OBJECTIVE: To determine whether older age continues to influence patterns of care and in-hospital mortality for hospitalized persons with HIV-related Pneumocystis carinii pneumonia (PCP), as determined in our prior study from the 1980s.

DESIGN: Retrospective chart review.

PATIENTS/SETTING: Patients (1,861) with HIV-related PCP at 78 hospitals in 8 cities from 1995 to 1997.

MEASUREMENTS: Medical record notation of possible HIV infection; alveolar-arterial oxygen gradient; CD4 lymphocyte count; presence or absence of wasting; timely use of anti-PCP medications; in-hospital mortality.

MAIN RESULTS: Compared to younger patients, patients ≥50 years of age were less likely to have HIV mentioned in their progress notes (70% vs 82%, P < .001), have mild or moderately severe PCP cases at admission (89% vs 96%, P < .002), receive anti-PCP medications within the first 2 days of hospitalization (86% vs 93%, P < .002), and survive hospitalization (82% vs 90%, P < .003). However, age was not a significant predictor of mortality after adjustment for severity of PCP and timeliness of therapy.

CONCLUSIONS: While inpatient PCP mortality has improved by 50% in the past decade, 2-fold age-related mortality differences persist. As in the 1980s, these differences are associated with lower rates of recognition of HIV, increased severity of illness at admission, and delays in initiation of PCP-specific treatments among older individuals—factors suggestive of delayed recognition of HIV infection, pneumonia, and PCP, respectively. Continued vigilance for the possibility of HIV and HIV-related PCP among persons ≥50 years of age who present with new pulmonary symptoms should be encouraged.

KEY WORDS: HIV; Pneumocystis carinii pneumonia; age; quality of care; outcomes.


The Centers for Disease Control and Prevention (CDC) reports that 5% of HIV infection cases in the United States through December 1999 were diagnosed in persons 50 years of age or older, and the percentage of AIDS cases diagnosed in this age group has remained at about 10% since 1991.1,2 However, health care workers and the public alike tend not to perceive HIV infection as a disease affecting older patients. A 1996 survey found that primary care physicians rarely discussed HIV/AIDS or HIV-related risk factor reduction with older patients and that older patients rarely asked questions concerning HIV or AIDS.3 Asymptomatic older HIV-infected individuals are less likely to seek out testing and medical care.4 Symptomatic older HIV-infected individuals are more likely to attribute HIV-related symptoms to other illnesses or to the normal aging process.4 Consequently, HIV infection in older patients may not be recognized until late in the course of the disease. The CDC estimates suggest that a higher proportion of older HIV-infected individuals present with an AIDS-defining opportunistic illness (OI) and die within the same month of being diagnosed with AIDS than younger HIV-infected persons.2 Deaths due to HIV infection may also go unrecognized in older individuals. Researchers at a Harlem, NY, hospital examined a sample of deceased patients without known HIV diagnosis and found a 6% rate of HIV infection in anonymous blood samples from older, deceased males and a 9% rate of HIV infection in older, deceased females.5

Although the use of prophylaxis and highly active antiretroviral therapy (HAART) has reduced the incidence of AIDS-defining OIs among HIV-infected patients, Pneumocystis carinii pneumonia (PCP) still remains an important OI. CDC surveillance from 1992 to 1997 indicates that PCP continued to be the most common presenting AIDS-defining OI.6 AIDS-defining OIs such as PCP are more likely to occur in patients who are considered unlikely to be HIV-infected or for whom access to HIV care occurs late in the disease course, as may be the case with many older, HIV-infected patients.5

Using data from 2,174 HIV-related PCP cases diagnosed between 1987 and 1990, we previously reported that patients ≥50 years of age were 10% less likely to have HIV
noted in their progress notes, 15% less likely to present with mild or moderately severe cases of PCP, 11% less likely to receive timely PCP-specific therapy, and almost twice as likely to die in-hospital compared to younger patients. A decade later, overall care for PCP has improved dramatically, with inpatient mortality rates decreasing from 18% in the late 1980s to 11% during the years 1995 to 1997. In light of the overall improvements in PCP care and outcomes, we evaluate whether age-related differences in severity of illness at admission, PCP-related patterns of care, and survival still persist.

METHODS

Sampling of Cities, Hospitals, and Patients

This cross-sectional study analyzes the care processes and outcomes of 1,861 HIV-infected patients who received care for PCP in New York, NY; Chicago, Ill; Los Angeles, Calif; Miami, Fla; Seattle, Wash; Phoenix, Ariz; Nashville, Tenn; and Memphis, Tenn, from 1995 to 1997. These cities represent 4 high AIDS-incident and 4 intermediate-to-low AIDS-incident regions, geographically dispersed across the United States.

The sampling method for hospitals and patients has been described in detail previously. In each city, a random sample of non-Veterans Affairs hospitals was chosen for inclusion in the study. Seventy-eight hospitals, representing >90% of hospitals chosen for the study, agreed to participate. Hospitals differed in ownership, teaching affiliation, and prior experience with AIDS patients. From each hospital, a random sample of HIV-infected PCP patients was selected. The number of charts reviewed from each hospital was approximately proportional to that hospital’s caseload.

All medical records with International Classification of Diseases, 9th Revision, Clinical Modification codes for PCP (136.3) and HIV-related disease (042–044) between January 1, 1995, and December 31, 1997, were screened for inclusion in the study. Eligibility criteria required that patients be 18 years of age or older and have cytologic confirmation of PCP or physician notes indicating that PCP accounted for the pulmonary process. Patients were excluded if they had received medical care for the current PCP episode at another hospital, were admitted for other conditions or only for diagnostic bronchoscopy, or had a diagnosis of cancer (except Kaposi’s sarcoma) reported in either the admitting note or discharge sheet.

Data Acquisition and Quality

Information from 1,861 medical records was included in this study. In each city, trained registered nurses having experience with AIDS and utilization review were recruited as medical records abstractors. Data quality was ensured by periodic evaluation of abstracted data by a study physician. Inter-rater reliability was evaluated by reabstraction of 5% of the records by a different abstractor.

Greater than 95% concordance was observed regarding sociodemographic characteristics, severity of illness, process of care, and outcomes.

Study Variables

Patient Characteristics. Patients were characterized by age, gender, race, HIV-related risk factor, insurance status, and prior HIV-related care. Age at hospital admission was measured as a continuous variable using date of birth or was recorded directly from the medical record. As in previous HIV-related age studies, patients aged 50 years or older constituted the older age group. Race was categorized as white, African American, or Hispanic/other. HIV-related risk factors were categorized according to information included in the medical records and included the following hierarchically ordered groups: men who have sex with men (MSM), patients reporting injection drug use, patients reporting noninjection drug use, and patients with unknown or unreported risk factors. Heterosexual acquisition of HIV-infection was infrequently noted in the medical records. Insurance status was categorized as private insurance (including fee-for-service and preferred provider organizations), public insurance (including Medicaid, Medicare, and government-sponsored veterans insurance), and self-pay/no insurance. Prior HIV-related care included prior antiretroviral and PCP prophylaxis use.

Severity of Illness. Alveolar—arterial oxygen gradient was categorized as ≤48.5 mm Hg and >48.5 mm Hg. CD4 lymphocyte counts were classified as <50 cells/mm³, 50–200 cells/mm³, or >200 cells/mm³, based on information on CD4 count measurements obtained within 3 months prior to admission. Low rates of recording of actual CD4 lymphocyte counts limited our ability to evaluate a continuous versus categorical measure for this variable. Severity of illness (SOI) at admission was categorized using a recently developed PCP-specific staging system based on three factors. Stage 1 included patients with no evidence of wasting (operationally defined as documentation of weight loss >20% and/or wasting syndrome) and an alveolar—arterial oxygen gradient ≤53 mm Hg and had an associated mortality rate of 3.7%. Stage 2 included patients with wasting and an alveolar—arterial oxygen gradient ≤53 mm Hg and had an associated mortality rate of 8.5%. Stage 3 included patients with no evidence of wasting and an alveolar—arterial oxygen gradient >53 mm Hg and had an associated mortality rate of 16.1%. Stage 4 included patients with an alveolar—arterial oxygen gradient >53 mm Hg, evidence of wasting, and a serum albumin level >2.55 g/dl and had an associated mortality rate of 23.3%. Stage 5 included patients with an alveolar—arterial oxygen gradient >53 mm Hg, evidence of wasting, and a serum albumin ≤2.55 g/dl and had an associated mortality rate of 49.1%. In comparison to the previously derived severity of PCP model for the years 1987 to 1990, this model performed 52% better.