Nursing-Home-Acquired Pneumonia: How and Where to Treat?

Lower respiratory tract infections (LRIs), principally pneumonia, are a leading cause of morbidity, mortality, and hospitalization of nursing home residents. Nursing-home-based studies since the mid-1980s suggest an LRI incidence of 540 to 943 per 1000 patient-years with 12 to 28 percent mortality from pneumonia or LRI.[1-5] In one study, LRIs accounted for 12 percent of all resident hospitalizations.[6]

Based primarily on hospital data, reviews from the late 1980s uniformly advocated hospitalization or at least broad-spectrum parenteral antibiotics for all cases of nursing-home-acquired pneumonia.[7-10] Studies from that era showed substantial variation among facilities in how frequently residents were hospitalized for infection.[11,12] Furthermore, the data suggested that institutional characteristics and practices mattered as much as patient characteristics in predicting hospitalization.

Yet for many nursing home residents, hospitalization can lead to serious negative consequences that could outweigh potential benefits. Hospitalized nursing home residents face new caregivers in unfamiliar surroundings. They are prone to such untoward consequences as immobility, urinary catheterization, pressure ulcers, and delirium.[13,14] From a social perspective, hospital costs for treating pneumonia likely substantially exceed nursing home costs. If pneumonia treatment in the nursing home is efficacious, caregiver continuity, patient comfort, and lower costs provide compelling reasons to treat it there.

In this issue of the *Journal*, Thompson and colleagues report on hospital and nursing home care for nursing-home-acquired pneumonia.[15] This retrospective study is the fourth—all in the past 5 years—discussing outcomes of pneumonia or LRI in nursing home residents.[1,4,5,15] Though all four considered treatment in the nursing home and the hospital, they used different illness and outcome definitions. All required some evidence of acute illness, and three of the four required an infiltrate on chest radiograph for study inclusion.[4,5,15] Mortality end points varied from death during treatment to death by 6 weeks from illness onset.

Thompson and colleagues found that most residents were cared for in the nursing home with oral or intramuscular antibiotics. Six-week mortality rates were 18.7 percent for those cared for in the nursing home and 39.5 percent for those cared for in the hospital. The authors do not tell us whether they included in the hospitalized group only immediate admissions or also later hospitalizations from those who failed initial care in the nursing home. This information might be difficult to ascertain from retrospective data, but it is a crucial distinction in understanding the effectiveness of nursing home treatment. The study found some predictors of hospitalization but no effective outcome predictors. In contrast to all three of the previous studies, dependency in activities of daily living was not associated with either mortality or hospitalization. Although clinicians ordered a wide variety of antibiotics, ciprofloxacin and ceftriaxone were the two most commonly used agents.

Along with all studies retrospectively focusing on LRIs, the present study has several limitations. First, clinicians might not order chest radiographs in nursing home residents with possible pneumonia. Patients without chest radiographs were excluded in Thompson's study and in two of the three other studies. Even if a broader surveillance definition is used, as my colleagues and I did in our earlier study,[1] there is no way of knowing whether all of the appropriate cases are included.

Second, abstracted records contain information of varying completeness and quality. Nurses

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and physicians are concerned with documenting care rather than evaluating predictors of LRI outcomes. In many institutions LRIs are treated by telephone, often with the only evaluation by facility nurses. This process substantially limits the usable data for considering outcome predictors.

Finally, all observational studies, both prospective and retrospective, face the problem of controlling for confounding variables. For example, poor outcomes associated with hospitalization or parenteral antibiotics undoubtedly reflect sicker residents receiving more aggressive treatment. The higher percentage of deaths likely relates more to illness severity than the treatment received. The three previous studies used multivariable methods to control for some confounders.[1,4,5] In all cases, however, it is likely that other relevant confounders were not detected. Because investigators can never be certain that they have accounted for all confounders, observational studies cannot tell us whether hospital or nursing home care is best for nursing-home-acquired pneumonia. Nonetheless, prospective observational studies can help us recognize low-risk residents for whom treatment in the nursing home is almost certainly appropriate. The Agency for Health Care Policy and Research recently funded a large prospective study of outcomes of LRI in nursing home residents. As data from this project become available, we should be able to make improved risk assessments.

Understanding risk is one element in making treatment decisions concerning serious infections in nursing home residents. Such decisions require a four-step process. The first step is to make a diagnosis. Although the symptoms and signs of pneumonia might be subtle, cases with truly nonspecific clinical manifestations are in a distinct minority. In Thompson's study, 79 percent of those treated in the nursing home had a fever.[15] Among those hospitalized, 63 percent had fever, and 58 percent had tachypnea.

Second, clinicians must consider appropriate goals for the resident. While some nursing home residents are candidates for aggressive therapy, strictly palliative care might be most appropriate for others. Many residents and their families do not desire aggressive care at the end of life, particularly where severe dementia has developed.

Third comes risk assessment. If we can determine which low-risk individuals are very likely to survive, they are probably excellent candidates for treatment in the nursing home. Additionally, knowing that a resident is at very high risk for dying can help make a decision to limit care. Finally, in residents who are candidates for therapy, the existence of any special conditions needs to be considered. For example, residents in facilities that are closely linked to a tertiary care hospital might be more likely to be colonized with resistant organisms.

Until we have better data, the decision on how and where to treat will remain subjective. Residents who are candidates for aggressive treatment and seem severely ill should probably be hospitalized. Many nursing home residents, however, will be appropriately treated in the facility. While older reviews recommended one or more parenteral broad-spectrum antibiotics, the authors of a careful 1994 review suggested oral trimethoprim-sulfamethoxazole for nursing-home-acquired pneumonia treated in the facility.[16] Alternatives were parenteral ceftriaxone or oral ciprofloxacin. For hospitalized residents, these authors recommended ampicillin-sulbactam; alternatives were cefotetan or intravenous ciprofloxacin.

Thompson and colleagues document a changing perspective on treating pneumonia in nursing home residents. Reflecting actual community practice, pneumonia treatment in the nursing home is now considered respectable and in some cases preferable. If so-called subacute care in nursing homes becomes more widespread, even more residents will receive their pneumonia care in nursing homes rather than being hospitalized. Whether treatment of pneumonia in the nursing home represents a step forward in care quality at a reduced cost will depend on how subacute care is implemented in individual facilities. Forthcoming prospective outcome studies will aid us in better judging individuals' risks and can help us understand the consequences of the changing management for nursing-home-acquired pneumonia.

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Difficult Decisions

Of all bodily desires, it is the sexual to which they [adolescents] are most disposed to give way, and in regard to sexual desire they exercise no restraint.

— Aristotle

The adult community is anxious and worried about the reported increased prevalence of early sexual activity among adolescents. Research fostered by educators, health care providers, and government agencies explores the nature of events leading to initiation of sexual activity and methods to postpone the timing of sexual debut. Norms created by modern society define behaviors appropriate for a given age and a range of ages appropriate for life transitions. Among these transitions is the initiation of sexual activity. Adults accept sexual experimentation as integral to adolescent growth and development. Fearing serious ramifications for accomplishment of future tasks, however, adults oppose frequent practice of such behavior.

Many studies show outcomes of this risky behavior to include high rates of sexually transmitted diseases, teenage pregnancy, substance abuse, and serious school problems. In addition, Billy and colleagues[1] have reported adverse effects on the social and psychological development of the adolescent. These effects appear more marked among whites than African Americans. Further, the study found a strong negative effect on self-reported academic grades among white male adolescents and a negative effect on the importance placed on going to college among white female adolescents. Both effects could jeopardize the future well-being of the adolescents. Several studies have looked at risk factors or social circumstances that predict early sexual activity. Ku and colleagues[2] documented that being African American, especially male, predicts a higher rate of early intercourse. In addition, being a child of a woman who first gave birth as a teenager, being held back in school, experiencing early physical maturation, or associating with an older partner increase the risk of initiating sexual activity early in adolescence.

The timing of the first intercourse varies widely from early adolescence to adulthood. Improved understanding of this event can lead to more effective educational interventions to postpone the experience and minimize the risks of the behavior. In their article, "First Coitus for Adolescents, Understanding Why and When," in this issue of the *Journal*, Alexander and Hickner[3]

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