

# Hospitalization and Mortality Rates for Nursing Home–Acquired Pneumonia

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**BACKGROUND.** The effect of hospitalization on nursing home patients with pneumonia is not known. We hoped to learn more about the effect of hospitalization on outcome by comparing patients with pneumonia from 2 nursing homes.

**METHODS.** Using a retrospective chart review, we compared a total of 129 patients with pneumonia from 2 community nursing homes in upstate New York over a 2-year study period. The main intervention measures were treatment in the hospital or treatment in the nursing home. The main outcome measures were resolution or mortality at 6 weeks.

**RESULTS.** Nursing home B had a hospital admission rate for pneumonia (38.8%) that was double that of nursing home A (19.4%). The patient populations were judged to be similar, and the overall mortality outcome for both (weighted average = 24.8%) was essentially identical.

**CONCLUSIONS.** Doubling the hospital admission rate in 1 of 2 similar groups of nursing home patients with pneumonia was not associated with an improved mortality outcome at 6 weeks.

**KEY WORDS.** Pneumonia; nursing homes; mortality. (*J Fam Pract* 1999; 48:291-293)

More nursing home patients are admitted to the hospital for an infection than for any other reason, and pneumonia is responsible for the most hospital admissions and deaths in this patient population.<sup>1-4</sup> During the last decade, preliminary research has supported a trend toward treating patients with nursing home–acquired pneumonia (NHAP) in the nursing home, instead of in the hospital.<sup>5-13</sup>

This is our second report on the nursing home population,<sup>5</sup> but it is the first time we separated the patients in our study group according to nursing home residence. As practicing physicians at the referral hospital system, our utilization review indicated a possible significant difference in the hospitalization rate between the 2 nursing homes, and we wanted to see if this affected overall mortality outcome.

Several papers have identified predictors of mortality in patients with NHAP. Measures showing a decline in a nursing home patient's general well-being, such as activities of daily living (ADL), premorbid health conditions, functional status, or cognitive ability, appear to have been most consistently associated with increased mortality.<sup>2,10,14-20</sup> However, even though there was consistent evidence of poorer outcome in nursing home patients with pneumonia and certain predictors, there was very little

information on how hospitalization affected outcome. One study by Fried and colleagues<sup>18</sup> of 316 episodes of NHAP suggested that the presence of tachypnea predicted that hospitalization would improve outcome. However, the assumption that treating nursing home patients with pneumonia in a hospital setting improves overall outcome has never been proved.

## METHODS

We performed a retrospective chart review of 2 community nursing homes (designated A and B) in upstate New York. These 2 nursing homes were chosen because of the investigators' familiarity with the facilities from working in the referral hospital system, and because they are located approximately 2 miles from each other. Their geographic proximity indicates that they are drawing from the same patient population.

The facilities had very similar nursing education levels and staffing patterns. Intravenous medications were not used in either nursing home. Both facilities had subacute-care patients. The average population size was similar, with 150 residents in nursing home A and 160 residents in nursing home B during the 2-year study period, from January 1993 to January 1995.

Infection control records in the nursing homes were used to develop an initial list of patients who had been given a diagnosis of pneumonia. Patients were included in the analysis if they had a new infiltrate found on chest radiograph within 48 hours of the diagnosis. In addition, at least 1 of the following signs had to be present: fever (temperature of 101°F or higher or an increase of 2°F above baseline); leukocytosis; tachyp-

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TABLE 1

## Activities of Daily Living Measures for Patients Later Given a Diagnosis of Pneumonia from 2 Different Nursing Homes

ADL	Nursing Home A mean $\pm$ SD	Nursing Home B mean $\pm$ SD
Eating	3.00 $\pm$ 1.30	2.97 $\pm$ 1.11
Toileting	3.49 $\pm$ 0.94	3.43 $\pm$ 0.97
Transferring	3.45 $\pm$ 0.96	3.40 $\pm$ 0.91
Mobility	3.96 $\pm$ 1.41	4.11 $\pm$ 1.25

ADL denotes activities of daily living; SD, standard deviation.

nea (more than 20 breaths per minute); new cough with sputum production; or decline in activity or functional status.

An ADL score was abstracted from a standardized patient-review instrument that appeared in all patient charts.<sup>21</sup> The scores used were from the most recent patient-review instrument that was completed more than 2 weeks before the patient's entry diagnosis of pneumonia. Four activities—eating, toileting, transferring, and mobility—were scored on a 5-point Likert-type scale (where 1 = highest functional status and 5 = total dependence).

Data were analyzed using the Statistical Package for Social Sciences (SPSS; Chicago, Illinois).<sup>22</sup> Continuous variables were analyzed using the Student *t* test, and categorical variables were analyzed using likelihood ratios, chi-squared tests, confidence intervals, or the Fisher exact test when the sample size was small.

Patients were divided according to their nursing home residence. The 2 main treatment strategies were continued care in the nursing home or hospitalization within 24 hours of the initial diagnosis of pneumonia. Subsequently, there were 2 basic outcomes: improvement (resolution of entry criteria) or death within 6 weeks of the diagnosis.

TABLE 2

## Hospitalizations and Outcomes for Patients with Pneumonia from 2 Different Nursing Homes

Nursing Home	Not Hospitalized		Hospitalized		Admission Rate, %	Overall Mortality Rate, % (95% CI)
	Died	Resolved	Died	Resolved		
A	10	40	6	6	19.4	25.8 (22.4 - 29.2)
B	7	34	9	17	38.8	23.8 (20.6 - 27.0)

Note: For nursing home A, N = 62; for nursing home B, N = 67. CI denotes confidence interval.

## RESULTS

Sixty-two patients from nursing home A and 67 patients from nursing home B met our inclusion criteria. The average age at diagnosis was 83.7 years and was statistically similar in both nursing home groups. The annual incidence for NHAP, at the 2 nursing homes studied was essentially identical (20.6% vs 20.9%). Neither patient sex nor age predicted hospitalization or outcome. Average scores for each of the ADL measures were not significantly different ( $P > .05$ ) between the 2 nursing home groups (Table 1).

Nursing home B had an admission rate of 38.8% for patients with NHAP, twice that of nursing home A. Despite this significant difference in admission rates, there were no significant differences ( $P > .05$ ) in mortality rates between the 2 nursing home groups for hospitalized patients, nonhospitalized patients, and overall mortality outcome at 6 weeks (Table 2).

Surprisingly, the remainder of the identifying data comparing the 2 nursing home groups (age, percentage of women, use of oxygen, average number of prescribed medications per patient, diagnostic entry criteria, and incidence of major comorbidities) also did not identify any significant statistical differences ( $P > .05$ ). The average length of stay for hospitalized residents of approximately 10 days was the same for both nursing homes.

Patients in both nursing home groups who were hospitalized for pneumonia were associated with a significantly higher risk of dying than those who were not hospitalized. Hospitalized patients from nursing home A had a fourfold chance of dying, and those from nursing home B had a 2.56 times' chance.

## DISCUSSION

Both nursing homes had higher mortality rates for patients treated in the hospital than for those treated in the nursing home. Intuitively, sending patients who are more ill to the hospital for treatment seems like reasonable clinical judgment. However, if this intervention

does not improve outcome, then hospitalization would not be indicated.

Our findings do not provide an acceptable or standard admission rate for nursing home patients with pneumonia, or suggest that nursing homes should start slashing their admission rates for patients with NHAP. However, we also do not believe our study results are isolated or parochial. In an 1897 paper, Sir William Osler<sup>23</sup> stated that "to die of pneumonia [is] the natural end of elderly people." More than 100 years later, this observation may still apply.

Whether because of the advent of stronger oral antibiotics or the beginning of critical investigations of the treatment outcomes for NHAP, it appears that the pendulum has swung away from hospitalizing nursing home patients with pneumonia. The next question to be asked may be: Which select minority of patients with NHAP would benefit from hospitalization? We believe that if supplemental oxygen and a reliable delivery route for antibiotics are available to the nursing home resident with pneumonia, hospitalization can generally be avoided.

## LIMITATIONS

Our study was limited because of its small sample size and retrospective design. There were many confounding variables we were unable to control, such as the treating physicians, the quality of care received in each nursing home, the specific antibiotics chosen, and input from the patients' families. Despite this, we were able to demonstrate the similarity of the most important prognostic variable — ADL scores — by comparing our 2 nursing home groups, and we documented several other important measures of sameness.

## CONCLUSIONS

Our study is the first to document a lack of association between hospitalization and decreased mortality in 2 similar groups of nursing home patients with pneumonia. There was a significant difference in the admission rate between the 2 groups with NHAP ( $P < .05$ ), but not a significant difference in mortality outcome at 6 weeks.

Our results raise some interesting and provocative conclusions that should stimulate further study on the effect of hospitalization on patients with NHAP, including whether the choice of oral antibiotics in the nursing home setting affects outcome.

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