

# Meta-analysis: Many factors affect mortality from community-acquired pneumonia

Fine MJ, Smith MA, Carson CA, et al. *Prognosis and outcomes of patients with community-acquired pneumonia: a meta-analysis.* JAMA. 1996 Jan 10;275:134-41.

## Objective

To determine, using meta-analysis, prognostic factors and mortality in patients with community-acquired pneumonia (CAP).

## Data sources

English-language studies were identified through MEDLINE (1966 to June 1995) with 2 search strategies: all pneumonias and mortality, morbidity, prognosis, or outcome; and all pneumonias and risk factors, survival analysis, survival rate, or time factors. Bibliographies of relevant papers were checked.

## Study selection

Studies of adults were selected if > 50% of the cases of pneumonia were confirmed by radiography and if the number of patients and deaths were provided. Exclusion criteria were nosocomial or noninfectious pneumonia, pneumonia in patients with HIV infection, case reports and small case series, studies of infants and children, and an-

## Commentary

CAP is a common condition that has substantial morbidity and is a leading cause of death. The prognosis of adults with CAP varies depending on the setting and patient characteristics. CAP may be a preventable illness in an ambulatory healthy adult, a serious illness that requires intensive care in a patient with underlying disease, or a fatal illness in an elderly patient in a nursing home.

This well-done meta-analysis on the prognosis of adults with CAP by Fine and colleagues provides useful information. For clinicians, it emphasizes the importance of the setting, with mortality rates of 5.1% in a combined hospital and ambulatory setting compared with 31% in the nursing home and 37% in the intensive care unit. The study quantifies the risk for death that is associated with presenting signs and medical diagnoses. For

tibiotic studies. 4573 citations were identified, 494 studies were reviewed, and 122 studies were included.

## Data extraction

Data were extracted on study design, patient characteristics, prognostic factors, and rates for death and other relevant outcomes. Data on 32 clinical variables related to death were analyzed and reported as odds ratios (ORs) and rate differences (RDs), defined as the percentage mortality in the exposed group minus the percentage in the nonexposed group.

## Main results

127 study cohorts (33 148 patients) were studied. 57% of the patients were men, 43% were black, and the weighted mean age was 61 years. The 3 largest comorbidities were smoking (49% of patients), pulmonary disease (33%), and congestive heart failure (26%). Overall mortality was 13.7%. Findings on history and examination associated with reduced mortality were chills (RD -6%, 95% CI -13% to 0%) and pleuritic chest pain (RD -4%, CI -8% to -1%). Mortality increased with increased age in 10-year increments (OR 1.05, CI 1.01 to 1.09) and with tachypnea (RD 9%, CI 4% to

investigators, it emphasizes the need for future studies to incorporate multivariate analyses, address outcomes other than death and long-term follow-up, and include more ambulatory patients from various clinical settings. Only 5% of the studies in this meta-analysis focused on pneumonia in patients in nursing homes, and only 7% focused on elderly persons. Two thirds of the studies included only hospitalized patients. In some settings, most episodes of lower-respiratory-tract infection in elderly persons are treated in the community (1); the outcomes in this population need further study.

The strengths of this meta-analysis are the thoroughness of the search, assessment of the quality of the studies, and the use of both the relative risk (ORs) and the absolute risk (RDs) for prognostic factors. An important limitation is the reasonable

13%); hypotension (RD 24%, CI 10% to 38%); and hypothermia (RD 19%, CI 8% to 30%). Mortality was associated with the following comorbidities: diabetes mellitus (RD 2%, CI 1% to 4%); neoplastic disease (RD 15%, CI 8% to 22%); and neurologic disease (RD 42%, CI 8% to 76%). Diagnostic tests associated with mortality included leukopenia (RD 8%, CI 1% to 15%); bacteremia (RD 15%, CI 10% to 21%); and radiographic infiltrate in > 1 lobe (RD 14%, CI 3% to 25%).

## Conclusion

Mortality from community-acquired pneumonia is high and is associated with various clinical findings, comorbid conditions, and laboratory and radiographic features.

Source of funding: Agency for Health Care Policy and Research.

For article reprint: Dr. M.J. Fine, 200 Lothrop Street, Montefiore University Hospital, University of Pennsylvania Medical Center, Suite E820, Pittsburgh, PA 15213-2582, USA. FAX 412-692-4892.

Abstract and Commentary also published in *ACP Journal Club*. 1996;125:20.

but arbitrary restriction to studies in which at least 50% of the patients had radiographic confirmation of pneumonia, thus potentially excluding studies done in ambulatory settings and nursing homes where radiographic confirmation may not be obtained in many patients with CAP. Nevertheless, this study provides important insight into the prognostic factors for death of patients with this serious respiratory infection.

Marc D. Silverstein, MD  
Mayo Clinic  
Rochester, Minnesota, USA

## Reference

1. Houston MS, Silverstein MD, Suman VJ. Community-acquired lower respiratory tract infection in the elderly: a community-based study of incidence and outcome. *J Am Board Fam Pract*. 1995;8:347-56.