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Riferimenti bibliografici

1. Ageing Res Rev. 2004 Jan;3(1):55-67.

Lung infections and aging.

Meyer KC.

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Respiratory tract infections are the leading cause of death due to infectious disease in the elderly. Many factors, especially waning immune responses and the onset of age-associated organ dysfunction, likely account for an increase in susceptibility to respiratory tract infection in the elderly, and morbidity and mortality rates are substantially greater for the elderly when outcomes are compared to that of younger individuals. The presence of underlying disease states such as chronic obstructive pulmonary disease (COPD) or other organ system disease further increases the likelihood of developing severe pneumonia in the elderly population, and the frail elderly, particularly when institutionalized in chronic care facilities, are at high risk for developing severe and recurrent pneumonia. This article will discuss various factors associated with advanced age that predispose the elderly to respiratory infections and summarize current approaches to treatment and prevention.

2. Clin Infect Dis. 2004 Jul 1;39(1):83-91. Epub 2004 Jun 14.

Aging and infectious diseases in the developing world.

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Although demographic aging does not remain restricted to industrialized countries, the medical challenge arising from the aging population will be distinct in the developing world. This is particularly true with respect to infectious diseases, which have a distinct spectrum in the elderly population, as well as a greater overall relevance in the developing world. Tropical diseases have a specific presentation and epidemiology in elderly patients. Infectious diseases with a worldwide distribution impact elderly patients in the developing world in a specific manner, which is most obvious with respect to human immunodeficiency virus and tuberculosis but is also true with respect to "trivial" manifestations of infection, such as diarrhea and pneumonia. Malnutrition contributes in a major way to the immunodeficiency of elderly patients in the developing world. Poorly controlled use of antimicrobial drugs leads to multidrug-resistant microorganisms, which, together with the limited resources available for drug treatment, makes appropriate treatment of infections in elderly patients in developing countries very difficult. Infections in

elderly patients will have an increasing impact on the public health and economy of developing countries.

3. Arch Intern Med. 2004 Jan 26;164(2):224-5; author reply 225.

Do findings of high mortality from pneumonia in the elderly make it the old man's friend?

van der Steen JT, Ribbe MW, Mehr DR, van der Wal G.

4. Lancet Infect Dis. 2004 Feb;4(2):112-24.

Pneumonia in the very old.

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Pneumonia is a major medical problem in the very old. The increased frequency and severity of pneumonia in the elderly is largely explained by the ageing of organ systems (in particular the respiratory tract, immune system, and digestive tract) and the presence of comorbidities due to age-associated diseases. The most striking characteristic of pneumonia in the very old is its clinical presentation: falls and confusion are frequently encountered, while classic symptoms of pneumonia are often absent. Community-acquired pneumonia (CAP) and nursing-home acquired pneumonia (NHAP) have to be distinguished. Although there are no fundamental differences in pathophysiology and microbiology of the two entities, NHAP tends to be much more severe, because milder cases are not referred to the hospital, and residents of nursing homes often suffer from dementia, multiple comorbidities, and decreased functional status. The immune response decays with age, yet pneumococcal and influenza vaccines have their place for the prevention of pneumonia in the very old. Pneumonia in older individuals without terminal disease has to be distinguished from end-of-life pneumonia. In the latter setting, the attributable mortality of pneumonia is low and antibiotics have little effect on life expectancy and should be used only if they provide the best means to alleviate suffering. In this review, we focus on recent publications relative to CAP and NHAP in the very old, and discuss predisposing factors, microorganisms, diagnostic procedures, specific aspects of treatment, prevention, and ethical issues concerning end-of-life pneumonia.

5. Clin Infect Dis. 2004 Dec 1;39(11):1642-50. Epub 2004 Nov 08.

The burden of community-acquired pneumonia in seniors: results of a population-based study.

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BACKGROUND: Pneumonia is recognized as a leading cause of morbidity in seniors. However, the overall burden of this disease--and, in particular, the contribution of ambulatory cases to that burden--is not well defined. To estimate rates of community-acquired pneumonia and to identify risk factors for this disease, we conducted a large, population-based cohort study of persons aged ≥ 65 years that included both hospitalizations and outpatient visits for pneumonia. **METHODS:** The study population consisted of 46,237 seniors enrolled at Group Health Cooperative who were observed over a 3-year period. Pneumonia episodes presumptively identified by International Classification of Diseases, Ninth Revision, Clinical Modification codes assigned to medical encounters were validated by medical record review. Characteristics of participants were defined by administrative data sources. **RESULTS:** The overall rate of community-acquired pneumonia ranged from 18.2 cases per 1000 person-years among persons aged 65-69

years to 52.3 cases per 1000 person-years among those aged ≥ 85 years. In this population, 59.3% of all pneumonia episodes were treated on an outpatient basis. In multivariate analysis, risk factors for community-acquired pneumonia included age, male sex, chronic obstructive pulmonary disease, asthma, diabetes mellitus, congestive heart failure, and smoking. **CONCLUSIONS:** On the basis of these data, we estimate that roughly 915,900 cases of community-acquired pneumonia occur annually among seniors in the United States and that approximately 1 of every 20 persons aged ≥ 85 years will have a new episode of community-acquired pneumonia each year.

6. Arch Bronconeumol. 2004 Dec;40(12):547-52.

Community-acquired pneumonia among the elderly: differences between patients living at home and in nursing homes

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OBJECTIVE: The etiology, presentation, and prognosis of community-acquired pneumonia (CAP) among nursing home residents are believed to differ from those of other groups. However, few Spanish studies have confirmed those assumptions or studied regional differences in CAP etiology. **PATIENTS AND METHODS:** A prospective study which included all patients over 65 years of age admitted to our hospital with CAP was carried out over a period of 18 months (2002-2003). We examined clinical, analytical, and radiographic characteristics paying particular attention to functional status--using the Eastern Cooperative Oncology Group (ECOG) scale and Barthel and Karnofsky indices--and comorbidity. Two blood cultures, a Legionella antigen test in urine, and serology for atypical bacteria were used for the etiologic diagnosis; bacterial cultures of respiratory samples were also used in certain cases. **RESULTS:** Ninety-one patients, 25 of whom were nursing home residents, were enrolled. The nursing home residents were older than the other patients (mean [SD] age of 82 [4] compared with 73 [5]; $P=.0001$) and had greater comorbidity ($P=.0001$)--with a significantly greater presence of diabetes mellitus, cerebrovascular disease, congestive heart failure, and dementia. They also had a poorer functional status (ECOG, 2.09 [0.9] compared with 0.93 [1.1], $P=.001$; Barthel Index, 19 [33] compared with 77 [35], $P=.001$; Karnofsky Index, 51 [17] compared with 78 [23], $P=.001$). Regarding clinical characteristics, significant differences were found for respiratory rate (39 [11] compared with 27 [7] breaths/min; $P=.001$), blood pressure (69.5 [20] compared with 79.2 [18] mm Hg; $P=.029$), and temperature (36.6 [1.2] compared with 37.7 [1.1] degrees C; $P=.001$). CAP patients from nursing homes presented a greater number of affected lobules in chest x-rays ($P=.004$), more hypoxemia, acidosis, anemia, hypoalbuminemia, and greater scores of urea and creatinine. Fine Scale scores were also greater (134 [26] compared with 95 [28]; $P=.001$) as was mortality (7/25 compared with 3/66; $P=.005$). Few patients had an etiologic diagnosis and no significant differences were observed between the groups. The variable that predicted mortality in elderly patients in this series, according to stepwise logistic regression, was urea (adjusted $R^2=0.452$). **CONCLUSIONS:** In our sample population, nursing home residents were older, had greater comorbidity, and severe functional impairment. Under these circumstances the severity of CAP increases and becomes an important cause of mortality despite the fact that the etiologic agents do not appear to differ from those of the other patients.

7. Am Fam Physician. 2004 Oct 15;70(8):1495-500.

Pneumonia in older residents of long-term care facilities.

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Compared with community-dwelling persons, residents in long-term care facilities have more functional disabilities and underlying medical illnesses and are at increased risk of acquiring infectious diseases. Pneumonia is the leading cause of morbidity and mortality in this group. Risk factors include unwitnessed aspiration, sedative medication, and comorbidity. Recognition may be delayed because, in this population, pneumonia often presents without fever, cough, or dyspnea. Accurate identification of the etiologic agent is hampered because most patients cannot produce a suitable sputum specimen. It is difficult to distinguish colonization from infection. Colonization by *Staphylococcus aureus* and gram-negative organisms can result from aspiration of oral or gastric contents, which could lead to pneumonia. Aspiration of gastric contents also can produce aspiration pneumonitis. This condition is not infectious initially and may resolve without antibiotics. Antibiotics for the treatment of pneumonia should cover *Streptococcus pneumoniae*, *Haemophilus influenzae*, gram-negative rods, and *S. aureus*. Acceptable choices include quinolones or an extended-spectrum beta-lactam plus a macrolide. Treatment should last 10 to 14 days. Pneumonia is associated with significant mortality for up to two years. Dementia is related independently to the death rate within the first week after pneumonia, regardless of treatment. Prevention strategies include vaccination against *S. pneumoniae* and influenza on admission to the care facility. This article focuses on recent recommendations for the recognition of respiratory symptoms and criteria for the designation of probable pneumonia, and provides a guide to hospitalization, antibiotic use, and prevention.

8. Can J Public Health. 2004 Sep-Oct;95(5):382-6.

Long-term-care residents: concerns identified by population and care trends.

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BACKGROUND: Despite an abundance of data and analysis of First Nations morbidity and mortality rates, accurate data have not been available to serve the First Nations community in Eastern Canada. METHODS: Data for Eskasoni, the largest Mi'kmaq community, were obtained for 1996 through 1999 and Cape Breton and Nova Scotia were used as regional and provincial reference populations respectively. Age-adjusted relative risks (AARR) were calculated for overall mortality and disease-specific hospital admissions. RESULTS: Eskasoni's mortality AARR was greater than 1.0 in 3 of the 4 years studied, although the data may understate Eskasoni's mortality rates. Eskasoni's total admission AARRs were significantly greater than the two reference populations. Neoplasm admission rates were generally lower, while circulatory disease admission AARRs were significantly higher. A rise in diabetic admission rates was noted with the AARR reaching statistical significance in the final years of the study. Respiratory disease was the leading cause of hospitalization with significantly greater rates of admission than regional or provincial rates. Pneumonia and influenza accounted for more than one half of respiratory admissions. Infectious disease admissions were more prevalent in Eskasoni while rates of liver disease were generally low. CONCLUSION: Results suggest that members of the largest Mi'kmaq band are at greater risk for a number of disease categories and health promotion should be targeted toward respiratory ailments, circulatory disease and diabetic management. Further analysis, however, remains an important priority.

9. J Am Geriatr Soc. 2004 Oct;52(10):1603-9.

Outcome predictors of pneumonia in elderly patients: importance of functional assessment.

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OBJECTIVES: To evaluate the outcome of elderly patients with community-acquired pneumonia (CAP) seen at an acute-care hospital, analyzing the importance of CAP severity, functional status, comorbidity, and frailty. **DESIGN:** Prospective observational study. **SETTING:** Emergency department and geriatric medical day hospital of a university teaching hospital. **PARTICIPANTS:** Ninety-nine patients aged 65 and older seen for CAP over a 6-month recruitment period. **MEASUREMENTS:** Clinical data were used to calculate Pneumonia Severity Index (PSI), Barthel Index (BI), Charlson Comorbidity Index, and Hospital Admission Risk Profile (HARP). Patients were then assessed 15 days later to determine functional decline and 30 days and 18 months later for mortality and readmission. Multiple logistic regression was used to analyze outcomes. **RESULTS:** Functional decline was observed in 23% of the 93 survivors. Within the 30-day period, case-fatality rate was 6% and readmission rate 11%; 18-month rates were 24% and 59%, respectively. Higher BI was a protective factor for 30-day and 18-month mortality (odds ratio (OR)=0.96, 95% confidence interval (CI)=0.94-0.98 and OR=0.97, 95% CI=0.95-0.99, respectively; $P<.01$), and PSI was the only predictor for functional decline (OR=1.03, 95% CI=1.01-1.05; $P=.01$). Indices did not predict readmission. Analyses were repeated for the 74 inpatients and indicated similar results except for 18-month mortality, which HARP predicted (OR=1.73; 95% CI=1.16-2.57; $P<.01$). **CONCLUSION:** Functional status was an independent predictor for short- and long-term mortality in hospitalized patients whereas CAP severity predicted functional decline. Severity indices for CAP should possibly thus be adjusted in the elderly population, taking functional status assessment into account.

10. Heart Lung. 2004 Sep-Oct;33(5):301-7.

Short-term outcomes and their predictors for patients hospitalized with community-acquired pneumonia.

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PURPOSE: This study of patients who were hospitalized with pneumonia describes 4 short-term outcomes and the relative value of 4 variables for predicting the outcomes. **METHOD:** We prospectively documented 4 short-term outcomes (hospital length of stay, discharge location, death, 30-day readmission) among 213 adults (mean age = 72.5 years) with pneumonia who were admitted to the hospital. Relationships between the Pneumonia Severity Index (PSI), preadmission walking, malnutrition, grip strength, and outcomes were examined with correlations and multiple logistic regression. **RESULTS:** The mean (SD) hospital stay was 8.8 (10.4) days. Many patients (51.6%) were not discharged to their homes; 13.6% died during admission or within 30 days of discharge. Of 205 patients discharged alive, 23.9% were readmitted within 30 days. All predictor variables correlated significantly with length of stay, discharge, and death. Except for grip strength, all predictor variables correlated significantly with readmission. Regression showed that the PSI contributed significantly to the prediction of all outcomes but that other variables also contributed ($R(2) = .099$ [readmitted] to .484 [discharged to home]). **CONCLUSIONS:** Because malnutrition and physical performance measures independently predicted or added to the PSI's prediction of untoward outcomes, the measures merit inclusion when assessing patients with pneumonia

11. J Am Geriatr Soc. 2004 Dec;52(12):2010-5.

Indicators of recurrent hospitalization for pneumonia in the elderly.

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OBJECTIVES: To identify modifiable risk factors of late unplanned readmissions for elderly with community-acquired pneumonia. **DESIGN:** A case-control study. **SETTING:** Three university-affiliated tertiary-care hospitals. **PARTICIPANTS:** Two hundred four case-control pairs. Case patients referred to all patients readmitted with pneumonia 30 days to 1 year after discharge. Control subjects were matched for age, admission date, and residence before admission. **MEASUREMENTS:** Baseline sociodemographic information, clinical data, activity of daily living (ADLs) information, and Charlson Comorbidity Index score were obtained. The Pneumonia Severity Index was calculated with swallowing dysfunction and pattern and extent of radiographic abnormalities, antimicrobial coverage, and total duration recorded. **RESULTS:** Median time to readmission was 123 days (interquartile range=65-238 days). Readmission was not associated with increased severity or length of hospital stay. In a Cox proportional hazards regression model, swallowing dysfunction (hazard ratio (HR)=2.15, 95% confidence interval (CI)=1.46-2.97), current smoking (HR=2.04, 95% CI=1.48-2.82), use of tranquilizers (HR=1.5, 95% CI=1.02-2.22), and lower ADL scores (HR=1.06, 95% CI=1.02-1.10) were independently associated with readmission for pneumonia. The receipt of angiotensin-converting enzyme inhibitors (HR=0.46, 95% CI=0.27-0.78) and prior pneumococcal vaccination (HR=0.59, 95% CI=0.42-0.82) had a protective effect. **CONCLUSION:** Although there are limited effective measures to improve functional status, preventive strategies that include smoking cessation and pneumococcal vaccination should be actively pursued. Routine evaluation of swallowing dysfunction and use of pharmacological agents to improve the cough reflex deserve further evaluation in multicenter controlled trials.

12. Med Clin (Barc). 2004 Sep 18;123(9):332-6.

Pneumonia in the elderly. Factors related with the mortality during the episode and after the discharge

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BACKGROUND AND OBJECTIVE: Pneumonia in the elderly (PIE) is a growing disease that causes great morbidity and mortality with frequent admissions to hospital and increasing health costs. The objective of our study was to analyze the characteristics of PIE in an internal medicine hospital ward, the influence of quality of life (Katz index and scale of Karnofsky) on its evolution and after the discharge and the factors of poor prognosis during the episode of PIE and throughout the ambulatory follow-up. **PATIENTS AND METHOD:** All the patients suffering from PIE admitted to the internal medicine ward of our hospital during a two years period were included in the study (125). Five of them were referred from geriatric centers. Mean age was 77.9 years (range = 65-95). The most frequent chronic disease was COPD (53.6%) and 10.4% were taking oral corticosteroids. We studied the association of several factors laboratory, clinical and radiological with the evolution of PIE and after discharge. **RESULTS:** Patients rated high on the indicators of quality of life used (78.4% scored 5 or greater on the Katz index and 76% scored 80 or greater on the scale of Karnofsky) and their comorbidity was low (44% lesser than or equal to 1 and 6.4% greater than or equal to 5). Fever above 38 C was recorded in 40% of cases. Mean APACHE score was 12.8. 21.6% patients had pleural effusion and 20% had

multilobar involvement. Overall mortality was 8.8% (11 patients). Fifteen patients suffered major complications during admission. One hundred patients out of the 114 who survived the episode of PIE were followed up on an ambulatory basis. Thirty of those died within 12 months after discharge. **CONCLUSIONS:** In our study, a poorer quality of life and a higher APACHE score were related to a greater mortality during the episode of PIE. After hospital discharge, a greater mortality was associated with a poor quality of life, comorbidity and low concentrations of albumin.

13. *Aging Clin Exp Res.* 2004 Feb;16(1):22-5.

Mortality and readmission of the elderly one year after hospitalization for pneumonia.

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BACKGROUND AND AIMS: Pneumonia, which is common among the elderly, is associated with untoward consequences. We sought, therefore, to describe the incidence of death and readmission, and to determine predictors of these variables during the year subsequent to index hospitalization. **METHODS:** This study involved the follow-up of 153 patients surviving an index hospitalization for pneumonia. Death and readmission were documented, and the relationship of selected variables with these outcomes was determined. **RESULTS:** Ninety-six (62.6%) of the patients had died or were readmitted. Only a count of comorbidities was correlated significantly with death, readmission, and either death or readmission. Using regression analysis, death alone was predicted by multiple variables. Grip strength and comorbidity counts correctly classified 75.2% of patients relative to that outcome. **CONCLUSIONS:** Untoward outcomes are likely among patients surviving acute hospitalization for pneumonia. These outcomes are related to variables that can be targeted in secondary prevention efforts.

14. *Am J Respir Crit Care Med.* 2004 Apr 15;169(8):910-4. Epub 2003 Dec 23.

Medium-term survival after hospitalization with community-acquired pneumonia.

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An episode of community-acquired pneumonia (CAP) has been suggested to predict greater than expected mortality after discharge from hospital. We ascertained the survival status as of December 2002 of a cohort of patients with CAP identified prospectively between November 1998 and June 2001. Cox regression analysis was used to examine the impact of demographic factors, comorbid illnesses, and CAP severity on subsequent mortality. Of 378 CAP survivors we ascertained the survival status of 366 (96.9%), 125 (34.1%) of whom had died. The mean length of follow-up was 1,058 days (range, 602-1,500 days). Independent predictors of mortality were increasing age ($p < 0.001$), comorbid cerebrovascular ($p = 0.002$) and cardiovascular ($p = 0.023$) disease, an altered mental state ($p < 0.001$), a hematocrit of less than 35% ($p = 0.035$), and increasing blood glucose level ($p = 0.025$). In 41- to 80-year-olds without significant comorbidities there was a trend to greater than expected mortality. In conclusion, an episode of CAP in young adults without significant comorbid illnesses does not appear to be an adverse prognostic marker of medium-term survival. The trend to greater than expected mortality in patients over 40 years of age needs further study and physicians should be particularly alert for underlying life-limiting disease processes in patients presenting with acute confusion or a hematocrit of less than 35%.

15. *J Am Geriatr Soc.* 2004 May;52(5):691-9.

Treatment of nursing home residents with dementia and lower respiratory tract infection in the United States and The Netherlands: an ocean apart.
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OBJECTIVES: To compare treatment of nursing home residents with dementia and lower respiratory tract infection (LRI) in Missouri and the Netherlands. **DESIGN:** Two separate but simultaneous prospective cohort studies. **SETTING:** Nursing homes in Missouri (n=36) and the Netherlands (n=61). **PARTICIPANTS:** Selected residents (701 from Missouri and 551 from the Netherlands) diagnosed with LRI and dementia. **MEASUREMENTS:** Treatment, dementia severity, symptoms and signs of LRI, and general health condition were recorded at the time of diagnosis of LRI. Death was monitored at follow-up. Treatment and mortality, stratified for dementia severity, are reported. **RESULTS:** Treatment of nursing home-acquired LRI in Missouri residents involved a larger number of antibiotics, more frequent hospitalization, and greater use of intravenous antibiotics and rehydration therapy than in Dutch residents of equal dementia severity. Furthermore, for Missouri residents, intensive interventions were more often provided irrespective of severe dementia. By contrast, in both countries, treatments to relieve symptoms of LRI were provided for only a minority of residents. Dutch mortality rates were higher overall. **CONCLUSION:** Care for U.S. nursing home residents with LRI and dementia is more aggressive than care for Dutch residents, particularly in residents with severe dementia. These results are relevant to the debate on optimal care in relation to curative or palliative treatment goals.

16. Med Care. 2004 Oct;42(10):1001-8.

Effects of nursing home ownership type and resident payer source on hospitalization for suspected pneumonia.

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BACKGROUND: Whether to hospitalize residents with suspected pneumonia is a complex decision determined both by clinical and financial considerations. The decision to hospitalize may be different in for-profit and not-for-profit facilities and for different payment sources. **OBJECTIVE:** The objective of this study was to examine the role of proprietary status in the decision to hospitalize residents with suspected pneumonia, controlling for facility- and resident-level factors. **DATA AND METHODS:** The analysis uses the 1996 Medical Expenditure Panel Survey Nursing Home Component, a nationally representative sample of 5899 nursing home residents in 815 facilities. During the year, 766 elderly residents in the sample were suspected of having pneumonia infections and 224 were hospitalized for them. Logistic regression is used to assess factors affecting the decision to hospitalize among the 766 with pneumonia infections. **MAIN OUTCOME MEASURE:** Hospitalization for suspected pneumonia. **RESULTS:** Residents with suspected pneumonia in not-for-profit facilities are hospitalized at a rate half that of for-profit facilities. The difference is most pronounced for residents who are older and more cognitively impaired and those who are covered by Medicare or private funds. Medicaid residents are most likely overall to be hospitalized, with higher rates in not-for-profit than for-profit facilities. **CONCLUSION:** Risk of hospitalization for suspected pneumonia varies widely by ownership type and resident payer source, with lowest overall risk in not-for-profit facilities. Higher Medicaid hospitalization in not-for-profit facilities is consistent with heterogeneity in

the not-for-profit sector, where Medicaid residents are sorted into the lower-quality facilities.

17. Jt Comm J Qual Saf. 2004 Jan;30(1):25-35.

Which strategies facilitate improvement in quality of care for elderly hospitalized pneumonia patients?

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BACKGROUND: A retrospective cohort study was conducted to elucidate which hospital-based quality improvement (QI) strategies are most effective in facilitating improvement in care for patients with community-acquired pneumonia. **METHODS:** In 1999 telephone interviews were conducted with 29 acute care hospitals in Connecticut regarding their use of QI strategies for 1,234 patients at baseline and 1,081 patients at follow-up. **RESULTS:** Hospital-based QI strategies were grouped into two domains of implementation approach (epidemiologic and social influence). Hospitals scoring a 4 in either the epidemiologic or social influence approach (versus a score of < or = 3) experienced a greater-than-average increase in percentage of patients with blood culture collection within 24 hours of hospital presentation. Hospitals applying all four social influence QI strategies showed a greater-than-average increase in delivery of antibiotics within 8 hours of patients' hospital arrival when compared with all the other hospitals combined. **DISCUSSION:** The finding that an increased proportion of patients receiving antibiotics within 8 hours and blood cultures within 24 hours of hospital arrival when the greatest numbers of hospital-based QI strategies were implemented is suggestive of a possible "dose effect" of QI.

18. Am J Manag Care. 2004 Oct;10(10):681-6.

Improving care for nursing home-acquired pneumonia in a managed care environment.

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OBJECTIVE: To characterize care of nursing home residents who became ill with nursing home-acquired pneumonia (NHAP) in a group-model, nonprofit HMO, and to pilot-test a strategy to implement evidence-based NHAP care guidelines. **STUDY DESIGN:** Medical record review and intervention pilot test. **METHODS:** Nursing home medical records of 78 patients who developed NHAP in 6 homes where the HMO contracts for Medicare services were reviewed for demographics, functional status, comorbidity, NHAP severity, care processes, and guideline compliance. The intervention, combining organizational change (facilitating immunization and providing appropriate emergency antibiotics) and education (quarterly in-services for nursing and aide staff), was pilot-tested for 7 months in 1 facility. Measures of baseline and intervention guideline adherence at that facility were compared with Fisher's exact test. **RESULTS:** Among the patients with NHAP, 83% had a response from their physician in less than 8 hours, 82% were treated with an antibiotic that met spectrum recommendations, and 74% were able to swallow were treated with oral antibiotics. However, few patients had documentation of influenza and pneumococcal vaccination; less than half the direct care staff had been vaccinated; and nursing assessments were incomplete for 23%. At the pilot-test facility, improvement was seen in influenza vaccination (14% to 52%, $P = .01$) and use of the most appropriate antibiotics (47% to 85%; $P = .03$). The guideline adherence score improved from 52% to 63% ($P = .04$). **CONCLUSION:** Use of a multidisciplinary, multifaceted intervention resulted in improvement in quality of care for nursing home residents who become ill with pneumonia.

19. *Curr Med Res Opin.* 2004 Aug;20(8):1309-20.

Nursing home-acquired pneumonia: an emergency department treatment algorithm.
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Nursing home-acquired pneumonia (NHAP) is a leading cause of morbidity, hospitalization, and mortality among older nursing home residents. Too often, these patients are erroneously grouped with cases of community-acquired and hospital-acquired pneumonia. Yet, they differ in terms of most common pathogens, significant underlying disease, impaired functional and cognitive status, and poor nutrition. The NHAP emergency department treatment algorithm presented here shows that an important decision for initial care in the emergency department (ED) is whether the patient should return to the nursing home. This decision often is based on the facility's ability to administer parenteral antibiotics, and care for co-morbidities and complications. Cephalosporins are the foundation of initial treatment of NHAP in the ED, and are combined with other antibiotics in anticipation of the most likely pathogens and treatment variables discussed here. It is hoped the NHAP treatment algorithm will contribute to improved outcomes.

20. *Am Geriatr Soc.* 2004 Jan;52(1):31-8.

Outcomes and costs among seniors requiring hospitalization for community-acquired pneumonia in Alberta.

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OBJECTIVES: To determine the age-specific rates of hospital discharge, cost per day, and overall in-hospital 1- and 4-year mortality for seniors who required hospitalization for the treatment of community-acquired pneumonia (CAP). **DESIGN:** Retrospective analysis of two administrative health service databases. **SETTING:** Province of Alberta, Canada. **PARTICIPANTS:** Residents of Alberta aged 18 and older. **MEASUREMENTS:** Hospital abstracts and vital statistics from April 1, 1994, to March 31, 1999, were analyzed, and mortality and cost outcomes statistically modeled by regression. **RESULTS:** There were 8,500 annual hospital discharges for CAP costing more than \$40 million per year. The overall in-hospital all-cause mortality rate was 12%, and the 1-year mortality rate was 26%. The mean age of pneumonia cases increased ($P<.000$) from 62.8 in 1994/1995 to 67.2 in 1998/1999. The proportion of hospital discharges in those aged 85 and older was 13% in 1994/1995, increasing to 18% in 1998/1999 ($P<.000$). The age-specific hospital discharge rate and length of hospitalization increased with age. After adjustment for other factors using modeling, it was found that the relative risk (RR) of in-hospital and 1-year mortality increased with age, the RR of using special medical care and higher-than-average daily hospital cost decreased with age, and the RR of greater-than-average daily hospital cost was not associated with an increase in comorbidity. Total costs per hospital stay were similar in patients aged 85 and older to those in patients aged 65 to 74, despite a one-third longer length of stay, which was consistent with reduced use of special medical care in those aged 85 and older. **CONCLUSION:** The increased use of hospital resources for CAP in the setting of an aging population may have been partially avoided because of limitations in care provided for seniors aged 85 and older.

21. *Chest.* 2004 Nov;126(5):1575-82.

Colonization of dental plaques: a reservoir of respiratory pathogens for hospital-acquired pneumonia in institutionalized elders.

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STUDY OBJECTIVES: Poor dental hygiene has been linked to respiratory pathogen colonization in residents of long-term care facilities. We sought to investigate the association between dental plaque (DP) colonization and lower respiratory tract infection in hospitalized institutionalized elders using molecular genotyping. **METHODS:** We assessed the dental status of 49 critically ill residents of long-term care facilities requiring intensive care treatment. Plaque index scores and quantitative cultures of DPs were obtained on ICU admission. Protected BAL (PBAL) was performed on 14 patients who developed hospital-acquired pneumonia (HAP). Respiratory pathogens recovered from the PBAL fluid were compared genetically to those isolated from DPs by pulsed-field gel electrophoresis. **MEASUREMENTS AND RESULTS:** Twenty-eight subjects (57%) had colonization of their DPs with aerobic pathogens. *Staphylococcus aureus* (45%) accounted for the majority of the isolates, followed by enteric Gram-negative bacilli (42%) and *Pseudomonas aeruginosa* (13%). The etiology of HAP was documented in 10 patients. Of the 13 isolates recovered from PBAL fluid, nine respiratory pathogens matched genetically those recovered from the corresponding DPs of eight patients. **CONCLUSIONS:** These findings suggest that aerobic respiratory pathogens colonizing DPs may be an important reservoir for HAP in institutionalized elders. Future studies are needed to delineate whether daily oral hygiene in hospitalized elderly would reduce the risk of nosocomial pneumonia in this frail population.

22. Am J Respir Crit Care Med. 2004 May 1;169(9):1041-5. Epub 2004 Feb 27.

Effects of an angiotensin-converting enzyme inhibitor-based regimen on pneumonia risk.

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Observational studies conducted among Asian populations suggest that the risk of pneumonia is substantially reduced among users of angiotensin-converting enzyme (ACE) inhibitors but not other blood pressure-lowering agents. We conducted analyses of the effects of ACE inhibitor therapy on pneumonia in 6,105 patients with a history of stroke or transient ischemic attack enrolled in a randomized trial conducted in Australasia, Europe, and Asia. Patients were randomly assigned perindopril-based active treatment or placebo. The effects of ACE inhibitors on pneumonia (fatal or nonfatal) were determined from Cox models fitted according to the principle of intention to treat. During a median follow-up of 3.9 years, 261 patients developed pneumonia. Overall, active treatment was associated with a nonsignificant 19% lower risk of pneumonia (95% confidence interval, -3 to 37; $p = 0.09$) compared with placebo. Active treatment significantly reduced the risk of pneumonia among participants of Asian ethnicity (47%, 14-67%; $p = 0.01$), with no significant effect among non-Asian participants (5%, -27 to 29%; $p = 0.7$) (p for homogeneity = 0.04). These findings substantially add to the body of evidence about the effects of these drugs on pneumonia but do not provide the definitive information required to inform clinical decisions about the prevention of pneumonia with ACE inhibitors

23. Am Med Dir Assoc. 2004 May-Jun;5(3):174-9.

Can we prevent aspiration pneumonia in the nursing home?

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Aspiration pneumonia is a significant cause of morbidity, hospitalization, and mortality in the nursing home population. Patients who aspirate have three times higher mortality than patients who do not aspirate. We discuss the factors known to increase the risk of aspiration and its consequences, and recognize some of the preventive measures for aspiration pneumonia. We suggest approaches to decrease the risk of this very prevalent syndrome.

24. *J Gerontol Nurs.* 2004 Apr;30(4):14-23; quiz 54-5.

Pneumonia in the long-term care setting: etiology, management, and prevention.
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1. Nursing-home acquired pneumonia (NHAP) is a major cause of death and disability among elderly nursing home residents, despite the availability of new antimicrobials and diagnostic techniques. 2. Elderly individuals with NHAP have vague clinical presentations and unique institutional limitations can lead to delays in diagnosis, treatment, and poor resident outcomes. 3. Successful management of the resident with pneumonia includes choice of antibiotic therapy, excellent nursing care, and thoughtful consideration of treatment setting. 4. Preventive strategies to reduce the risk of NHAP include attention to vaccination status and oral hygiene care to reduce bacterial colonization of potential respiratory pathogens.

25. *Dysphagia.* 2004 Winter;19(1):7-14.

Characteristics of dysphagia in elderly patients requiring mechanical ventilation.
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The purpose of this study was to describe the swallowing characteristics of elderly patients requiring mechanical ventilation with tracheostomy admitted to a long-term, acute-care hospital. The study was conducted through retrospective record review of patients on mechanical ventilation who had received a Modified Barium Swallow Study (MBSS) during their hospitalization. In a period from 1994 to 2002, 58 patients met the inclusion criteria. The study examined the results of both the clinical and the MBSS evaluations and compared the results and recommendations of the two examinations. Data were obtained from the MBSS records to describe the group in terms of dysphagia symptoms, frequency and occurrence of aspiration, respiratory status, and demographic variables. Parametric and nonparametric statistics were used to determine differences between the evaluations and any significant associations between aspiration and demographic variables, pharyngeal symptoms, and cognitive deficits. Significant differences were found between diet recommendations before and after the MBSS, and significant associations were found between aspiration and three pharyngeal symptoms. Although aspiration and especially silent aspiration occurred frequently in this group, most individuals were able to begin some level of oral intake after the MBSS evaluation. Due to the lack of reliable clinical evaluation measures, the MBSS is necessary for differential diagnosis of dysphagia and dietary recommendations for these individuals.

26. *Chest.* 2004 Oct;126(4):1066-70.

Daily oral care and cough reflex sensitivity in elderly nursing home patients.

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BACKGROUND: Intensive oral care can reduce the incidence of pneumonia in elderly nursing home patients, but the mechanism is unknown. **OBJECTIVE:** To explore the effects of intensive oral care on impaired cough reflex sensitivity, which is a known risk factor of aspiration pneumonia. **METHODS:** Cough reflex sensitivity to citric acid was measured in elderly nursing home patients, who were randomly assigned to the intervention group (n = 30) and the control group (n = 29). The patients in the intervention group had their teeth and gingiva cleaned by caregivers after every meal for 1 month. The patients in the control group performed their own oral care during the same period. Serum substance P (SP) concentration, cognitive function, and activities of daily living (ADL) were also assessed. **RESULTS:** In the intervention group, cough reflex sensitivity at 30 days showed significantly higher sensitivity than baseline ($p < 0.01$). At 30 days, the cough reflex sensitivities in the intervention group were significantly higher than that of the control group ($p < 0.05$). Compared with the control group, the odds ratio of improvement of cough reflex sensitivity was 5.3 (95% confidence interval, 1.7 to 16.0; $p < 0.005$) for the intervention group. One month of intensive oral care did not have a significant effect on serum SP concentration, cognitive function, and ADL. **CONCLUSION:** Intensive oral care may reduce the incidence of pneumonia by improving cough reflex sensitivity in elderly nursing home patients.

27. P R Health Sci J. 2004 Mar;23(1):19-24.

Potentially serious infections in the aging person: diagnosis, treatment and prevention.

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Infections in the elderly patient are a challenge, since the classical signs of infection are absent or ill defined. The present paper describes the presentation, diagnosis, clinical manifestations and treatment for a selected group of potential serious infections including influenza, bacterial pneumonia, urinary tract infections as well as infections caused by multiresistant bacteria, like vancomycin-resistant enterococcus and methicillin resistant *S. aureus*. We conclude with the need for prevention in the older person with the use of vaccines, specifically the influenza and pneumococcal vaccine as well as the prevention of urinary infections. Influenza is a significant cause of morbidity, whose ill effects can be prevented in many older persons with the use of a vaccine. The use in prophylaxis and treatment of antiviral agents like amantadine, rimatadine, and oseltamivir is presented. Bacterial pneumonia is one of the leading causes of death in the USA among the older persons. The emergence of drug resistant *Streptococcus pneumoniae* leads to the consideration as empiric therapy the newer fluoroquinolones or the use of third or fourth generation cephalosporins. Of importance is the use of pneumococcal vaccine among people age 60 or above. The frequency of urinary tract infections among the elderly is of primary although in many instances important do not require treatment. When infection of the urinary tract is diagnosed, most authors use a fluoroquinolone as empiric therapy. The emergence of multiresistant bacteria like methicillin resistant *S. aureus* and or vancomycin resistant enterococci leads to the need to consider new agents like quinipristin-dalfopristin, linezolid and debrinomicin in the management of such patients.

28. Chest. 2004 May;125(5):1888-901.

Guidelines for empiric antimicrobial prescribing in community-acquired pneumonia. File TM Jr, Garau J, Blasi F, Chidiac C, Klugman K, Lode H, Lonks JR, Mandell L,

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Empiric antimicrobial prescribing for community-acquired pneumonia remains a challenge, despite the availability of treatment guidelines. A number of key differences exist between North American and European guidelines, mainly in the outpatient setting. The North American approach is to use initial antimicrobial therapy, which provides coverage for *Streptococcus pneumoniae* plus atypical pathogens. Europeans tend to focus on providing pneumococcal coverage with less emphasis on covering for an atypical pathogen. Ambulatory patients without comorbidity are more likely to receive macrolide therapy in North America, whereas in Europe these patients would probably receive a beta-lactam agent. Major issues that are fundamental to this difference include the importance of providing therapy for atypical pathogens and the clinical significance of macrolide-resistant *S pneumoniae*. Prospective data are required to evaluate which of these two approaches offers clinical superiority.

29. J Infect Dis. 2004 Feb 1;189(3):450-8. Epub 2004 Jan 23.

Development and validation of a clinical prediction rule for hospitalization due to pneumonia or influenza or death during influenza epidemics among community-dwelling elderly persons.

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BACKGROUND: Uncertainties among health care providers and patients about the risk of serious influenza-associated complications and the potential benefits of vaccination may contribute to unsatisfactorily low influenza vaccination rates. To quantify the risk of serious outcomes (hospitalization due to pneumonia or influenza or death due to any cause) during influenza seasons, we developed a clinical prediction rule for the probability of hospitalization due to pneumonia or influenza or death among elderly persons.

METHODS: We developed the clinical prediction rule using data from linked administrative databases in a cohort of 16,280 noninstitutionalized and unvaccinated elderly persons.

Validation of the rule was conducted in 5 unvaccinated and 6 vaccinated cohorts, each consisting of >11,000 elderly members of 3 managed care organizations. Logistic regression was used to produce a prognostic score on the basis of the following predictors: age; sex; presence of pulmonary, cardiac, and renal disease; dementia or stroke and cancer; number of outpatient visits; and hospitalization due to pneumonia or influenza during the previous year. **RESULTS:** Reliability of the regression model was good ($P=.65$, by goodness-of-fit test), and it discriminated well between those who did and those who did not experience an outcome (area under the receiver-operating curve, 0.83; 95% confidence interval, 0.81-0.85). Validation revealed moderately lower but acceptable discriminating values (0.72-0.81). In the derivation cohort, the prognostic accuracy of the rule was high when a cutoff score for the upper 50th percentile was used: > or =10 of 1000 subjects with a score in the upper 50th percentile were predicted to have an outcome, and 89% of all outcomes were observed in this high-risk group, whereas <10 of 1000 subjects with a score in the lower 50th percentile were predicted to have an outcome, and only 11% of outcomes occurred in this group. Among unvaccinated subjects in the single-derivation cohort and the 11 validation cohorts combined, the outcome event rates were 35 events/1000 subjects in the higher-risk group and 6 events/1000 subjects in the lower-risk group. With vaccination, these event rates dropped by 15 events/1000 subjects and 2 events/1000 subjects, respectively. **CONCLUSIONS:** This prediction rule may be a useful

tool to complement other age-based strategies, to further encourage vaccination, especially among those at the highest risk of serious complications due to influenza.

30. Cochrane Database Syst Rev. 2004;(2):CD002109.

Antibiotics for community acquired pneumonia in adult outpatients.

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BACKGROUND: Community-acquired pneumonia (CAP) is a common condition representing a significant disease burden for the community, particularly for the elderly. Because antibiotics are helpful in treating CAP, they are the standard treatment and CAP thus contributes significantly to antibiotic use, which is associated with the development of bacterial resistance and side-effects. Although several studies have been published concerning CAP and its treatment, the available data arises mainly from studies conducted in hospitalized patients and outpatients. There is no concise summary of the available evidence that can help clinicians in choosing the most appropriate antibiotic.

OBJECTIVES: Our goal was to summarize the evidence currently available from randomized controlled trials (RCTs) concerning the efficacy of alternative antibiotic treatments for CAP in ambulatory patients above 12 years of age. **SEARCH STRATEGY:**

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, Issue 2, 2003) which contains the Cochrane Acute Respiratory Infections Group's trial register; MEDLINE (January 1966 to September week 3, 2003), and EMBASE (January 1974 to March 2003). Studies were also identified by checking the bibliographies of studies and review articles retrieved as well as by perusing medical journals. To identify any additional published or unpublished studies, we contacted the following antibiotics manufacturers: Abbott, AstraZeneca, Aventis, Boehringer-Ingelheim, Bristol-Myers-Squibb, GlaxoSmithKline, Hoffmann-LaRoche, Lilly, Merck, Merck Sharp & Dohme, Novartis, Pfizer, Pharmacia, Sanofi, and Yamanouchi. No language restrictions were applied in any of the search strategies. **SELECTION CRITERIA:** We included all randomized controlled trials (RCTs) in which one or more antibiotics were tested for the treatment of CAP in ambulatory adolescent or adult patients. Studies testing one or more antibiotic and reporting the diagnostic criteria used in selecting patients as well as the clinical outcomes achieved were included. No language restrictions were applied. **DATA COLLECTION AND ANALYSIS:** Data were extracted and study reports assessed by two independent reviewers (LMB and TJMV). Authors of studies were contacted as needed to resolve any ambiguities in the study reports. The data were analyzed using the Cochrane Collaboration's RevMan 4.2.2 Software. Differences between reviewers were resolved by discussion and consensus. **MAIN RESULTS:** Three randomized controlled trials involving a total of 622 patients aged 12 years and older diagnosed with community acquired pneumonia were included. The quality of the studies and of the reporting was variable. A variety of clinical, radiological and bacteriological diagnostic criteria and outcomes were reported. Overall there was no significant difference in the efficacy of the various antibiotics under study. **REVIEWERS' CONCLUSIONS:** Currently available evidence from RCTs is insufficient to make evidence-based recommendations for the choice of antibiotic to be used for the treatment of community acquired pneumonia in ambulatory patients. Pooling of study data was limited by the very low number of studies. Individual study results do not reveal significant differences in efficacy between various antibiotics and antibiotic groups. Multi-drug comparisons using similar administration schedules are needed to provide the evidence necessary for practice recommendations

31. Braz J Infect Dis. 2004 Feb;8(1):90-100. Epub 2004 Jul 20.

Gatifloxacin in the treatment of community-acquired pneumonias: a comparative trial of ceftriaxone, with or without macrolides, in hospitalized adult patients with mild to moderately severe pneumonia.

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Community-acquired pneumonia is very common, but some of the cases do require hospitalization for treatment, particularly when older patients and/or co-morbidities are involved; both "typical" and "atypical" respiratory pathogens take part etiologically, and there is increasing concern about the emergence of resistance. There is interest in therapeutic options that can: a) comprehend such a spectrum of bacteria and resistance; b) allow parenteral to oral sequential treatment. We made a multicenter, prospective and randomized trial to compare the "standard" treatment of ceftriaxone IV alone or in combination with erythromycin IV, followed by clarithromycin PO (ceftriaxone treatment arm), with gatifloxacin IV, followed by oral administration (gatifloxacin treatment arm). The need for hospitalization was based on clinical criteria as judged by the investigators. Standardized criteria for diagnosis and follow-up were employed. Fifty-six patients were enrolled, with 48% over 65 years old, and there were frequent co-morbidities. Of these, 51 were clinically evaluable, 26 in the gatifloxacin and 25 in the ceftriaxone arm, with comparable success rates, 92% and 88%, respectively, even when major prognostic factors were considered. There were no serious adverse events or significant laboratory value changes attributable to the study drugs. Gatifloxacin as monotherapy (initially IV then orally until completion of treatment) was shown to be effective and safe, comparable to ceftriaxone IV alone or in combination with a macrolide (initially IV then orally until completion of treatment), in empirical therapy for community-acquired pneumonias, for patients that, at the physician's discretion, require initial treatment as inpatients

32. Arch Gerontol Geriatr. 2004 Sep-Oct;39(2):111-6.

Pneumonia in elderly patients with preexisting respiratory disease.

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To evaluate the optimal duration of appropriate antibiotic therapy for pneumonia in elderly patients with preexisting respiratory disease, we studied improvement of infectious parameters in these patients. The medical record database was used to identify patients admitted with the following characteristics: primary diagnosis of benign respiratory disease; aged 65 years or over; no active malignant diseases in any organs; and at least one admission for pneumonia during April 2001 to May 2003. We observed 47 pneumonia episodes in 30 patients. Elevated CRP levels more than 8.0 mg/ml and leukocytosis more than $10.0 \times 10^3 \text{ mm}^{-3}$ was seen in 21 and 29 pneumonia episodes, respectively. With appropriate intravenous antimicrobial therapy, average of CRP levels on day 0 ($9.16 \pm 6.81 \text{ mg/dl}$) decreased to $5.18 \pm 4.67 \text{ mg/dl}$ on day 3 ($P = 0.0073$). In more than 70% of pneumonia episodes, serum levels of CRP normalized on day 10. Average of leukocyte counts on day 0 ($(12.3 \pm 4.7) \times 10^3 \text{ mm}^{-3}$) decreased to $(8.1 \pm 3.5) \times 10^3 \text{ mm}^{-3}$ on day 3 ($P = 0.0001$). In more than 80% of pneumonia episodes, leukocyte count normalized on day 7. The clinical response to appropriate antimicrobial therapy for pneumonia occurs within the first 3 days of therapy. Duration of intravenous antimicrobial therapy for pneumonia in these patients of 10 days would be sufficient and could prevent recurrent infection with resistant bacteria

33. Arch Intern Med. 2004 Mar 22;164(6):637-44.

Timing of antibiotic administration and outcomes for Medicare patients hospitalized with community-acquired pneumonia.

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BACKGROUND: Pneumonia accounts for more than 600 000 Medicare hospitalizations yearly. Guidelines have recommended antibiotic treatment within 8 hours of arrival at the hospital. **METHODS:** We performed a retrospective study using medical records from a national random sample of 18 209 Medicare patients older than 65 years who were hospitalized with community-acquired pneumonia from July 1998 through March 1999. Outcomes were severity-adjusted mortality, readmission within 30 days of discharge, and length of stay (LOS). **RESULTS:** Among 13 771 (75.6%) patients who had not received outpatient antibiotic agents, antibiotic administration within 4 hours of arrival at the hospital was associated with reduced in-hospital mortality (6.8% vs 7.4%; adjusted odds ratio [AOR], 0.85; 95% confidence interval [CI], 0.74-0.98), mortality within 30 days of admission (11.6% vs 12.7%; AOR, 0.85; 95% CI, 0.76-0.95), and LOS exceeding the 5-day median (42.1% vs 45.1%; AOR, 0.90; 95% CI, 0.83-0.96). Mean LOS was 0.4 days shorter with antibiotic administration within 4 hours than with later administration. Timing was not associated with readmission. Antibiotic administration within 4 hours of arrival was documented for 60.9% of all patients and for more than 50% of patients regardless of hospital characteristics. **CONCLUSIONS:** Antibiotic administration within 4 hours of arrival was associated with decreased mortality and LOS among a random sample of older inpatients with community-acquired pneumonia who had not received antibiotics as outpatients. Administration within 4 hours can prevent deaths in the Medicare population, offers cost savings for hospitals, and is feasible for most inpatients.

34. J Am Geriatr Soc. 2004 Feb;52(2):224-9.

Radiographic resolution of community-acquired bacterial pneumonia in the elderly.

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OBJECTIVES: To investigate the radiographic clearance of proven community-acquired nontuberculous bacterial pneumonia in nonimmunocompromised older patients to provide working estimates of the rate of radiographic resolution as a function of the patient cumulative comorbidities, extent of initial radiographic involvement, functional status, and causative pathogens. **DESIGN:** A prospective study. **PARTICIPANTS:** Seventy-four patients aged 70 and older, consecutively admitted to a hospital for community-acquired bacterial pneumonia. **SETTING:** A university-affiliated teaching hospital.

MEASUREMENTS: Chest radiographs were performed every 3 weeks from the date of admission for a total period of 12 weeks or until all radiographic abnormalities had resolved or returned to baseline. **RESULTS:** Sixty-four patients (86%) completed the study. The rate of radiographic clearance was estimated at 35.1% within 3 weeks, 60.2% within 6 weeks, and 84.2% within 12 weeks. Radiographic resolution was significantly slower for those with high comorbidity index, bacteremia, multilobar involvement, and enteric gram-negative bacilli pneumonias. Multivariate regression analysis demonstrated that the comorbidity index (relative risk for clearance=0.67 per class index, $P<.001$) and multilobar disease (relative risk for clearance=0.24 for more than one lobe, $P<.001$) had independent predictive value (Cox proportional hazards regression model) on the rate of resolution. **CONCLUSION:** The radiographic resolution of nontuberculous bacterial pneumonia in the elderly should take into account the extent of lobar disease and the

burden of underlying illnesses. A waiting period of 12 to 14 weeks is recommended for slowly resolving pneumonia to be considered nonresolving.

35. Clin Infect Dis. 2004 Mar 15;38(6):787-98. Epub 2004 Mar 01.

Drug-resistant pneumococcal pneumonia: clinical relevance and related factors. Aspa J, Rajas O, Rodriguez de Castro F, Blanquer J, Zalacain R, Fenoll A, de Celis R, Vargas A, Rodriguez Salvanes F, Espana PP, Rello J, Torres A; Pneumococcal Pneumonia in Spain Study Group.

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A multicenter study of 638 cases of community-acquired pneumonia due to *Streptococcus pneumoniae* (SP-CAP) was performed to assess current levels of resistance. Of the pneumococcal strains, 35.7% had an minimum inhibitory concentration (MIC) of penicillin of $>$ or $=0.12$ microg/mL (3 isolates had an MIC of 4 microg/mL), 23.8% had an MIC of erythromycin of 128 microg/mL, and 22.2% were multidrug resistant. Logistic regression determined that chronic pulmonary disease (odds ratio [OR], 1.44), human immunodeficiency virus infection (OR, 1.98), clinically suspected aspiration (OR, 2.12), and previous hospital admission (OR, 1.69) were related to decreased susceptibility to penicillin, and previous admission (OR, 1.89) and an MIC of penicillin of MIC $>$ or $=0.12$ microg/mL (OR, 15.85) were related to erythromycin resistance (MIC, $>$ or $=1$ microg/mL). The overall mortality rate was 14.4%. Disseminated intravascular coagulation, empyema, and bacteremia were significantly more frequent among patients with penicillin-susceptible SP-CAP. Among isolates with MICs of penicillin of $>$ or $=0.12$ microg/mL, serotype 19 was predominant and was associated with a higher mortality rate. In summary, the rate of resistance to beta-lactams and macrolides among *S. pneumoniae* that cause CAP remains high, but such resistance does not result in increased morbidity.

36. Drugs Aging. 2004;21(13):851-64.

Drug treatment of pneumococcal pneumonia in the elderly. Neralla S, Meyer KC.

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Streptococcus pneumoniae has been recognised as a major cause of pneumonia since the time of Sir William Osler. Drug-resistant *S. pneumoniae* (DRSP), which have gradually become resistant to penicillins as well as more recently developed macrolides and fluoroquinolones, have emerged as a consequence of indiscriminate use of antibacterials coupled with the ability of the pneumococcus to adapt to a changing antibacterial milieu. Pneumococci use cell wall choline components to bind platelet-activating factor receptors, colonise mucosal surfaces and evade innate immune defenses. Numerous virulence factors that include hyaluronidase, neuraminidase, iron-binding proteins, pneumolysin and autolysin then facilitate cytolysis of host cells and allow tissue invasion and bloodstream dissemination. Changes in pneumococcal cell wall penicillin-binding proteins account for resistance to penicillins, mutations in the *ermB* gene cause high-level macrolide resistance and mutations in topoisomerase IV genes coupled with *GyrA* gene mutations alter DNA gyrase and lead to high-level fluoroquinolone resistance. Risk factors for lower respiratory tract infections in the elderly include age-associated changes in oral clearance, mucociliary clearance and immune function. Other risks for developing pneumonia include poor nutrition, hypoalbuminaemia, bedridden status, aspiration, recent viral infection, the presence of chronic organ dysfunction syndromes including parenchymal lung disease and recent antibacterial therapy. Although the incidence of infections caused by DRSP is rising, the effect of an increase in the prevalence of resistant pneumococci on mortality is not clear. When respiratory infections occur, rapid diagnosis and prompt, empirical

administration of appropriate antibacterial therapy that ensures adequate coverage of DRSP is likely to increase the probability of a successful outcome when treating community-acquired pneumonia in elderly patients, particularly those with multiple risk factors for DRSP. A chest x-ray is recommended for all patients, but other testing such as obtaining a sputum Gram's smear is not necessary and should not prolong the time gap between clinical suspicion of pneumonia and antibacterial administration. The selection of antibacterials should be based upon local resistance patterns of suspected organisms and the bactericidal efficacy of the chosen drugs. If time-dependent agents are chosen and DRSP are possible pathogens, dosing should keep drug concentrations above the minimal inhibitory concentration that is effective for DRSP. Treatment guidelines and recent studies suggest that combination therapy with a beta-lactam and macrolide may be associated with a better outcome in hospitalised patients, and overuse of fluoroquinolones as a single agent may promote quinolone resistance. The ketolides represent a new class of macrolide-like antibacterials that are highly effective in vitro against macrolide- and azalide-resistant pneumococci. Pneumococcal vaccination with the currently available polysaccharide vaccine is thought to confer some preventive benefit (preventing invasive pneumococcal disease), but more effective vaccines, such as nonconjugate protein vaccines, need to be developed that provide broad protection against pneumococcal infection.

37. *Infect Dis Clin North Am.* 2004 Sep;18(3):533-49, viii.

Antibiotic agents in the elderly.

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Diagnosis and treatment of infections in the elderly is challenging and complicated because of age-related physiologic changes and lack of classical clinical symptoms. Elderly patients are more vulnerable to infections because of their underlying diseases. This article reviews the pharmacologic issues in treating the elderly with antibiotics, the most frequently encountered infections in this patient population, and the suggested antibiotic regimens. The discussion also includes the special challenges of treating these most frequently encountered infections in the elderly who reside in long-term care facilities.

38. *Drugs Aging.* 2004;21(3):167-86.

New developments in antibacterial choice for lower respiratory tract infections in elderly patients.

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Elderly patients are at increased risk of developing lower respiratory tract infections compared with younger patients. In this population, pneumonia is a serious illness with high rates of hospitalisation and mortality, especially in patients requiring admission to intensive care units (ICUs). A wide range of pathogens may be involved depending on different settings of acquisition and patient's health status. *Streptococcus pneumoniae* is the most common bacterial isolate in community-acquired pneumonia, followed by *Haemophilus influenzae*, *Moraxella catarrhalis* and atypical pathogens such as *Chlamydia pneumoniae*, *Legionella pneumophila* and *Mycoplasma pneumoniae*. However, elderly patients with comorbid illness, who have been recently hospitalised or are residing in a nursing home, may develop severe pneumonia caused by multidrug resistant staphylococci or pneumococci, and enteric Gram-negative bacilli, including *Pseudomonas*

aeruginosa. Moreover, anaerobes may be involved in aspiration pneumonia. Timely and appropriate empiric treatment is required in order to enhance the likelihood of a good clinical outcome, prevent the spread of antibacterial resistance and reduce the economic impact of pneumonia. International guidelines recommend that elderly outpatients and inpatients (not in ICU) should be treated for the most common bacterial pathogens and the possibility of atypical pathogens. The algorithm for therapy is to use either a selected beta-lactam combined with a macrolide (azithromycin or clarithromycin), or to use monotherapy with a new anti-pneumococcal quinolone, such as levofloxacin, gatifloxacin or moxifloxacin. Oral (amoxicillin, amoxicillin/clavulanic acid, cefuroxime axetil) and intravenous (sulbactam/ampicillin, ceftriaxone, cefotaxime) beta-lactams are agents of choice in outpatients and inpatients, respectively. For patients with severe pneumonia or aspiration pneumonia, the specific algorithm is to use either a macrolide or a quinolone in combination with other agents; the nature and the number of which depends on the presence of risk factors for specific pathogens. Despite these recommendations, clinical resolution of pneumonia in the elderly is often delayed with respect to younger patients, suggesting that optimisation of antibacterial therapy is needed. Recently, some new classes of antibacterials, such as ketolidones, oxazolidinones and streptogramins, have been developed for the treatment of multidrug resistant Gram-positive infections. However, the efficacy and safety of these agents in the elderly is yet to be clarified. Treatment guidelines should be modified on the basis of local bacteriology and resistance patterns, while dosage and/or administration route of each antibacterial should be optimised on the basis of new insights on pharmacokinetic/pharmacodynamic parameters and drug interactions. These strategies should be able to reduce the occurrence of risk factors for a poor clinical outcome, hospitalisation and death.

39. Eur J Epidemiol. 2004;19(4):353-63.

The 23-valent pneumococcal polysaccharide vaccine. Part I. Efficacy of PPV in the elderly: a comparison of meta-analyses.

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A 23-valent polysaccharide pneumococcal vaccine (PPV) has been available in the UK for more than 20 years and is currently recommended for use in high-risk groups (HRG) of 2+ years of age. The degree of protection afforded by the PPV remains a critical issue, although a number of randomised clinical trials and case-control studies (CCS) have been published. The aim of this work is to review the estimates on the efficacy of PPV against pneumococcal pneumonia and invasive pneumococcal disease (IPD) in the elderly and to perform a meta-analysis in order to obtain a pooled estimate of the level of protection in high and low risk individuals. These two groups of individuals are at the centre of the current debate on whether or not to extend the vaccination programme to all elderly individuals 65+. Only randomised and quasi-randomised studies are included in the analysis and results are compared with previous meta-analyses. The effect of the inclusion of observational studies is investigated in the sensitivity analysis. When taken with the results of other meta-analyses and observational studies, it appears that PPV offers protection against IPD in the general elderly population (VE = 65%; 95% CI: -49-92%) whereas it has a moderate effect in the high-risk elderly (VE = 20%; 95% CI: -188-78%). The vaccine has little or no effect against pneumonia (VE = 16% in the general elderly and -20% in HRG).

40. Vaccine. 2004 Dec 16;23(5):639-45.

Is influenza vaccination cost effective for healthy people between ages 65 and 74 years? A randomised controlled trial.

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The aim of this study was to determine the cost effectiveness of influenza vaccination for healthy people aged 65-74 years living in the UK. People without risk factors for influenza (chronic heart, lung or renal disease, diabetic, immunosuppressed or those living in an institution) were identified from 20 general practitioner (GP) practices in Liverpool in September 1999. 729/5875 (12.4%) eligible individuals were recruited and randomised to receive either influenza vaccine or placebo (ratio 3:1), with all participants receiving 23-valent-pneumococcal polysaccharide vaccine unless already administered. The primary analysis was the frequency of influenza as recorded by a GP diagnosis of pneumonia or influenza like illness. In 2000, the UK vaccination policy was changed with influenza vaccine becoming available for all people aged 65 years and over irrespective of risk. As a consequence of this policy change, the study had to be fundamentally restructured and only results obtained over a one rather than the originally planned two-year randomised controlled trial framework were used. Results from 1999/2000 demonstrated no significant difference between groups for the primary outcome (relative risk 0.8, 95% CI 0.16-4.1). In addition, there were no deaths or hospitalisations for influenza associated respiratory illness in either group. The subsequent analysis, using both national and local sources of evidence, estimated the following cost effectiveness indicators: (1) incremental NHS cost per GP consultation avoided = 2000 pound sterling; (2) incremental NHS cost per hospital admission avoided = 61,000 pound sterling; (3) incremental NHS cost per death avoided = 1,900,000 pound sterling and (4) incremental NHS cost per QALY gained = 304,000 pound sterling. The analysis suggested that influenza vaccination in this population would not be cost effective.

41. Vaccine. 2004 Dec 2;23(3):283-9.

Effectiveness of the MF59-adjuvanted influenza vaccine in preventing emergency admissions for pneumonia in the elderly over 64 years of age.

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Case-control study designed to determine the effectiveness of an MF59-adjuvanted influenza vaccine in the population aged 65 years and older living in the community. Detailed health histories were obtained on both cases and controls that included a functional measure of co-morbidity (Barthel Index). Subjects were all eligible persons admitted to various hospitals with a diagnosis of pneumonia during the winter months and were matched by sex, hospital and admission week to controls admitted for non-medical reasons. The influenza vaccination programme using the MF59-adjuvanted influenza vaccine significantly reduced the probability of being hospitalised for pneumonia in the elderly over 64 years of age, even in a season with a low influenza activity, during which the predominant circulating strains were types B and A (H1N1).

42. J Rural Health. 2004 Spring;20(2):125-30.

Attitudes, perceived norms, and intentions: a needs assessment study of the influenza immunization intentions of elderly citizens in Vermont.

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CONTEXT: Influenza and pneumonia rank among the 5 leading causes of death among

persons aged 65 and over. Although immunization has been demonstrated to prevent influenza or reduce its incidence and associated complications among the elderly, it has been largely underutilized. **PURPOSE:** This study examined the association of attitudes, perceived norms, and intention to obtain influenza immunization among community-dwelling rural elderly. The goal was to design an effective intervention program to increase the rate of flu immunization among the rural elderly. **METHODS:** In spring 2000, random-digit dialing selected 1,239 households in 2 rural Vermont counties. Telephone interviews were conducted with 799 persons aged 60 or older, resulting in a response rate of 65%. **FINDINGS:** Factor analyses revealed 2 dimensions underlying attitudes and perceived norms. Subsequent regression analyses confirmed that 1 attitude construct--perceived benefits--and both normative indices were significant predictors of immunization intention, explaining 45% of its variation. **CONCLUSIONS:** An intervention program targeting rural elderly should emphasize the benefits and perceived side effects of immunization. The program should publicize that most elderly believe that the advantages of influenza immunization outweigh the disadvantages. These findings will inform an intervention program designed to increase immunization coverage among rural seniors in Vermont.

43. *Prev Med.* 2004 Sep;39(3):517-27.

Characteristics of community dwelling elderly not vaccinated for pneumococcus in 1998 and 2001.

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Background. We estimate proportions and numbers of elderly (>65 years old) not vaccinated for pneumococcus in 1998 and 2001 by ethnic group, socioeconomic status, health history, and access and use of health care. **Methods.** Self-reported lifetime pneumococcal vaccination and participant characteristics were obtained from 10,624 community dwelling elderly in the 1998 and 2001 National Health Interview Surveys (NHIS). Robust descriptive and inferential statistical analyses were fit. **Outcome.** Non-receipt of pneumococcal vaccination. **Results.** In 2001, about 13 million (or 45% of all) community dwelling elderly were unvaccinated against pneumococcus, including 11.5 million who saw a doctor at least once, 4 million who received an influenza vaccination and 2.3 million who were hospitalized, during the previous year. In 1998 and 2001 non-US born, Hispanic, African-American, and Medicaid recipient elderly were disproportionately un-vaccinated, with about 65% of each group not vaccinated in 2001. **Conclusions.** In 2001, lifetime pneumonia vaccination of community dwelling elderly (55%) was below the goal (60%) for Healthy People 2000. While there has been important progress in improving overall vaccination rates, much more needs to be done to attain national goals and reduce large, persistent racial/ethnic and socioeconomic disparities. Lack of a usual source of healthcare and lower frequency of physician visits were among the factors associated with non-vaccination. However, most unvaccinated individuals had seen a physician in the last year, and many had received influenza vaccination or been hospitalized, suggesting the need for more consistent implementation and monitoring of guidelines for routine pneumococcal vaccination in healthcare settings.

44. *Mechanisms of Ageing and Development* Vol: 125 Issue: 2, February, 2004 pp: 129-131

Protection of the elderly from pneumococcal pneumonia with a protein-based vaccine?

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Abstract

Vaccines exist to protect children and adults from pneumococcal infection. The adult vaccine contains capsular polysaccharides from those pneumococci causing the vast majority of pneumococcal infection around the world. This vaccine is, however, poorly immunogenic and not as protective as would be desired. The vaccine for children is a seven-valent conjugate vaccine, which is highly protective against invasive infection and offers some protection against otitis media and pneumococcal carriage. The capsular types in the vaccine are not all appropriate for the developing world and the vaccine is too expensive for use in the developing world. As a result of these problems there have been extensive efforts to develop pneumococcal vaccines for adults and children based on cross-reactive protein antigens. The molecules used are in general virulence factors and the antibodies to them neutralize their function, thus reducing the virulence of the infecting bacteria. Studies in humans have revealed that the proteins studied are invariably immunogenic in humans, as at least low levels of antibody are seen following colonization or infection. Studies in mice have demonstrated that vaccines containing more than one of these virulence proteins are generally more protective than those involving just one. Proteins that have been studied the most in mice are pneumococcal surface protein A (PspA), PspC, PsaA, and pneumolysin. PspA has been used in human safety trials and was shown to elicit antibodies that can protect mice from otherwise fatal pneumococcal infections.

45. Vaccine. 2004 Aug 13;22(23-24):3214-24.

The effectiveness of pneumococcal polysaccharide vaccines in adults: a systematic review of observational studies and comparison with results from randomised controlled trials.

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The use of pneumococcal polysaccharide vaccine has remained controversial since licensure, especially in the elderly. Observational studies form much of the evidence base. We conducted a systematic review of observational studies and compared results with those obtained from an earlier review of randomised controlled trials (RCTs). Estimates of protection against invasive disease from observational studies were consistent, homogenous and compatible with sparse information obtained from RCTs. Studies were of moderate quality. From 13 observational studies the estimate of vaccine efficacy against invasive disease was 53% (46-59%) compared with 38% (-4 to 63%) from nine RCTs. Estimates of protection against all-cause pneumonia were based on fewer, heterogeneous studies that were not consistent with the findings from RCTs for this outcome. From five studies combined efficacy was 32% (7-50%) compared with 3% (-16 to 19%) from 13 RCTs.

46. Eur Respir J. 2004 Mar;23(3):363-8.

Additive preventive effect of influenza and pneumococcal vaccines in elderly persons.

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Dept of Communicable Disease Control and Prevention, Stockholm County, Sweden. In 1999, all individuals > or = 65 yrs of age (n=258,754) in Stockholm County, Sweden,

were offered influenza and pneumococcal vaccination in a prospective study on the effectiveness of these vaccines in reducing the need for hospital treatment and death due to influenza, pneumonia and invasive pneumococcal disease (IPD). Data on hospitalisation and mortality during 1 yr were obtained from the administrative database in Stockholm County Council. Vaccination was performed in 124,702 (48%) subjects; 72,107 had both vaccines, 29,346 only had the influenza vaccine and 23,249 only had the pneumococcal vaccine. Compared with the unvaccinated cohort, a lower incidence of hospitalisation for all endpoint diagnoses was seen in vaccinated persons. An additive effectiveness of vaccination was seen when both vaccines were given, with a reduction of hospital admissions for influenza (37%), pneumonia (29%) and IPD (44%). In-hospital mortality for pneumonia was significantly lower in those who received both vaccines, than in unvaccinated persons. To conclude, vaccination with influenza and pneumococcal vaccines together was effective in reducing the need for hospital admission for influenza and pneumonia. There was a strong indication that pneumococcal vaccination alone, was effective not only in the prevention of invasive pneumococcal disease, but also of pneumonia overall, although to a low degree.

47. *Curr Opin Infect Dis.* 2004 Apr;17(2):127-30.

Pneumonia in the elderly.

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PURPOSE OF REVIEW: This review provides an update on new data about the etiology, clinical characteristics, outcomes, and prevention of community-acquired pneumonia. The impact of severe acute respiratory syndrome in older persons is also addressed. **RECENT FINDINGS:** *Streptococcus pneumoniae* remains the most important cause of community-acquired pneumonia in the very elderly (80 years and over). *Pneumococcus* is also an important etiologic agent of pneumonia in residents of long-term care facilities. Clinical signs and symptoms of community-acquired pneumonia are less distinct in this group compared with younger patients. New data about influenza immunization reveal better mucosal immunity with the intranasal vaccine compared with the intramuscular vaccine. A review of clinical trial evidence differs from observational studies that demonstrate a clear benefit of the polysaccharide pneumococcal vaccine in the elderly. The prospect of severe acute respiratory syndrome in older adults is the most important new issue to emerge, as older adults are at increased risk from complications and death. **SUMMARY:** There are many challenges in preventing and managing community-acquired pneumonia in the elderly. *S. pneumoniae* remains the most important cause. The clinical presentation of pneumonia in the very elderly can be nonspecific. Given the safety profile of the vaccine and supportive observational evidence, public health policymakers should continue to support use of the polysaccharide pneumococcal vaccine. However, research into new vaccine strategies, including use of conjugate or common antigen vaccines, is a priority.

48. *Vaccine.* 2004 Jul 29;22(21-22):2806-11.

Influenza and pneumococcal vaccination of the elderly in Taiwan.

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In 1998, Taiwan became the first country in Asia to provide free influenza vaccination to high-risk groups, mainly the elderly. The purpose of this study is to determine: (1) the annual mortality rate from influenza and pneumococcal-related illnesses such as pneumonia, chronic bronchitis, pulmonary emphysema and asthma and (2) the

effectiveness of and adverse events associated with the influenza vaccination. In the elderly, influenza vaccination caused the annual death rate due chronic bronchitis, pulmonary emphysema, and asthma to decline steadily but had no effect on the annual pneumonia death rate. The only adverse effect of concern was vertigo (in approximately 2-3%).