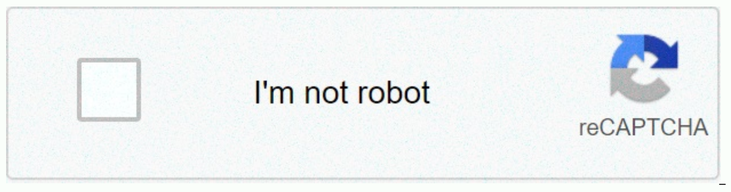

Continue

Guidelines treatment pneumonia elderly

Lebanese Society for Infectious Diseases and Clinical Microbiology (LSIDCM) guidelines for community-acquired adult pneumonia (Cap) in Lebanon. Moghnieh R, Yared Sakr N, Kanj SS, Musharrafieh U, Husni R, Jradeh M, Al-Awar G, Matar M, Jureij W, Antoine S, Azar E, Abi Hanna P, Minari A,

Hammoud J, Kfoury J, Mahfouz T, Abou Chakra D, Zaatari M, Tabarah ZA; Lebanese Society for Infectious Diseases and Clinical Microbiology (LSIDCM). Moghnieh R, et al. J Med Lebanon. 2014 Ian-Mar;62(1):40-7. two: 10.12816/0002626. J Med Lebanon. 2014. PMID: 24684125 Skip Nav Destination

Pneumonia in the Elderly is a common and serious problem with a clinical presentation that may differ from that in younger patients. Older patients with pneumonia complain of significantly fewer symptoms than younger patients, and delirium occurs frequently. Indeed, delirium may be the only manifestation of pneumonia in this group of patients. Alcoholism, asthma, immunosuppression and age >70 years are risk factors for community-acquired pneumonia in the elderly. Among home healthcare residents, the following are risk factors for pneumonia: old age, male, difficulty swallowing, inability to take oral medications, deep disability, bedridden state, and urinary incontinence. Streptococcus pneumoniae is the most common cause of pneumonia among the elderly. Aspiration pneumonia is underdiagnosed in this group of patients, and tuberculosis should always be considered. In this population, an etiological diagnosis is rarely available when antimicrobial therapy should be instituted. It is recommended to use guidelines for the treatment of pneumonia issued by the Society of Infectious Diseases of America, with changes for treatment in the medical environment. Managing pneumonia in an elderly patient requires an appreciation of many aspects of geriatric medicine, including the demography of our elderly population [1,2], the effect of pneumonia on the general health of an elderly person, and knowledge of how pneumonia in this population is different from that of the younger population. According to Sir William Osler [3], in old age, pneumonia can be latent, coming without cold, coughing and expectoration are mild, physical signs poorly defined and changing, and constitutional symptoms are disproportionate. The majority of patients requiring hospitalization for the treatment of community-acquired pneumonia (PAC) are elderly and most are treated by non-specialists. In a retrospective study of 13,919 external patients and patients admitted ⩾65 years with pneumonia (asylum residents excluded), Dean et al. [4] found that a lung specialist was involved in the provision of care in 10.6% of episodes, an infectious disease specialist in 0.9%, and both in 0.2%. The involvement of a specialist was more for cases of pneumonia requiring hospitalization for treatment only in cases that did not require it (20% vs. 8.6%) and more likely for episodes leading to death than other episodes față de 11,2%) [4]. Niederman et al. [5] a calculat costul anual al tratamentului pacienților cu vârsta de ⩾65 de ani cu pneumonie la 4,8 miliarde de dolari, comparativ cu 3,6 miliarde de dolari pentru cei în vârstă <65 years= with= pneumonia.= they= also= noted= that= the= average= hospital= stay= for= an= elderly= person= with= pneumonia= was= 7.8= days,= at= a= cost= of= $7166 ,= whereas= for= a= younger= patient= the= corresponding= values= were= 5.8= days= and= $6042.= pneumonia= in= the= elderly= definition.= pneumonia= is= an= infection= involving= the= alveoli= and= bronchioles.= it= may= be= caused= by= bacteria,= viruses,= or= parasites.= clinically= pneumonia= is= characterized= by= a= variety= of= symptoms= and= signs.= cough= (which= may= be= productive= of= purulent,= mucopurulent,= or= “rust-colored”= sputum),= fever,= chills,= and= pleuritic= chest= pain= are= among= its= manifestations.= extrapulmonary= symptoms= such= as= nausea ,= vomiting,= or= diarrhea= may= occur.= there= is= a= spectrum= of= physical= findings,= the= most= common= of= which= is= crackles= or= rales= in= the= lungs.= other= findings= in= the= lungs= may= include= dullness= to= percussion,= increased= tactile= and= vocal= fremitus,= bronchial= breathing,= and= a= pleural= friction= rub.it= is= important= to= remember= that= pneumonia= in= the= elderly= may= present= with= few= respiratory= symptoms= and= signs= (data= given= below)= and= instead= may= be= manifest= as= delirium ,= worsening= of= chronic= confusion,= and= falls.= delirium= or= acute= confusion= was= found= in= 45= [44.5%]= of= 101= elderly= patients= with= pneumonia= studied= by= riqueleme= et= al.= [6],= compared= with= 29= (28.7%)= of= 101= age-= and= sex-matched= control= subjects.= falls= are= usually= an= indication= that= the= person= is= ill.= among= the= healthy= elderly,= rough= or= slippery= ground= accounted= for= 54%= of= falls ,= but= in= the= sick= elderly= this= factor= accounted= for= only= 14%= of= falls= [7].= dizziness,= syncope,= cardiac= and= neurological= disease,= poor= health= status,= and= functional= disability= are= more= likely= to= account= for= falls= among= the= sick= elderly= [7].epidemiology.= pneumonia= is= a= common= and= often= serious= illness.= it= is= the= sixth= leading= cause= of= death= in= the= united= states.= about= 600,000= persons= with= pneumonia= are= hospitalized= each= year ,= and= there= are= 64= million= days= of= restricted= activity= due= to= this= illness= [8,= 9].= the= caregiver= burden= associated= with= pneumonia= has= not= been= measured,= although= we= know= that= long-term= caregiving= is= associated= with= an= increased= mortality= rate= among= the= caregivers= [10].= the= mortality= rate= among= persons= providing= long-term= care= and= experiencing= strain= has= been= reported= to= be= 63%= higher= than= among= noncaregiving= control= subjects= [10].recovery= is= prolonged= in= the= elderly ,= especially= the= frail= elderly= who= require= up= to= several= months= to= return= to= their= baseline= state= of= mobility.= indeed,= hospitalization,= with= its= enforced= immobility,= often= hastens= functional= decline= in= the= elderly;= 25%–60%= of= older= patients= experience= a= loss= of= independent= physical= function= while= being= treated= in= the= hospital= [11].= twenty-one= percent= of= those= aged=>de 85 de ani au nevoie de ajutor pentru scăldat și 10% au nevoie de ajutor în utilizarea toaletei și </65> </65> [11] The presence of any of the following elderly persons or all elderly persons at greatest risk of functional decline: decubit ulcer, cognitive impairment, functional disorders and low level of social activity [12]. Older patients with pneumonia complain of fewer symptoms than younger patients with pneumonia; patients aged 45 to 64 years, aged 65 to 74 and ⩾75 years had 1.4, 2.9 and 3.3 fewer symptoms than patients aged 18 to 44 [13]. The incidence of pneumonia is highest at the extremes of age. Jokinen et al. [14] studied all patients with suspected or confirmed pneumonia among 46,979 inhabitants in 4 communes in Kuopio Province, Finland, from 1 September 1981 to 31 August 1982. Age-specific incidences per 1000 inhabitants were 36.0 for those aged <5 years; 16.2 for persons aged 5 to 14 years; 6.0 for persons aged 15 to 59; 15.4 for persons aged 60 to 74; 34.2 for people ⩾75 years of age. 42% were admitted to hospital and the mortality rate was 4%. In another population-based study in a Finnish city, Koiula et al. [15] found that every year 14 per 1000 people ⩾60 years developed pneumonia. Seventy-five percent of these cases were CAP. It is interesting to examine the average age of patients requiring hospitalization for the treatment of the CAP in recent decades. From October 1969 to March 1970, Dorff et al. [16] studied 148 consecutive patients with pneumonia who were admitted to Milwaukee County General Hospital (Milwaukee, Wisconsin) and found that patients tended to be elderly (average age, 55 years). Sullivan et al. [17] noted that the average age of 292 PATIENTS with CAP admitted to Grady Memorial Hospital in Atlanta from July 1, 1967 to June 30, 1968 was 54 years. By contrast, a study carried out in Halifax, Nova Scotia, between November 1981 and 15 March 1987 showed that the average age of the 719 patients with THE CAP was 63.2 years [18]. A graphical analysis of all PAC patients admitted to 20 Canadian hospitals (11 educational establishments and 9 non-teaching schools) in November 1996, January 1997 and March 1997 showed that the average age ± DS of the 858 patients was 69.4 ± 18 [19]. Meehan et al. [20] focused on 14,069 patients aged ⩾65 who required hospitalization for CAP. They observed that 30.3% were between the ages of 64 and 74, 41.8% were between 75 and 84 years of age and 27.8% were aged ⩾85 years. Patients with CAP who are treated in an outpatient setting are much younger than those who are being treated in hospital. Only 18.4% of the 944 patients treated for pneumonia were ⩾65 years of age, while 58.7% of the 1343 patients who required hospital admission for the treatment of pneumonia were in this age group [21]. From these observations, there is no doubt that the majority of patients who are hospitalised with the CAP are elderly. The attack rate for pneumonia is highest among those in nursing homes. Marrie et al. found that 33 out of 1000 nursing homes per year needed treatment of pneumonia, compared to 1.14 in 1000 adults living in the community [22]. Loeb et al. [23] studied 475 residents in 5 nursing homes and noted that there were 1.2 episodes of pneumonia per 1,000 resident days. In another study, the incidence of pneumonia among residents in long-term care centers was 0.27 to 2.5 episodes per 1000 day patients [24]. Pneumonia is the main cause of infection requiring the transfer of medical care patients to the hospital, accounting for 10%-18% of all investigations for the CAP [24]. Risk factors and result predictors. Risk factors for the CAP in the elderly and for acquired home-pneumonia care are presented in Tables 1 and 2. Table 3 shows factors indicating a poor prognosis in this group of patients [26]. Torres et al. [27], in a study of 124 patients with chronic obstructive pulmonary disease and CAP (average age ± D.Hr., 67 ± 11 years; 115 men; 2 patients in a nursing home) found that the overall mortality rate was 8%; for the 30 (24%) which required treatment in the intensive care unit, was 17%. Risk factors for specific etiologies of pneumonia may differ from those for pneumonia as a whole. Thus, dementia, seizures, congestive heart failure, cerebrovascular disease and chronic obstructive pulmonary disease were special risk factors for pneumococcal pneumonia [28]. In a population-based case-control study, Nuorti et al. [29] found that smoking was the strongest independent risk factor for invasive pneumococcal disease among non-alcoholic immunocompetent adults. It is likely that this is also true for elderly adults. Among HIV-infected patients, the rate of pneumococcal pneumonia is 41.8 times higher than for those in the same age group who are not infected with HIV [30]. Risk factors for Legionnaires' disease include male sex, tobacco smoking, diabetes, haematological malignancy, cancer, end-stage kidney disease and HIV infection [31]. There is a high incidence of silent aspiration in elderly patients with PAC [32]. Kikuchi et al. [32] examined the role of silent aspiration during sleep in 14 elderly patients with CAP and age-appropriate control subjects by applying a paste containing indium-111 wrapped in gauze and fixed to the teeth. Chest scanning showed that 71% of patients in the study aspirated, compared to 10% of control subjects (P < .02). Just over 28% of patients with Alzheimer's disease [33] and 51% of those who had a stroke [34] aspirated, according to videofluoroscopy. Croghan et al. [35] found that the placement of a feeding tube in patients who aspirated, as revealed by videofluoroscopy, was associated with a higher rate of pneumonia and than for those who vacuumed, but did not receive such a tube. Host factors that also had a major impact on pneumonia epidemiology are an increase in the number of immunosuppressed people living in the community and a significant increase in the number of older people (aged >80 years). Grouping these in retirement villages or in old people's homes led to a new entity: home-acquired pneumonia. Additional host factors that influence the outcome of the infection are just beginning to be understood. These include the observation that 50% of patients with bacterial pneumococcal pneumonia, compared to 29% of uninfected control subjects, were homozygous for FcpRIIa-R31, which is weakly bound to IgG2 [36]. Environmental factors. There is a clear seasonal variation in the rate of pneumonia; both attack rates and mortality rates are highest in the winter months [37]. This is probably due to an interaction between viruses, such as influenza virus and S. pneumoniae, and isolation inside. In a squirrel monkey model, influenza A infection before S. pneumoniae inoculation resulted in a mortality rate of 75%, compared to 0% for animals with influenza virus infection only [38]. Healthy, withdrawn aged travel a lot and thus can develop, for example, Legionnaires' disease while on a cruise ship (due to exposure to a decorative contaminated water fountain) or merioidosis during a visit to Southeast Asia.Microbinism related factors. Pneumococcus for which penicillin MIC is <0.1 µg/ml= are= defined= as= penicillin-susceptible;= those= for= which= the= small= is= 0.1–1.0= µg/ml= are= intermediately= susceptible;= and= those= for= which= the= small= is=>1.0 µg/ml are very resistant [39]. In many publications, the last two categories are combined in the penicillin-non-susceptible category (i.e., comprising isolated with a MIC >0.1 µg/mL). Penicillin-resistant S. pneumoniae (PRSP) is now common in most communities in North America. Many of the PRSP isolates are resistant to ⩾3 classes of antibiotics (multidrug resistance). In a recent review, 14% of the bacteremyc isolates of S. pneumoniae were resistant to penicillin, 12% to ceftazidime and 24% to trimethoprim-sulfamethoxazole [40]. In a study conducted by Butler et al. [41], 740 isolates of S. pneumoniae were collected from sterile sites between 1993 and 1994. Twenty-five percent of isolates were resistant to >1 antibiotic: 3.5 percent were resistant to erythromycin and 5% were resistant to clarithromycin [41]. It is probably a harbinger of the future; in Madrid in 1992, 15.2% of S. pneumoniae isolates were resistant to erythromycin [42]. Fortunately, it is possible to predict who is likely to have pneumonia due to PRSP. Previous use of β-lactam antibiotics, alcoholism, non-invasive disease, age <5 or=>65 years, immunosuppression and residence in a nursing home are risk factors for PRSP pneumonia [43-46]. Outbreaks of influenza [47] and infections caused by respiratory syncytial virus [48], S. pneumoniae [45] and Chlamydia pneumoniae [49] occur in care homes Loeb et al. [50] conducted prospective surveillance and a retrospective audit of outbreak records in 5 healthcare homes in the Toronto area over a 3-year. They prospectively identified 16 outbreaks involving 480 out of 1313 residents (36%) and 30 other outbreaks involving 388</5> </0.1> </0.1> have been identified retrospectively. Pathogens of outbreaks included influenza virus, paraflu virus, respiratory syncytial virus, Legionella sainthelensi and C. pneumoniae. Pneumonia developed in 15% of the 480 residents, and 12% required a transfer to the hospital. Thirty-seven (8%) Died. In addition, colonization with methicillin and gentamicin-resistant Staphylococcus aureus and/or ceftriaxone-resistant gram-negative bacilli are also common among residents of some nursing homes [51]. Etiology. Although there are more than 100 microorganisms that can cause pneumonia, only a few (S. pneumoniae, Haemophilus influenzae, S. aureus, C. pneumoniae, Enterobacteriaceae, Legionella species, influenza viruses, and respiratory syncytial virus) cause most cases of pneumonia. The rank order of the causes of pneumonia changes depending on the severity of the disease, which is usually reflected in the chosen place of care: home, hospital ward, hospital intensive care unit, or asylum. Mycoplasma pneumoniae is the most commonly identified etiological agent in younger patients treated in an outpatient, accounting for 24% of cases [52-55]. S. pneumoniae is probably underdiagnosed in outpatient because a working diagnosis is rarely made. In published data, S. pneumoniae accounts for 5% of cases of outpatient pneumonia. In reality, the proportion is probably closer to 50%. A compilation of data from 9 comprehensive studies on CAP etiology among 5225 patients requiring hospitalization identified S. pneumoniae as an etiological agent in 17.7% of cases [56-64]. However, if we focus on the 3 studies that used serological methods in addition to the blood and sputum culture to identify S. pneumoniae, then this microorganism accounted for up to 50% of CAP cases [56, 57, 62]. Ruiz et al. [65] examined the impact of age on pneumonia etiology and concluded that an age of ⩾60 years was not associated with any visible effect on microbial etiology; however, patients aged <60 years had more frequent PCAs caused by an atypical pathogen, especially M. pneumoniae. Woodhead et al. [66] analyzed 11 studies that reported the etiology of pneumonia in the elderly and compared them with 3 pneumonia studies in younger populations. The proportion of cases caused by H. influenzae, S. aureus and gram-negative bacilli was higher among the elderly, and the proportion due to legionella and other atypical pathogens was higher among younger patients. The etiology of pneumonia acquired at home is not well established, as these studies were based almost entirely on the results of sputum cultures. The problem is distinguishing colonization from infection, especially when aerobic gram-negative bacilli are identified, such as Escherichia coli, Klebsiella species, species The species Enterobacter and Pseudomonas aeruginosa. Colonization of the oropharyngeal mucosa with gram-negative aerobic bacilli increases with and is particularly common among residents of nursing homes [67]. S. pneumoniae is the most commonly identified agent in patients with pneumonia at home. In 6 studies in 471 patients with pneumonia at home, S. pneumoniae accounted for the majority (12.9%) followed by H. influenzae (6.4%), S. aureus (6.4%), Moraxella cataralis (4.4%) and gram-negative aerobic bacilli (13.1%) [61, 68–72]. Asylum residents account for 20% of tuberculosis cases in the elderly [2]. In studies conducted in 1980, Stead et al. [73] found that 12% of people who entered a nursing home were tuberculosis positive and that active tuberculosis developed in 1% of tuberculin patients treated with isoniazide, compared to 2.4% of those who did not receive isoniazide. Tuberculosis outbreaks occur within this framework [74], and the incidence of active tuberculosis among patients at the asylum is 10-30 times higher than among elderly adults [2] living in the community. Cap management Key variables on decisions to be taken for successful treatment of the CAP are as follows: place of care, diagnostic activity, empirical antimicrobial therapy, whether and when to switch from IV to oral antibiotic therapy, discharge conditions and monitoring. Site care. The place of care for optimal management is dictated by the severity of pneumonia, which can be indicated by a score of severity of the disease. Fine et al. [75] developed a pneumonia-specific disease severity score derived from 20 different elements (3 demographic characteristics, 5 comorbidity characteristics, 5 physical examination results and 7 laboratory data elements). Points are assigned to each feature and totaled. Patients are then placed in 1 in 5 risk classes. Those in risk classes I-III have a low risk (<1%) for= mortality,= whereas= the= mortality= for= those= in= class= iv= is= 9%,= and= for= those= in= class= v,= 27%.= in= general,= patient= in= classes= i–iii= can= be= teat= at= home,= wherea those= in= classes= iv= and= v= should= be= admitted.= fine's= prediction= rule= has= limitations:= it= predictions= mortality= and= thus= was= not= specificlly= designed= as= an= admission= guideline,= and= it= doe not= take= into= account= other= factors= that= may= be= important= in= the= decision= to= admit= an= outside, = such= as= the= caregivers'= need= for= a= respite.a= british= thoracic= society= study= found= that= for= 453= adults= who= required= admission= to= the= hospital= for= treatment= of= head,= there= was= a= 21-fold= increated= risk= of= death= if= 2= the= following= 3= features= were= noted := respiratory= rate= ⩾32= breaths/min,= diastolic= blood= pressure= ⩽60= mm= hg,= and= blood= urea= nitrogen= level=>7 mM/L [76]. In another study, the same group observed that 72% of 60 patients admitted to the intensive care unit (35% were aged>65 years) had ⩾2 of these characteristics [77]. The investigators concluded that this rule, in conjunction with careful evaluation of confused or hypoxic patients, must identify the majority of patients with severe PCP. Conte et al. [78] derivative </1%)> </1%)> prognosis for elderly patients with CAP. They assigned a score of 1 to the following factors: age of >85 years, impaired motor response (failure to present an motor response to verbal stimuli; localization of painful stimuli alone; withdrawal of flexion; shelled/decerebrate; or no response) and increased serum creatinine concentration; assigned a score of 2 to comorbidity and vital sign abnormality. They defined 4 stages: a score of 0 was associated with the mortality rate of 4%; a score of 1–2, 11%; a score of 3–4, 23%; and a score of ⩾5, 41%. Ewig et al. [79] validated Fine's prediction rule in a population of 168 elderly patients with CAP. They found that the rule accurately predicted the length of stay, the requirement of admission to the intensive care unit, and the risk of death from pneumonia. Mylotte et al. [80] conducted a retrospective review of the 158-episode schedule of home-acquired pneumonia: 100 were treated in hospital and 58 were treated in the nursing home. The severity score of fine pneumonia was applied to both groups, and the 30-day mortality rate was the same in both groups. The potential of the Fin scoring system [75] is demonstrated by a study by Atlas et al. [81], which prospectively enrolled 166 low-risk patients with pneumonia who report to an emergency department. Physicians were given the pneumonia severity index score for each patient and were provided with enhanced visiting and antibiotic clarithromycin services. Two control groups were used: 147 consecutive retrospective control subjects identified during the previous year and 208 patients from the study hospital who participated in the cohort study of the team researching the results of patients with pneumonia. The percentage of patients initially treated as external patients increased from 42% in the control period to 57% during the intervention period (relative increase of 36%; P = 0.01). Several outpatient therapy failed during the intervention period (9%) control period (0%). Marrie et al. [82] enrolled 20 Canadian teaching and community hospitals in a study of a critical path to CAP management. Ten hospitals were randomized to the intervention arm (critical pathway) and 10 to conventional management. Hospitals were suitable for the status of community education or hospital and for the historical duration of stay for patients with THE CAP. A university hospital in the intervention arm withdrew after randomization and was not replaced. Levofloxacin was the antibiotic used in the intervention arm, while antimicrobial therapy for patients in the conventional arm was at the discretion of the attending physician. The pneumonia-specific disease severity score was taken into account in the decision on where to care. An analysis of the intention of treatment was carried out based on data from 1753 patients enrolled in the study. At intervention hospitals, the admission rate was lower in low-risk patients (classes I-III) than in conventional management (31% versus 49%; P = 0.013). To use the use of atlas et al. [81], 69% of the intervention arm, compared to 41% in the conventional management arm, were treated at home. Monitoring of these patients showed that there was no difference in the failure rates of outpatient therapy: 6% of patients in both groups required further admission. Asylum treatment. A study by Degelau et al. [83] provides guidance on who can be treated in a nursing home for pneumonia. They found that the following characteristics were associated with the failure of treatment in asylum: a heart rate >90 beats/min; temperature >38,1°C; respiratory rate >30 breaths/min; dependence of the feeding tube; and mechanically modified the diet. If none of the above risk factors were present, the failure rate was 11%; if 2 were present, it was 23%; and when ⩾3 were present, it was 59%. The model was not predictive of mortality. Medina-Walpole and Katz [2], in an analysis of home-acquired pneumonia, concluded that the following could be used as indicators for hospitalization: respiratory distress; dependence on others for everyday activities; low body temperature; decrease in the level of consciousness; and WBC number <5 or=>20 × 109 cells/L.Naughton and Mylotte [84] treated 171 (72%) 239 episodes of pneumonia at home in the nursing home. There was no significant difference in 30-day mortality rates between those initially treated in nursing homes (22%) and those initially treated in hospitals (31%) or among those treated with an oral regime in asylum (21%) and those initially treated with an intramuscular antibiotic in asylum (25%). There is a great variation in the organization of care within nursing homes. Those with special care facilities and quick access to doctors are less likely to transfer patients to hospitals for acute episodes of the disease [85]. However, there is sufficient data from the various studies cited above to make recommendations on who can be safely treated in a nursing home; these recommendations are summarised in Table 4. It is important to point out that the facility must have properly trained medical personnel experienced in the care of acutely ill patients/residents, physicians willing to care for residents in a long-term care facility on a daily basis, quick access to facilities for appropriate laboratory and radiological studies, as well as the ability to administer parenteral medications and provide such supportive means of care as oxygen and suction. In other words, the availability of adequate physical and human resources for the care of these patients in the nursing home should be added to the criteria listed in Table 4. Admission to the intensive care unit. Guidelines of the Thoracic Society for the management of the CAP provides criteria for severe pneumonia that could be useful in deciding whether to admit a patient to an intensive care unit [86]. Ewig et al. [87] calculated the sensitivity, specificity and positive and negative predictive values of </5> </5> with the use of data from a prospective study in 422 consecutive patients with CAP, 64 of whom were admitted to an intensive care unit. They found that no single criterion had sufficient sensitivity to be used on its own. For example, a respiratory rate of >30 breaths/min had a sensitivity of 64% and a specificity of 57%. The respective sensitivity and specificity values for other characteristics were as follows: mechanical ventilation requirement, 58% and 100%; septic shock, 38% and 100%; progressive pulmonary infiltration, 28% and 92%; renal failure, 30% and 96%; systolic blood pressure <90 mm Hg, 12% and 99%; diastolic blood pressure <60 mm Hg, 15% and 95%; bilateral infiltration, 41% and 86%; and multilob infiltrates, 52% and 89%. The investigators concluded that the definition of severe pneumonia with the use of one of the American Thoracic Society criteria had a sensitivity of 98%, a specificity of 32%, a positive predictive value of 24% and a negative predictive value of 99%. These authors developed a new rule for identifying severe pneumonia based on the presence of 2 out of 3 minor criteria (partial pressure of O_2/arterial fraction of O_2 <250 mm Hg; multilobar involvement; systolic blood pressure of 90 mm Hg) plus 1 of 2 major criteria (septic shock or mechanical ventilation). They noted that this rule had a sensitivity of 78%, a specificity of 94%, and a positive predictive value of 75%. Age itself is not a consideration in the decision not to admit a patient with pneumonia to an intensive care unit. Diagnostic work. The extent of diagnostic activity for patients with pneumonia depends on the severity of pneumonia. For otherwise healthy patients to be treated in outpatient, a chest X-ray to confirm the clinical diagnosis is all that is needed; however, for elderly patients, who often have comorbidities for which they receive medications, a complete number of blood cells and measurements of serum electrolytes and creatinine are usually indicated. All patients requiring hospital admission for THE treatment of CAP should undergo a chest X-ray. It should be noted the limitations of chest X-ray for diagnosing pneumonia in the elderly. Often all that is available is a portable anteroposterior film of suboptimal quality. The research team's research study of head pneumonia patient outcomes found that 2 personal radiologists agreed with the presence of pulmonary infiltration in 79.4% of 282 patients with clinically diagnosed pneumonia whose films had already been read (and interpreted as guidelines of pneumonia) by a study radiologist, and the 2 radiologists agreed on the absence of an infiltration in 6% of patients [88]. In one study, chest X-ray was compared with high-resolution CT for CAP [89]. Chest X-rays detected opacity in 18 out of 47 patients (38.3%) suspected pneumonia, while high-resolution CT detected opacity in these 18 patients and 8 other 8 [89] All patients admitted to hospital should have blood cultures performed, even if only 6%-10% of patients with PC will be bacterial [56-64]. The reason for this recommendation is that a blood culture positive for a pathogen is clear evidence that the microorganism causes pneumonia. Such isolates (60% will be S. pneumoniae) provide useful epidemiological information that can be used to track trends in antimicrobial resistance, and for clinician allows the switch to more specific antimicrobial therapy. Gram staining of a good sputum specimen<10 squamous= epithelial= cells= per= low-powered= field;=>(25 WBC in low-power field) is useful for conducting initial antibiotic therapy (for example, a good specimen that is gram-positive for dylococi suggests a diagnosis of pneumococcal pneumonia, thus allowing for more specific antibiotic therapy); thus, attempt should be made to collect such a specimen. Limitations of expectorate sputum should be recognized by the clinician, especially for the elderly, in which oropharyngeal colonization with aerobic gram-negative bacilli is common, so differentiating colonization from infection can be difficult. Bronchoscopy is not performed less frequently in patients with pneumonia requiring admission to an intensive care unit. In such cases, samples of secretions of the lower respiratory tract with a protected bronchial brush or bronchoalveolar lavage should be obtained. Rarely is an open biopsy of the lungs required. Serological studies are not commonly recommended. However, if certain etiological agents are suspected, such as Coxiella burnetii, M. pneumoniae, C. pneumoniae or a virus, serological tests of acute and convalescent serum samples can help with diagnosis. Unfortunately, the results of these studies are not available for 3-4 weeks, during which time the clinical situation has been resolved. These studies are useful for public health purposes and should always be performed in workups during an outbreak of pneumonia. A urine specimen for the detection of Legionella antigen is useful in all cases of severe pneumonia. The tests currently available detect only the legionella pneumophila serogroup 1 antigen (which accounts for 80% of Legionnaires' disease cases) [90, 91], but a test capable of detecting antigens of other serogroups L. pneumophila should be available shortly. PCR has been used to amplify the DNA of various pneumonia pathogens in nasopharyngeal samples, lung tissue samples and WBCs. Currently, PCR is not recommended for routine use. Empirical therapy with antibiotics. The American Thoracic Society [86] and the American Infectious Disease Society published guidelines for the empirical treatment of the CAP [92] (Table 5). The recent introduction of quinolones with against S. pneumoniae and activity against the majority of the pathogens that cause the CAP is a breakthrough in the treatment of the CAP. However, there are many unanswered questions about these new drugs. What's the best? </10> </10> only for patients with pneumonia requiring hospitalization? Will the widespread use of new fluoroquinolone for the treatment of outpatient pneumonia lead to the development of resistance among S. pneumoniae? Opened in the new tabDownload slideAntibiotic therapy (choices in order of preference) for community-acquired pneumonia when etiology is unknown (modified from [84] and [92]). The new fluoroquinolones are levofloxacin, sparfloxacin, gepafloxacin, trovafloxacin, gatifloxacin, and moxifloxacin. Gepafloxacin and trovafloxacin were withdrawn from the market - the first due to the extension of the QT interval resulting in the torsade of points and the latter due to hypersensitivity hepatitis, some cases being fatal. The advantages of new fluoroquinolone include excellent bioavailability, so that even hospitalized patients in non-intensive therapy units can be treated orally (if they can eat and drink) and work against the spectrum of agents causing the CAP, so that a single antibiotic is necessary for empirical treatment of patients with CAP. Another major problem with empirical treatment of the CAP is what to do about penicillin-resistant S. pneumoniae strains. One study concluded that these pathogens are less virulent than penicillin-sensitive strains, but lead to an increased length of stay [93], while another concluded that the clinical outcome of non-CNS penicillin-non-susceptible infections may be more closely related to the clinical state at presentation than to the level of resistance of the causative strain when such infections are treated with β-lactam antibiotics [94]. However, Metlay et al. [95], using data from a 1994 study on invasive pneumococcal infection in Atlanta, showed that the relative risk of death among those without HIV infection who were infected with S. pneumoniae not susceptible to penicillin instead of Penicillin-sensitive S. pneumoniae was 1.5 (range, 0.6-3.3), while for those with HIV infection it was 11.7 (1.3–10.2). Leikin et al. [96] studied 5,837 patients with invasive pneumococcal pneumonia. Increased mortality has not been associated with resistance to penicillin or cefotaxim; however, when deaths from the first 4 days of hospitalization were excluded, mortality has been significantly associated with a ⩾4 mg/L penicillin MIC and a ⩾2 mg/L CEfotaxim MIC. Despite this, the general consensus is that for infections involving CNS, treatment with penicillin or second- or third generation cephalosporin is appropriate (ceftazidime is not recommended due to poor activity against S. pneumoniae). Another problem is the empirical use of oral macrolides, since the resistance to macrolides among S. pneumoniae in some areas is high. Despite there is a lack of data on clinical failures of macrolide therapy [97]. Amsden [97] tried to explain this by showing the addition of serum to antibiotic sensitivity test ing averages decreases MIC for macrolides by 1–2 dilutions MIC in vivo will be lower than MIC in vitro) and showing that these agents are concentrated in WBCs, which are attracted to the site of infectionOne of the problems with the recommendations listed in Table 4 is that they are mainly based on expert opinion. Currently, data are emerging that can be used to give future guidance more of an evidence-based approach. Early administration of antibiotics affects the results. Thus, Meehan et al. [98] conducted a retrospective multicentric cohort study of those aged >65 years of age who presented themselves to the emergency departments with the CAP. Investigators used the national medical claims history file from 1 October 1994 to 30 September 1995. Just over 75% of patients received antibiotics within 8 hours of presentation to the emergency department, and a significantly lower 30-day mortality rate was observed for them than for those who did not receive antibiotic treatment within 8 h.Gleason et al. [99] revised hospital records of 12,945 patients Medicare hospitalized for CAP treatment and found that initial therapy with a second generation cefalsporoin plus a macrolid, a third generation nonpseudomonal cephalosporin plus a macrolid or fluoroquinolone alone was independently associated with less than 30 days of mortality than was therapy with a third generation nonpseudomonal cephalosporin. The use of a β-lactam/β-lactamase inhibitor plus a macrolid e or aminoglycoside plus another agent was associated with a mortality of more than 30 days. Switching from IV to oral antibiotic therapy and duration of treatment. In a number of studies, Ramirez and my colleagues defined criteria for the transition from IV to oral antibiotics for the treatment of patients with PAC [100, 101]. These include (1) 2 normal temperature readings 2 times, every 8 hours, for previously febrile patients; (2) The WBC number shall return to normal; (3) subjective reduction of cough; and (4) subjective decrease in shortness of breath. Based on these criteria, 33 patients randomized to ceftyoxym were eligible for switchto oral therapy in 2.76 days, compared to 3.17 days for those randomized to receive ceftriaxone [100]. Seventy-four of the 75 evaluable patients were cured at 3-5 weeks of follow-up. Similar results were obtained in another study conducted by this group, in which patients were initially treated with ceftriaxone and, when the criteria were met, were switched orally to clarithromycin therapy. Ninety-six patients were enrolled in this study and 59 were evaluated for 30-day monitoring. All 59 were cured [101]. The presence of bacteremia and the identification of high-risk pathogens, such as S. aureus or P. aeruginosa, contraindications for changing therapy [102]. Patients whose conditions are clinically improved with empirical therapy with third generation cephalosporin are switched to third-generation oral cephalosporins, while patients receiving β-lactam / β-lactamase are switched to oral-lactam β / / Inhibitors. If IV therapy is an antibiotic β-lactam and erythromycin, oral therapy should be a new macrolid [102]. The optimal total duration of antibiotic treatment for CAP has not been defined in prospective studies. Studies should be carried out to determine whether a longer duration of treatment is required for elderly patients. Since about half of patients with PC have respiratory symptoms at a 30-day follow-up, a therapy that is currently administered may be beneficial. By convention, 10-14 days is the usual duration of treatment. Legionnaires' disease should be treated for 21 days, as should pneumonia caused by Pneumocystis carinii. Discharge decision. Halm et al. [103] investigated how long it took to hospitalize patients with CAP to achieve stability. The median time to stability was 2 days for heart rate (100 beats/min) and systolic blood pressure (⩾90 mm Hg). It took three days to achieve stability if the following parameters were used: 24 breaths/min, an oxygen saturation level ⩾90% and a temperature of 37.2°C. Once stability has been achieved, clinical deterioration requiring admission to a critical care unit or telemetry monitoring occurred for less than 1% of patients. Patients in the halm study frequently remained in the hospital ⩾1 day after reaching stability. Elderly patients frequently require hospitalization beyond the time needed to achieve physiological stability in order to recover the function that decreased during the acute disease. Follow-up. All elderly patients with CAP should undergo a follow-up chest X-ray to ensure that pneumonia has resolved. Distal pneumonia in an obstructed bronchi is one of the cancer presentations of the lung; for 50% of patients with this presentation, the diagnosis of cancer is made at the time of presentation. For the rest, the main clue to the underlying disease is the failure of pneumonia to resolve. The radiographic resolution of pneumonia remains following clinical resolution and correlates with the age and presence of chronic obstructive pulmonary disease. In one study, radiographic resolution occurred after ⩾12 weeks in patients with bacterial pneumococcal pneumonia who had aged>50 years, had chronic obstructive pulmonary disease coexist and or were alcoholic [104]. If you have reason to suspect an underlying malignancy in a patient, perform chest X-rays of follow-up in 4-6 weeks; otherwise, chest tracking X-rays are best performed 10-12 weeks after diagnosis of pneumonia. If a full resolution has not taken place, further investigation is required to rule out an obstructed bronchi. Long-term result. Koivula et al. [105] conducted a 12-year follow-up of the 122 of a Finnish locality (all of whom were aged >60 years) who survived an episode of pneumonia between 1983 and 1985. Thirty-nine percent of those with CAP treated in outpatient settings were alive at 10 years, compared to 26 percent of those who required hospitalization pneumonia. The relative mortality risk associated with all types of CAP was 2.1 and the risk of pneumococcal pneumonia was 2.8. Hedlund et al. [106] followed 241 patients who survived the CAP for 31 months and noticed that 51 died, while the estimated number of deaths was 29.5. Thus, the relative risk of death was 2. Brancati et al. [107] found that 38 out of 119 patients (32%) surviving the CAP died within the next 24 months. Two-year mortality was independently linked to severe comorbidity, for which RR was 9.4 (moderate comorbidity had an RR of 3.1; hematocrit <35% had a RR of 2.9). However, compared to patients aged 18 to 44, those aged 45 to 64 years, aged 65 to 74 years or aged 75 to 92 years were not significantly more likely to die during the 24 months of discharge. Asylum residents were excluded from the study. Marrie and Blanchard [108] studied 71 patients with pneumonia at home, 79 patients who were admitted from a nursing home for conditions other than pneumonia, and 93 elderly patients with CAP. Hospital mortality rates were 32%, 23% and 14%, respectively. The 1-year mortality rates for the 3 groups were 58%, 50% and 33%. In Muder's study [24] in 108 patients with pneumonia in a veteran affairs unit, 14-day mortality was 19%; 12-month mortality, 59%; and mortality over 24 months, 75%. Functional state was the main determinant of survival after pneumonia: at 24 months, mortality rates for various basic activities were as follows: mortality score of 10, 48%; score 11–15, 75%; and score ⩾16, 77% [24]. Problems that are particularly significant when treating elderly patients with pneumonia functional evaluation. It is useful to quantify the level of function of elderly patients with the use of the Barthel index [109] and or the hierarchical assessment of balance and mobility [110, 111]. Former scores 15 factors that are evaluated by the patient after follows: it can be done by itself, it can be done with the help of someone else, and it can't do it at all. The total score can range from 0 (total dependency) to 100 (full independence). A score of 40 defines those who are severely dependent, while a score of 41-60 indicates a marked dependency. The hierarchical assessment of balance and mobility separates mobility into 3 categories – mobility, transfers and balance – and builds a hierarchical range of skills in each section. Reference to the geriatric evaluation and restorative care team. Elderly patients with functional impairments (fragile elderes [112]) should be guided for geriatric evaluation. Some of these patients may require admission to a geriatric rehabilitation centre after it's done. Studies have shown that geriatric assessment teams improve the care of older people, leading to a reduction in the number of patients in need of discharge to long-term care institutions [113]. However, such an assessment with limited monitoring was not effective [114]. Non-smour state. A One discussing do-not-resuscitation (DNR) issues is beyond the scope of this article. In an epidemiology study of DNR orders, Wenger et al. [115] noted that several DNR orders were received for patients with higher disease at admission and functional insufficiency. DNR orders were more often attributed to older patients, women and patients with dementia or incontinence and were less frequently assigned to black patients, Medicaid patients and patients treated in rural hospitals. High hospital mortality rates and the presence of comorbidities that often indicate the futility of resuscitation efforts dictate that doctors who manage pneumonia in elderly patients should be aware of any advance directives that their patients may have made. In the absence of such a directive, the issue of resuscitation should be discussed with the patient and his close relatives at the beginning of his stay in the hospital. Many hospitals require that the state of resuscitation of these patients be indicated on the control sheet at the time of admission. Nutritional evaluation. From the age of 30 to the age of 80, energy expenditure decreases by a third [116]. However, the protein intake requirements do not [116]. Malnutrition has been identified as a risk factor for the development of the CAP in the elderly [25]. A recent study on malnutrition in elderly patients hospitalized with the CAP showed that only 16% of the 101 patients studied were characterized as well fed at the time of hospital admission, compared to 47% of the control population [6]. Many factors combine to compromise the nutritional condition of older people and, in turn, this compromise potentiates immune disorder and can perpetuate or worsen the ongoing disease processes, would be pneumonia. The quality of the diet in the aging population is influenced by physiological factors, such as poor dentition, altered taste acuity, limited mobility and polypharmacy. People between the ages of 74 and 80 have less than 100 taste buds, while young adults have 250 [117]. Psychological factors in this group that can contribute to poor oral intake include depression, dementia, and lack of motivation. Social factors that further compromise food intake include institutionalization, living alone, isolation during meals and poor education. Similarly, in an ageing population, economic factors would be low income, inadequate cooking and health care costs can affect the quality of the diet [118]. It is important to be able to identify the nutritional risk in an elderly person presenting with the CAP. The cornerstone of identifying nutritional risk is a history of weight. Weight loss of >10% of the usual weight is associated with a very high mortality rate and is considered A loss of 5%-10% of the usual weight is considered potentially important. Loss of <5% of the usual weight is not considered significant [119]. Another way to determine body composition and nutritional condition is to consider body mass ([weight in kg/height in m]2). A body mass index of 21–25 is considered normal. In the study cited above by Riquelme et al. [6], patients with CAP at the time of enrolment in the study had an average body mass index of 22.8, which was significantly lower than that of the control group (24.3; P = 0.043). This would suggest that a lower body mass index is associated with an increase in nutritional risk and ultimately an increased risk of THE CAP. Serum albumin levels are frequently cited as a marker of nutritional status and have been independently correlated with a higher fatality case rate among people with CAP [120]. Although serum albumin

levels are an indicator of nutritional status, experimental and clinical data indicate that in inflammatory disorders the synthesis of proteins in acute phase occurs at the expense of albumin and therefore a low level of serum albumin can be caused by both malnutrition and acute inflammatory response. Hedlund et al. [120], in a study of 97 patients with pneumonia, found that a low thickness triceps skin-times, low body mass index, and high acute physiology and chronic health assessment (APACHE) II score correlated with death within 6 months. Impairment of renal and liver function. Older people have impaired function of many organs by virtue of the aging process and as a result of comorbidity. Doctors should pay particular attention to drug dosages and drug interactions in this group of patients. Preventing the next episode of pneumonia. Those who are at risk of aspiration should be positioned at a 45° angle when eating and should receive mashed food. Nasogastric or percutaneous gastrostomy feeding tubes do not prevent and indeed predispose to aspiration, unless protocols are followed to prevent aspiration in these settings. Both influenza and pneumococcal vaccination have been shown to be beneficial in the prevention of pneumonia in the elderly [121–128]. Vaccination of the elderly will be covered in a subsequent article in this series. Because tobacco smoking increases the risk of pneumonia, all tobacco smokers should receive advice and help quit smoking. Confirmations Dr. L. Miedzinski and M. Majumdar reviewed the manuscript and provided useful comments. Dr. L. Gramlich contributed to the nutrition assessment section. References 1US Department of Health and Human Services, , vol. (pg. -)9National Center for Health StatisticsNational Interrelation for The Discharge of Hospitals: Annual Summary 1990, , Vol. (pg. -)19, , , , . Treatment and results of community-acquired pneumonia in Canadian hospitals, , vol. (pg. -)21, et al. Processes and results of care of patients with community-acquired pneumonia. Results of the Paty pneumonia cohort study Research Team (PORT), , vol. (pg. -)23, , , , . Risk factors for pneumonia and other lower respiratory tract infections in elderly residents of long-term care units, , vol. (pg. -)25, , et al. Pneumonia acquired in the community in the elderly: a analysis of risk and prognostic factors, I J Respir Crit Care Med, , vol. (pg. -)26, , , . study group for severe pneumonia acquired in the communitySevere community-acquired pneumonia in the elderly: epidemiology and prognosis, , vol. (pg. -)27, , et al. Pneumonia acquired in the community in chronic obstructive pulmonary disease: a Spanish multicenter study, I J Respir Crit Care Med, , vol. (pg. -)30, , . Franklin County Pneumonia Study GroupBacteremia with Streptococcus pneumoniae. Implications for therapy and prevention, , vol. (pg. -)32, , , , , . High incidence of silent aspiration in elderly patients with community-acquired pneumonia, I J Respir Crit Care Med, vol. (pg. -)41, et al. The continued emergence of drug-resistant streptococcus pneumoniae in the United States: an update from the Centers for Disease Control and Prevention Surveillance System, , , vol. (pg. -)42, , , , . Infections caused by erythromycin-resistant streptococcus pneumoniae: incidence, risk factors and response to treatment in a prospective study, , vol. (pg. -)43, et al. Multivariate analysis of risk factors for infection due to penicillin-resistant and multidrug-resistant Streptococcus pneumoniae: a multicentric study, , vol. (pg. -)44, , et al. Predictive factors for invasive disease due to penicillin-resistant pneumoniae streptococcus: a population-based study, , vol. (pg. -)45, , et al. Outbreaks of pneumococcal pneumonia among unvaccinated residents in chronic care units-Massachusetts, October 1995, Oklahoma, February 1996, and Maryland, May-June 1996, MMWR Morb Mortal Wkly Rep, , vol. (pg. -)48, , , , , . An outbreak of respiratory syncytial virus pneumonia in a nursing home, , vol. (pg. -)51, , , , . Colonization and infection with antibiotic-resistant bacteria in a long-term care facility, vol. (pg. -)53, , et al. Outpatient patients with community-acquired pneumonia: frequency of atypical agents and clinical course, , vol. (pg. -)54, , et al. Prospective study on community-acquired pneumonia diagnosed and followed by private practitioner, Program and summaries of the Intersciences Conference on Antimicrobial Agents and Chemotherapy, vol. American Society for Microbiologypg. 57, , et al. Diagnosis of pneumonia on cultures, bacterial and viral antigen detection tests and serology with special reference to antibodies against pneumococcal antigen, , vol. (pg. -)5860, , et al. Incidence of community-acquired pneumonia requiring hospitalization: results of a population-based active surveillance study in Ohio, vol. (pg. -)62, , et al. The etiology of community-acquired pneumonia among patients hospitalized during an epidemic of Chlamydia pneumoniae in Finland, , vol. (pg. -)63, , et al. Pneumonia acquired in the community. Importance of initial non-invasive bacteriological and radiographic investigations, vol. (pg. , and al. Serological study of responses to selected pathogens respiratory tract infections in institutionalised elderly people, , vol. (pg. -)70, . Use of intramuscular cefoperazone versus intramuscular ceftriaxone in patients with pneumonia acquired at home, , vol. (pg. -)72, , et al. Interim report on the review of the use of medicinal products for Community and nosocomial pneumonia: clinical bacteriological and radiological spectrum, vol. (pg. -)76 Community-acquired conomy in adults in British hospitals in 1982-1983: an BTS/PHLS study on etiology, mortality, prognostic factors and outcome, , vol. (pg. -)77The research committee of the British thoracic society and the laboratory service of public healthAtheiology, management and outcome of severe pneumonia acquired in the community on the intensive care unit, , vol. (pg. -)79, , , , , . Comparative validation of prognostic rules for community-acquired pneumonia in the elderly, , vol. (pg. -)80, , , . Validation and application of the prognosis index of pneumonia to asylum residents with pneumonia, , vol. (pg. -)81, , , et al. Safe increase in the proportion of patients with community-acquired pneumonia treated as external patients, , vol. (pg. -)82, , , , . for investigators of the capitaLO controlled randomized trial of a critical path for the management of acquired pneumonia in the community, , vol. (pg. -)86, , et al. Guidelines for initial management of adults with community-acquired pneumonia: diagnosis, severity assessment and initial antimicrobial therapy, , vol. (pg. -)91, et al. Comparison of the enzyme immunotest of the urinary antigen enzyme Binax Legionella (EIA) with the urinary antigen Biotest Legionella EIA for the detection of Legionella antigen in both concentrated and unconcentrated urine samples, vol. (pg. -)93, , , , . Pneumonia caused by non-susceptible and penicillin-sensitive pneumococcus in adults, vol. (pg. -)95, , et al. Impact of penicillin sensitivity on medical outcomes for adult patients with bacterial pneumococcal pneumonia, , vol. (pg. -)9699, , , , . Associations between initial antimicrobial therapy and medical outcomes for elderly patients hospitalized with pneumonia, , vol. (pg. -)100, , , . Early transition from intravenous cephalosporins to oral cephalosporins in the treatment of hospitalized patients with acquired pneumonia in the community, , vol. (pg. -)103, , , , , , . Time to clinical stability in hospitalized patients with community-acquired pneumonia. Implications for practice guidelines, , vol. (pg. -)107, , , , . Is pneumonia really the old man's girlfriend? Two-year prognosis after community-acquired pneumonia, , vol. (pg. -)108, . A comparison of patients with pneumonia at home with patients with acquired pneumonia in the community and patients at home without pneumonia, vol. (pg. -)113, , , . A randomised care trial in a designed hospital medical unit improve the functional results of elderly patients with acute diseases, , vol. (pg. -)114115, , et al. Epidemiology do-not-resuscitate d disparity by age, diagnosis, gender, race and functional impairment, , vol. (pg. -)120, , . Short- and long-term prognosis for middle-aged and elderly patients hospitalized with community-acquired pneumonia: impact of nutritional factors, , vol. (pg. -)121, , , . Effectiveness of influenza vaccine in older people: a meta-analysis and review of literature, , vol. (pg. -)122, , , . Effectiveness and effectiveness of the costs of vaccination against influenza among elderly people living in the community, , vol. (pg. -)123, , et al. The protective efficacy of vaccines combined with influenza virus has live and inactivated in the elderly, , vol. (pg. -)124, , et al. Flu vaccination of medical personnel in long-term care hospitals reduces the mortality of elderly patients, , vol. (pg. -)125, , et al. Effectiveness of pneumococcal vaccination in adults: a meta-analysis of randomized controlled clinical trials, , vol. (pg. -)126, , , et al. Swedish Pneumococcal Vaccination Study GroupRandomised trial of 23-valent penumococcal capsular polysaccharide vaccine in prevention of pneumonia in middle-s wedish people, , , vol. (pg. -)127, , , . Clinical efficacy of pneumococcal vaccine in the elderly: a randomized, single-blind population-based trial, vol. (pg. -)128, , . Health and economic benefits associated with pneumococcal vaccination of elderly people with chronic lung disease, , vol. (pg. -) Special section: Ageing and infectious diseases