Primary Care Delivery Is Associated With Greater Physician Experience and Improved Survival Among Persons with AIDS


**OBJECTIVE:** It has been shown that greater physician experience in the care of persons with AIDS prolongs survival, but how more experienced primary care physicians achieve better outcomes is not known.

**DESIGN/SETTING/PATIENTS:** Retrospective cohort study of HIV-infected patients enrolled in a large staff-model health maintenance organization from 1990 through 1999.

**MEASUREMENTS:** Adjusted odds of medical service delivery and adjusted hazard ratio of death by physician experience level (least, moderate, most) and service utilization.

**MAIN RESULTS:** Primary care delivery by physicians with greater AIDS experience was associated with improved survival. After controlling for disease severity, patients cared for by the most experienced physicians were twice as likely to receive a primary care visit in a given month compared with patients of the least and moderately experienced physicians \((P < .01)\). Patients of the least experienced physicians received the lowest level of outpatient pharmacy and laboratory services \((P < .001)\) and were half as likely to have a specialty care visit compared with patients of the most and moderately experienced physicians \((P < .05)\). Patients who received infrequent primary care visits by the least experienced physicians were 15.3 times more likely to die than patients of the most experienced physicians \((P = .02)\). There was a significant increase in primary care services delivered to the population of HIV-infected patients receiving care in 1999, when highly active antiretroviral therapy (HAART) was in general use, compared with the time period prior to the introduction of HAART.

**CONCLUSIONS:** Primary care delivery by physicians with greater HIV experience contributes to improved patient outcomes.

**KEY WORDS:** HIV; outcome and process assessment health care; physician’s practice patterns.

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Greater experience among primary care physicians in the care of persons with AIDS improves survival.\(^1\) Patients of more experienced physicians have been shown to be more likely to receive appropriate and timely prophylaxis against *Pneumocystis carinii* pneumonia (PCP) and measurement of CD4 cell count level.\(^2\) While the survival benefit of PCP prophylaxis is clear,\(^2,3\) it is not known whether more frequent CD4 cell count monitoring results from closer outpatient follow-up by more experienced physicians and if such differences in the delivery of medical care account for the improvement in patient outcomes.

The provision of medical care for persons with HIV infection in the United States shifted from inpatient to outpatient setting early in the epidemic.\(^4,5\) Ambulatory care largely supplanted rather than simply augmented hospital care for patients with HIV disease,\(^6\) a pattern now common among patients with other chronic conditions. Thus, the delivery of care to patients in the ambulatory setting may significantly impact clinical outcomes. Evidence supports the health advantages of continuous primary care provided to patients with chronic disease.\(^7–21\) Successful interventions that improve outcomes for chronically ill patients emphasize regularly scheduled primary care and ready access to ancillary services and specialty expertise.\(^12–21\)

While clinical information regarding inpatient care is routinely captured in hospital administrative billing systems, outpatient care is often provided in multiple settings over many years. Thus, longitudinal information about treatment and outcomes for individual patients is difficult to characterize.\(^6\) Estimates of the overall cost and utilization of inpatient and outpatient services for persons with HIV disease have been projected from patient interviews, medical chart review, and claims data.\(^5,22–27\) However, examination of the effect of medical care delivery on outcomes has been limited to studies of hospital care and in-hospital mortality.\(^29–32\) This study was conducted to determine whether physician experience level is associated with differences in the delivery of medical services across all settings of care, and if patterns of delivery, such as the frequency of primary care visits, affect patient outcomes.

**METHODS**

**Study Setting**

The study cohort was selected from the enrollee population of Group Health Cooperative of Puget Sound (GHC), Seattle, Washington. GHC is a staff-model HMO that provides comprehensive medical care for a fixed,
prepaid fee to approximately 500,000 individuals in western Washington, the majority of whom have their premiums paid by their employers. Primary care physicians manage both the outpatient and inpatient care for defined groups of patients. Referrals for specialty consultation and ancillary services are at the discretion of the primary care physician to support the overall management of care, and there are no financial incentives to limit referrals or hospitalizations. The care of HIV-infected individuals is distributed among all primary care physicians in this generalist-based model of care. Insurance coverage for patients with AIDS is maintained through several financial arrangements that extend beyond the end of their employment; as a result, less than 3 percent of these patients leave GHC for reasons other than death.

Study Patients

We identified all patients enrolled at GHC in whom first AIDS-defining illnesses were diagnosed from 1984 through mid-1994 using entry criteria described previously. Four patients were excluded because their primary care physician changed within a year prior to their diagnosis of AIDS or thereafter, and 3 were excluded because their primary care physician had subspecialty training. Of these 403 adult male patients, 197 were enrolled after January 1990, when utilization data were first automated in the GHC system and included in the analysis. Review of medical records enabled criteria for AIDS-defining diagnoses to be applied to all cases consistently. All patients had serologically confirmed HIV infection and were men who had male sexual contact as a risk factor for HIV transmission. We identified all HIV-infected patients enrolled at GHC who received care in 1996 and 1999; these patients were included in the analysis of medical care utilization during these time periods.

Study Physicians

Eighty-three physicians provided primary care for the 197 patients with AIDS: 87% of these physicians were trained in family medicine or general practice, and 13% in internal medicine. We defined physicians’ level of experience with AIDS care accounting for medical school, residency, and practice experience with AIDS care. Estimates for medical school and residency experience were developed from the AIDS incidence rates in the metropolitan area where physicians trained and the year training was completed. Practice experience was defined as the cumulative number of patients with AIDS whose care a physician had managed at the time a patient in the physician’s practice was diagnosed with AIDS; the new patient was included in this total. As each patient entered the cohort, he was identified as his physician’s first, second to fifth, or sixth or subsequent patient with AIDS. Some physicians graduated from lower to higher experience categories during the study period as they accumulated patients with AIDS. Therefore, a physician may have been assigned to different experience categories for patients diagnosed in her/his practice at different times. Medical school experience was redundant with residency experience for the physicians in our study. Thus, we combined residency and practice experience to define 3 levels of physician experience with AIDS care: least, moderate, and most. By the end of the study period, 25% of physicians remained in the least experienced category, 49% acquired moderate experience, and 25% had acquired the most experience. Individual physicians cared for a total of 1 to 21 patients with AIDS.

Sources of Data

We obtained information on the patients in the study, including demographic data, AIDS-defining diagnosis and date of diagnosis, risk factors for HIV transmission, and date on which care from GHC ended (because of death or transfer from the HMO) from the GHC HIV/AIDS Surveillance Database. Dates of death were confirmed by cross matching with the Washington State vital records. Personnel records provided information on the study physicians. We obtained health care utilization and cost data from the Decision Support System (DSS), implemented at GHC in 1989 to provide standardized data for all health care provided to members. Systematic verification of DSS data is performed both internally and through independent audits.

Statistical Analysis

Physician Experience Level and Medical Care Utilization. We used a generalized estimating equation (GEE) approach to logistic regression to examine the probability of utilizing medical services in a given month (including a primary care visit, a specialty care visit, a home health/hospice care visit, or a hospitalization) controlling for correlation between individual observations. In our data, correlation between individual observations could arise from 2 sources—observations on individuals with the same physician and repeated observations of the same individual. The GEE methodology developed by Heagerty and Zeger allowed us to account for 2 sources of correlation simultaneously. This analysis indicated that within-patient correlation was significant and declined smoothly with increasing time between the observations. However, there was no significant correlation between observations for individuals with the same physician; thus, only within-patient correlations were included in the final analysis.

Previous studies have shown that utilization of services and costs of care among patients with AIDS are significantly higher at the end of life, and are probably higher immediately after the diagnosis of a clinical AIDS-defining illness. To control for potential confounding by time period of care, we included a variable in the analysis to distinguish