Background: The Department of Veterans Affairs Health Care System (VA) is the largest integrated single payer system in the United States. To date, there has been no systematic measurement of health status in the VA. The Veterans Health Study has developed methods to assess patient-based health status in ambulatory populations.

Objectives: To describe the health status of veterans and examine the relationships between their health-related quality of life, age, comorbidity, and socioeconomic and service-connected disability status.

Methods: Participants in the Veterans Health Study, a 2-year longitudinal study, were recruited from a representative sample of patients receiving ambulatory care at 4 VA facilities in the New England region. The Veterans Health Study patients received questionnaires of health status, including the Medical Outcomes Study Short Form 36-Item Health Survey; and a health examination, clinical assessments, and medical history taking. Six hundred sixty-seven patients for whom we conducted baseline assessments are described.

Results: The VA outpatients had poor health status scores across all measures of the Medical Outcomes Study Short Form 36-Item Health Survey compared with scores in non-VA populations (at least 50% of 1 SD worse). Striking differences also were found with the sample stratified by age group (20-49 years, 50-64 years, and 65-90 years). For 7 of the 8 scales (role limitations due to physical problems, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health), scores were considerably lower among the younger patients; for the eighth scale (physical function), scores of the young veterans (aged 20-49 years) were almost comparable with the levels in the old veterans (≥65 years). The mental health scores of young veterans were substantially worse than all other age groups (P<.001) and scores of screening measures for depression were significantly higher in the youngest age group (51%) compared with the oldest age groups (33% and 16%) (P<.001).

Conclusions: The VA outpatients have substantially worse health status than non-VA populations. Mental health differences between the young and old veterans who use the VA health care system are sharply contrasting; the young veterans are sicker, suggesting substantially higher resource needs. Mental health differences may explain much of the worse health-related quality of life in young veterans. As health care systems continue to undergo a radical transformation, the Department of Veterans Affairs should focus on the provision of mental health services for its younger veteran.

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METHODS

VETERANS HEALTH STUDY

The conceptual framework and methods of the VHS are described elsewhere. Briefly, we characterized the health status of patients using multidimensional assessments of HRQoL. In doing this, we are building on the work of previous studies, most notably the Rand Health Insurance Experiment and the Medical Outcomes Study. These studies have demonstrated the value and utility of patient-based measures of HRQoL.

STUDY DESIGN

The VHS is a 2-year prospective study. Patients were recruited from a cross-sectional sample of the VA patient population receiving ambulatory care at 4 VA facilities in the greater Boston, Mass, area.

The study sites represent clinical settings that are fairly typical of VA ambulatory care. They differed from each other in a number of ways, including geographic location, type of hospital (ie, 2 outpatient clinics, geriatric and extended care facility, and tertiary care hospital), organizational structure, and types of medical care provided. Sites include a large tertiary care facility, a long-term care facility, and 2 freestanding satellites providing ambulatory care services.

Male patients were identified when they came to ambulatory care clinics for a medical visit between August 1993 and December 1995. Eligibility for the study included all patients identified in the clinic who (1) had a medical visit to a VA ambulatory clinic in the past 12 months, (2) provided contact information, such as telephone number and/or address, and (3) read and signed the consent form. Eligible patients were randomly sampled, contacted via telephone, and recruited for the study. All recruited patients were mailed a questionnaire that included the Medical Outcomes Study Short Form 36-Item Health Survey (SF-36) and were scheduled for a health examination, including physical examination, clinical assessments, and medical history taking. Examinations were also completed a questionnaire that included a depression screening measure, and questions about sociodemographics, military history, and VA eligibility. Data collection occurred in 3 waves, each separated by 8 months to control for seasonal variations. Examined patients were impaneled over time and their health was monitored with brief mailed questionnaires on a quarterly basis and with follow-up examinations at 12 and 24 months.

Five thousand six hundred sixty-seven patients have been surveyed and 1667 patients for whom we conducted baseline assessments are included in this study. Of the eligible patients, 58% participated. Nonparticipants who were approached were not significantly different from the participants in terms of sociodemographics or general health measures except that nonparticipants had slightly less education.

STUDY MEASURES

Short Form 36-Item Health Survey

The SF-36 is our primary measure of HRQoL. This assessment has been extensively documented as reliable and valid in ambulatory patient populations. Because the SF-36 is being disseminated as a standard core set of HRQoL assessments, we examined the utility of this battery for use in VA populations. The SF-36 assesses 8 dimensions of health status, spanning a spectrum from physical to mental health. This health survey includes measures of physical functioning, role limitations due to physical problems, bodily pain, general health perceptions, vitality, and social functioning, and role limitations due to emotional problems and mental health. The tables and figures in this study are arranged so that the 8 scales reflect this ordering and first indicate content in the scales that are more physical (physical functioning and role limitations because of physical problems), then switch to scales that involve both physical and mental constructs (eg, bodily pain, general health perceptions, vitality, and social functioning), and last include scales that are more psychologically based (role limitations because of emotional problems and mental health). Items from each concept are summed and rescaled with a standard range of 0 to 100, where 100 denotes the best health, to permit comparisons with other populations. The 8 SF-36 scales have been summarized into 2 component summary scales, a physical component summary (PCS) and a mental component summary (MCS). The summary scales are based on distinct physical and mental constructs that are well documented in the literature. Eighty-five percent of the reliable variance in the 8 SF-36 scales is explained by the physical and mental dimensions of health. The 2 summary component scales, PCS and MCS, were each

In recent years new approaches for assessing the health of patients have been developed. These approaches are patient-derived measures of health status or health-related quality of life (HRQoL). These methods for assessing health have received considerable attention toward the goal of providing rigorous methods for evaluating impacts of medical interventions on patient outcomes. These measures are obtained directly from the patient using structured questionnaires that provide assessments of functional status (physical, psychological, social, and role functioning) and overall perceptions of health. Patient-derived measures of health status are especially pertinent to health systems such as the VA, since health status information provides a useful and comprehensive assessment of the needs of veterans for monitoring their outcomes of care. In this article, we report the characteristics of a VA outpatient population in terms of sociodemographics, disease prevalence, and HRQoL. We report on some of the unique characteristics of users of the VA ambulatory health care system. We describe veterans’ health status and examine its relationships to age, disease, socioeconomic status, and service-connected disability status. This health status information used to characterize the heterogeneity of the veteran population is important in providing a baseline set of assessments for future studies that will monitor the outcomes of care.
scored using weights derived from a national probability sample. Each summary is expressed as a t score with a mean of 50 (SD, 10), which facilitates comparisons between the VA patients and the general US population.

Results for the SF-36 scales produced Cronbach's α ranging from .93 for physical functioning to .78 for social functioning.

Medical History

Medical history was assessed using an interviewer-administered questionnaire previously adapted and modified from the Medical Outcomes Study. This questionnaire has been clinically validated and tested in prior work. A number of questions were added to identify patients with currently active medically diagnosed conditions, including hypertension, diabetes, chronic lung disease, osteoarthritis of the knee, chronic low back pain, and alcohol-related disorders. The presence of these study conditions has been corroborated by chart audit, and levels of agreement between the 2 data sources range from 95% for diabetes to 70% for low back pain. Using information obtained from the medical history, we developed an index of the number of health conditions or morbidities that ranged from 1 to an observed maximum of 22. These health conditions include symptoms and reported morbidities (eg, anemia, angina pectoris, congestive heart failure, dermatitis, diverticulitis, enlarged prostate, dizzy spells, fainting spells, gout, inflammatory bowel disease, skin cancer, or thyroid disease). This index has been validated against SF-36 and measures of utilization.

OTHER CLINICAL ASSESSMENTS, SOCIODEMOGRAPHICS, AND SERVICE-CONNECTED DISABILITY

Depression was assessed using the 3-item screening instrument developed by Rost and coworkers that includes items from the Diagnostic Interview Survey and the Center for Epidemiologic Studies in Depression. Alcohol-related disorders (abuse or dependence) were defined as 2 or more positive responses to an alcoholism screening question set. The presence of these study conditions has been corroborated by chart audit, and levels of agreement between the 2 data sources range from 95% for diabetes to 70% for low back pain. Using information obtained from the medical history, we developed an index of the number of health conditions or morbidities that ranged from 1 to an observed maximum of 22. These health conditions include symptoms and reported morbidities (eg, anemia, angina pectoris, congestive heart failure, dermatitis, diverticulitis, enlarged prostate, dizzy spells, fainting spells, gout, inflammatory bowel disease, skin cancer, or thyroid disease). This index has been validated against SF-36 and measures of utilization.

STATISTICAL ANALYSIS

Analysis included evaluation of bivariate associations using contingency tables for categorical variables. For most analyses, the sample was divided into 3 age groups, 22 to 49 years, 50 to 64 years, and 65 years or older, reflecting the observed trimodal age distribution that coincides with the 3 major eras of service, that is, Vietnam, Korea, and World War II. We report the scores from the SF-36 scales and 2 component summary scores by the 3 age groups using means and 95% confidence intervals. Analysis of variance and pairwise comparisons are used to report significant differences between the groups. Tests for linear trend are reported for the SF-36 scores. Least squares regression analysis was used to estimate the associations of sociodemographics (age, education, race, marital status, and income), selected prevalent conditions (hypertension, angina, diabetes, osteoarthritis, chronic low back pain, chronic lung disease, alcohol-related disorders, depression), number of other comorbidities, and service-connected disability rating with each of the SF-36 scales and 2 components. Sets of independent variables were entered into the regression analysis model sequentially to assess the incremental $R^2$ that they contributed.

RESULTS

In the sample of 1667 VA ambulatory patients, ages ranged from 22 to 90 years (mean, 62 years; median, 65 years). Eighteen percent of the 1667 veterans in this study were aged 22 through 49 years, 29% were 50 through 64 years, and 52% were 65 through 90 years (Table 1). Fifty-eight percent of the patients had 12 or fewer years of education, 92% were white, 58% were married, and 52% had an income of $20,000 or lower. Results by age group indicated that the younger groups were less often married, more highly educated, and had higher incomes ($P<.001$). Overall, 36% of the patients had disability ratings that were higher than 50%, and the proportion higher than 50% ranged from 42% in the youngest to 33% in the oldest age groups ($P<.05$). Forty-six percent of the patients reported combat experience, with a range from 26% in the middle-age group to 59% in the oldest group. Forty-eight percent of the total patient sample reported serving during the World War II era, 30% during the Korean era, and 22% during the Vietnam era. By age group, 98% reported serving during the Vietnam era in the youngest age group (22-49 years), 85% during the Korean era in the middle-age group (50-64 years), and 91% during the World War II era in the oldest group (65-90 years).

Patients had an average of 5.8 diagnoses (Table 2). The most prevalent conditions were hypertension and angina (41% and 26%, respectively), and the least preva-
lent conditions were chronic lung disease and alcohol-related disorders (15% and 11%, respectively). The youngest age group had lower prevalence rates for hypertension, angina, diabetes, and osteoarthritis compared with the other age groups (\(P<.001\)). However, for chronic low back pain, the youngest group had a higher prevalence than the older groups (\(P<.01\)). Depression was more common in the youngest (51%) than the other 2 age groups (33% and 16%, respectively) (\(P<.001\)). Similarly, alcohol-related disorders had a higher prevalence in the youngest age group (21% vs 15% and 6%, respectively) (\(P<.001\)).

Compared with published data from non-VA systems of care (health maintenance organizations and multispecialty groups), mean scores for each of the 8 scales are at least 50% of 1 SD worse compared with those of patients seen in non-VA systems of care controlling for age and sex.\(^{17,18}\)

The results of the SF-36 by the 3 age groups with 95% confidence intervals are presented in Figure 1. With the exception of physical function, 7 of the scales have lower scores (worse health) for the younger age groups. Predictably, physical function scores are lower in the older age groups. With the exception of role limitations due to physical problems, the linear age trends are highly significant (\(P<.001\), by analysis of variance F test of trend).

Figure 2 presents results of the PCS and MCS components by age group. Results for the PCS show a linear trend and slightly worse health in the older age groups (\(P<.05\)). This trend does not mirror the stronger trends often seen in non-VA ambulatory settings, where increasing age is associated with declining overall physical health status, possibly because of the relatively low physical health score in the youngest age group.\(^{19}\) The MCS scores indicate a highly significant linear trend with the youngest groups showing substantially worse mental health than the older groups (\(P<.001\)); differences between the 22- to 49-year-old age group and those in the older groups are more marked than what has been reported in non-VA patient populations.\(^{20}\)

The overall level of the PCS score (36.9; 95% confidence interval, 36.3-37.5) is more than 140% of 1 SD worse than that of a general US population (score, 50), and more than 50% of 1 SD worse than that of a sample of ambulatory patients seen in non-VA systems of care.
ties) in the second set of models (II) substantially in-

terpreted outcomes in "Methods" section of the text.

The findings in this study are consistent with the
literature that indicates that younger adults report poorer
mental health status than older adults. Perhaps veterans
who survive to old age, by virtue of their longevity, are
more psychologically resilient to poor health than their
younger counterparts.22,23 Alternatively, presentation and
manifestation of psychiatric distress may differ by age
group.24,25 The prevalence of screening diagnoses re-
ported in this study are noteworthy. Rates of depression
among the youngest group of veterans (aged 22-49 years)
were more than 5 times those estimated among men in
private sector primary care health systems; for veterans
aged 50 to 64 years, rates were more than 3 times; and
for those 65 years or older, rates were nearly double.26
Screening prevalence of current alcohol disorders among
the youngest group of veterans is approximately 1.5 times
the rate found among men in the private sector; and for
veterans aged 50 to 64 years, rates are approximately com-
parable. However, rates of alcohol disorders among the
oldest group of veterans were one third of those esti-
minated among those in non-VA health care systems. Per-
haps alcohol consumption is medically proscribed among
this oldest group of veterans who carry a major burden
from medical illnesses. Another possibility is that the ef-
effects of alcohol disorders have taken their toll such that
there was attrition of more severe drinkers out of the co-

Figure 2. Physical component summary (PCS) and mental component
summary (MCS) scales by age group among outpatients served by the
Department of Veterans Affairs in the Veterans Health Study. Values are
means and 95% confidence intervals. For definitions of scale see the
"Methods" section of the text.
hort due to mortality, and the less severe drinkers and abstainers were more likely to survive to old age. The limitations in physical functioning were severe in the old age group but interestingly were similar to the levels of dysfunction in the young age group. This suggests major limitations in health status in the younger veterans. The poor functional status in the younger veterans is an indicator in part of their diseases. The young veterans are different and sicker than one might expect in other young populations.

The findings of this study suggest that those in the youngest group require more mental health services than the other age groups. The majority of VHS patients in the youngest group report that they are from the Vietnam War era, while the middle and oldest age groups report that they are from the Korean War and World War II eras. Differences by age are likely related to the war cohorts represented by the age groups as well as factors associated with aging. While this cross-sectional study does not allow us to make causal inferences as they relate to periods of engagement and differences in the mental health functional outcome measures, it does suggest that those in the youngest group require more mental health services than the other groups.

Using physical and mental health status as the outcomes in regression analysis models, demographics explained relatively little of the variability in physical health, but explained almost half the variance in mental health. Education and income were important, but added relatively little power to the overall model when controlling for comorbidity and VA disability status. For mental status, age and income were important and contributed almost half the explanatory power to the model controlling for these other variables. Age was not associated with physical status and reflects the relatively poor levels of function across all age groups. Comorbid medical conditions were the major contributors to the physical and mental health status outcomes. This suggests that a good deal of the variability in the physical and mental status measures of outcome is explained by the mix of morbidities or the presence of disease. The results emphasize the usefulness of the HRQoL measures as an aggregate summary of the burden of disease or case-mix. The VHS was designed to be representative of users of VA ambulatory care. Given the demands of the study in terms of reading comprehension and concentration, the sample may have been underrepresented by patients with less education or limitations in literacy or cognitive functioning. Nevertheless, VHS patient characteristics are comparable with those of other surveys of VA users, including the National Survey of Veterans (IV), and suggests that our findings are generalizable to users of VA ambulatory care services on a national basis.

This study has several limitations. This is a cross-sectional sample, so that relationships between variables

<table>
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<th>Table 3. Regression Coefficients of SF-36 Physical and Mental Component Scales With Sociodemographics, Morbidities, and Veteran Status*</th>
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<td><strong>Sociodemographics</strong></td>
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<td>Service-connected disability, %</td>
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* Unstandardized coefficients denoted. SF-36 indicates the Medical Outcomes Study 36-Item Short Form Health Survey; VA, Veterans Affairs; ellipses, not applicable; numbers in parentheses in the first column, coding of the dummy variables (1 equals yes); and roman numeral column headings, each of the multiple regression models.
† Versus those aged 65 years or older.
‡ P=.001.
§ P=.005.
|| P=.05.
are descriptive and do not imply causality. The cross-sectional sample is also influenced by the selection of veterans from those who receive VA health care. We do not have internal data to describe or completely model the selection effects (ie, studying patients who chose the VA) that occurred in the VHS, nor are internally estimated selection models equal to the task. Adjustments for age or demographics may be biased. However, the regression analysis models generated coefficients that have been confirmed by previous work\(^2\) in non-VA patient populations. Another limitation is that patients have not been diagnosed as having depression but merely screened for depression. However, the screener used in this study has a sensitivity of 80%, a specificity of 95%, and a positive predictive value of 49% based on a medical outpatient clinic population.\(^1\)

The use of patient-centered measures provides a means for understanding the health care needs of veterans. The results of this study strongly suggest that VA ambulatory patients are characteristics differently from the populations served by other non-VA health care systems.\(^2\) The distribution of illness in the VA patient population differs markedly from that in the general population and from that of various other health care organizations. In many cases, patients appear to come to the VA for care because they are uninsured, something that is in itself a consequence of their burden of illness and corresponding disability. These findings suggest that because of the considerable needs of veterans, as reflected in their health status outcomes, the Veterans Health Administration will require considerable resources to provide care for its patients.

Health status assessments such as the SF-36 are well suited to measuring the needs of VA health care users. These measures serve as indicators of the outcomes of care and integrate sociodemographics, morbidities, and other patient characteristics into single measures of health. These assessments also provide a means for measuring the outcomes of care given specific defining events that may occur either during hospitalization or an ambulatory visit. The use of these measures by the Veterans Health Administration may provide a useful way of gauging the outcomes of the health status of patient populations within an integrated care system.

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