22. Özlü T, Özsu S. Yaşlılarda gelişen pnömoni. (İn): Özlü T, Metintaş M, Karadağ M, Kaya A.Editör. Solunum sistemi ve hastalıkları. 1.Baskı. İstanbul: İstanbul Tıp Kitabevi; 2010.s. (853-861).