Editorial

Hospital-Resource Utilization and Tuberculosis

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As I sat down to write this editorial, I was paged by a colleague who had just learned that she may have pulmonary tuberculosis. She had a very strong exposure history in a highly endemic area of the world within the past year, a positive tuberculin skin test, and a "soft" but compatible history of recent symptoms. Her only available diagnostic test, a chest radiograph, obtained because of a nonproductive cough of 1 week duration, was suggestive of pulmonary tuberculosis. Based on this information, I arranged for her to be furloughed from work, ordered sputum specimens, and sent her home to complete the evaluation as an outpatient. One of her first two sputum smears was positive for acid-fast organisms, and antituberculosis therapy was initiated at home.

Six months ago, while I managed a hospitalized diabetic, alcoholic patient with multidrug-resistant tuberculosis and a track record of poor compliance, the medical director of the patient's managed-care company called to inform me that payment for the hospitalization would be denied effective 2 days after an episode of massive hemoptysis. He expressed his concern for the dilemma I faced, but informed me that the hospitalization would be denied nonetheless. I replied that the dilemma was his, not mine, and that I would not discharge the patient from the hospital. Each of us stood our ground, and the patient stayed in the hospital. The institution eventually recouped a level of reimbursement below the acute-care rate. The patient was discharged a week later, but died within a month, although not of hemoptysis.

Opinions on the role of hospitalization for tuberculosis are divided. Physicians with whom I've shared these cases, an admittedly biased sample, have concurred with my decisions. I believe most physicians who treat tuberculosis regularly would have managed these patients in a similar fashion. Milliman and Robertson, Inc, a national consulting firm that provides guidelines to managed-care organizations on length of stay, indicates in the December 1997 edition of its *Healthcare Management Guidelines* that, for all diagnostic categories of tuberculosis, a 2- to 4-day hospitalization is the optimal length of stay, with the exception of tuberculous meningitis, which is accorded 7 days.[1] These guidelines are designed to "define recovery and care for patients who do as well as one hopes and have no complications."[2] The authors acknowledge that their recovery guidelines are "extremely optimistic and in some instances, unrealistic," particularly for the most severe medical conditions. The qualifications in these guidelines notwithstanding, the denial I described previously is not an unusual occurrence. Our institution is informed regularly by managed-care organizations that admissions for the evaluation and initiation of therapy for tuberculosis will be denied on the basis that such patients can be evaluated and have therapy initiated in the outpatient setting. At the heart of the issue is the cost of hospitalization and resource utilization.

To this debate, Griffiths and colleagues have injected science from their well-executed study published in the current issue of *Infection Control and Hospital Epidemiology.*[3] They have evaluated the utilization of medical resources related to tuberculosis in a municipal hospital in a community with one of the highest endemic rates of tuberculosis in the United States. Cases were selected on

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the basis of having a positive acid-fast smear or culture, and controls were selected with no microbiological evidence of infection with *Mycobacterium tuberculosis.* Patients were stratified into four mutually exclusive categories, based on the results of sputum cultures and smears, and outcomes were assessed during the diagnostic phase and postdiagnostic phase of each admission. The results provide a striking insight into the current state of our management and diagnostic tools for tuberculosis.

More than 3% of the admissions to the study hospital had culture-proven *M tuberculosis* infection in 1993, a year near the peak of the recent resurgence of tuberculosis in the United States. Fifty-one percent of those admitted with a diagnosis of tuberculosis were proven to have the disease by culture. This rate of culture-proven disease among those admitted with the diagnosis is impressive, given the uncertainty that is characteristic of many admissions for tuberculosis. Clinicians have been encouraged to "think TB" and to consider tuberculosis in their differential reasoning because of the varied manifestations of the disease, particularly among human immunodeficiency virus (HIV)-infected persons. Indeed, failure to consider tuberculosis as the cause of pulmonary disease was an important factor in the outbreaks of nosocomial tuberculosis in the early 1990s.[4,5] It should not be concluded that the remaining 49% of patients who were culture-negative wasted precious hospital resources. Some of those who were not proven by culture to have tuberculosis could have had clinically active but culture-negative disease for reasons such as poor sputum quality, lack of effective cough, or failure to perform more invasive studies such as bronchoscopy to obtain the diagnosis. In this highly endemic community, "thinking TB" was an appropriate strategy as tuberculosis reemerged.

Griffiths and colleagues demonstrated that the length of stay was long in each diagnostic category. Patients who were culture- or smear-positive were hospitalized for a median duration of 18 to 41 days. Culture- and smear-negative suspects were hospitalized for a median of 16 days, still much longer than the optimal lengths of stay described by Milliman and Robertson's *Guidelines*. Undoubtedly, concurrent illnesses in nontuberculous diagnostic categories contributed to these extended hospitalizations.

The majority of hospital days spent in isolation occurred in the smear-positive categories. The culture-positive, smear-positive group was most likely to be isolated, have a longer length of stay, and receive antituberculosis medications. Those without culture-proven disease still accounted for 36% of the isolation days utilized and 65% of inpatient medication days. It is noteworthy that 43% of those patients who were culture- and smear-negative were in respiratory isolation for some period of time during their hospitalization. Additionally, other resources such as consultative services, imaging studies, and invasive procedures not specifically related to tuberculosis were consumed in large quantities. Categories of patients other than culture-positive and smear-positive, particularly those in whom diagnostic uncertainty was greater, utilized more invasive procedures.

An assessment of appropriate resource utilization in this arena must be conducted with the knowledge of the current state of our diagnostic tools, the endemic rates of tuberculosis in the United States, and physician practice patterns. The poor predictive value of our screening tools such as the tuberculin skin test and the sputum acid-fast smear, in addition to recent public health concerns regarding the resurgence of tuberculosis, has driven resource consumption in this area. The authors note appropriately that diagnostic uncertainty and the push to identify and isolate all tuberculosis suspects as soon as possible drives resource utilization; however, tuberculosis cases have declined considerably since 1993, the year the cohort in this study was admitted to the hospital.[6] To the extent that 1993 perceptions of disease prevalence are applied to 1998 hospitalization criteria and diagnostic-test interpretation, excess resource utilization will continue to occur, perhaps in greater volume than in 1993.

This report should make us cognizant of the resources consumed in the effort to control tuberculosis in the United States. The results of this study should not be used to minimize the need for hospitalization among tuberculosis suspects. The current state of diagnostic testing is such that our resource utilization is driven by the poor quality of our tools. Tests with better positive and negative predictive values will produce shorter hospital stays and reduce resource consumption. Broader application of the TB-direct test is necessary. For smear-positive individuals, the positive and negative predictive values of this test exceed 90%, but fall considerably short of that level for smear-negative and nonpulmonary specimens.

The problem for physicians, health systems, and the public health is very real. Many patients suspected of having pulmonary tuberculosis have concurrent medical and social morbidities that render an outpatient evaluation extremely difficult. The expectation that such patients will return on multiple occasions to complete their workup, initiate therapy, and gain tolerance of the medications is often unrealistic. The discharge of such patients from emergency departments and ambulatory clinics when homelessness or drug or alcohol addiction is prevalent inevitably will send contagious persons back into the community, leading to additional infection and disease. Hospitals should continue to serve the important public health function of evaluating tuberculosis suspects when they voluntarily seek care.

What is the most appropriate approach to hospitalization for tuberculosis? The current guidelines of the Centers for Disease Control and Prevention and the American Thoracic Society do not address this issue.[7] No consensus or guideline exists on this issue, and, as a result, managed-care organizations have filled the void. The National Tuberculosis Controllers Association recently completed a survey on managed-care initiatives, but the results have not yet

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been made public. Some TB controllers have taken the initiative in their own jurisdiction to help establish the community standard of care for managed-care organizations.

Physicians who manage tuberculosis and public health agencies responsible for the control of tuberculosis are not blind to the costs of hospitalization. Recent increases in federal funding for tuberculosis notwithstanding, physicians and public health officials are acutely aware that funding for communicable disease is not a bottomless pit and that the future of appropriations and the distribution of funds is uncertain. It should be noted that federal funding to public health agencies cannot be used for direct patient care. While any future reductions in federal support for TB control activities would not affect direct patient care, it becomes that much more important that private physicians, hospital systems, and managed-care organizations behave appropriately in managing patients who are suspected or proven to have tuberculosis. Under-utilization of appropriate inpatient resources will affect public health resource utilization adversely. We are all in this together, and we will do well to recall this quote from the 1994 Statement of the American Thoracic Society and Centers for Disease Control and Prevention on "The Treatment of Tuberculosis and Tuberculosis Infection in Adults and Children":

The ultimate elimination of tuberculosis requires an organized and smoothly functioning network of primary and referral services based on cooperation between health care facilities and community outreach programs, and between the private and public sectors of medical care.

There is merit in both the inpatient and outpatient approach to the diagnosis and initiation of therapy for tuberculosis, but narrow prescriptions for care that deny reasonable inpatient admissions in a disease of such social complexity are wrongheaded. Many patients with tuberculosis do not require acute-care hospitalization, but hospitalization will benefit many patients and society. The web of poverty, substance abuse, concurrent illnesses such as HIV, and frequent adverse drug reactions are intrinsic components of this disease and should not be separated to be managed in different environments by different caregivers. Inpatient care is often the best, most efficient, and most effective means to diagnose tuberculosis, initiate therapy, address related issues, educate about the disease, and monitor for adverse drug reactions and intolerance.

The study of Griffiths et al shines a light on the cost of this disease and cries out for better diagnostic tests. When better diagnostic tests become widely available, resource consumption will fall. Until that time, hospitalization will remain an important component of tuberculosis care. Physicians and institutions should resist intrusions on appropriate inpatient management.

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