

Impact of Behavioral Health Problems on Access to Care and Health Services Utilization

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Abstract

Access to specialists for treatment of behavioral health problems has become restricted in this era of capped budgets and reductions in Medicare and Medicaid reimbursement. Patients with multiple mental health problems may face additional barriers to obtaining needed health care services. The study's aim was to measure the impact of behavioral health problems on access to care and health services utilization for veterans and non-veterans and to determine the contribution of health system characteristics in the prediction of self-reported health services utilization. The study sample consisted of Vietnam veterans who participated in both the Vietnam Drug User Study (September 1971 Army discharges) and the Vietnam Era Study (25-year follow-up) (N=642), as well as a non-veteran cohort (N=197). (JEL I12); Atlantic Econ. J., 32(2): pp. 113-29, June 04. ©All Rights Reserved

Introduction

Access to health care services has become a key performance benchmark in most health care systems. This is especially important in the current era of capped budgets and reductions in Medicare and Medicaid reimbursement. In many large metropolitan areas, the safety net is in peril as downsizing has become necessary [Zuckerman, et al., 2001]. Some areas of the country have no public hospital to serve as this safety net. Thus, community hospitals have had to absorb the additional workload [Health System Change, 1998-99]. In such areas, Medicaid patients report difficulty obtaining appointments with private pediatricians and primary care providers. According to data from the National Comorbidity Survey, for those respondents with three or more lifetime psychiatric disorders, only 60 percent ever receive any care for those illnesses, only one-third receive care for a current episode, and only one-fifth receive any specialty mental health care for the current episode [Kessler, et al., 1994]. Thus, it appears that access to care for behavioral health problems is a particularly problematic area in the current health care system. The Community Tracking Study, which tracks changes in the U.S. health system in 60 sites representative of the nation, reported that 16 percent of patients in metropolitan areas believed that their doctor might not refer them to a specialist when needed. Twenty-five percent of physicians stated that it was not always possible to provide high-quality care to all of their patients. Of the primary care physicians, 20 percent reported difficulty in obtaining referrals to high-quality specialists for their patients, though medically necessary [Health System Change, 1998-99].

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Conducted as part of a 25-year follow-up study of Vietnam veterans and a sample of matched non-veterans, the first objective of this study was to measure the impact of behavioral health problems, such as posttraumatic stress disorder, depression, drug use, and alcohol use, on access to care and health services utilization for veterans and non-veterans. The second objective was to determine the relative contribution of health system measures in the prediction of self-reported health services utilization for veterans and non-veterans and identify any differences in that contribution between inpatient utilization and outpatient utilization.

Background

Common barriers to care identified in studies of health services utilization include language, culture, child care or adult care costs, travel distance and associated travel cost, living in a rural area or poor community, lack of health insurance or funds to pay for treatment, lack of a regular source of care, inconvenient office or clinic hours, and personal obligations [Gresenz, et al., 2000; McFall, et al., 2000; Fournet, et al., 1999; Li, et al., 1999; Grella, 1997]. Additional barriers, specifically faced by patients with behavioral health problems, include lack of knowledge of the range of available treatment options, lack of knowledge of the mental health benefits they are entitled to, fear of rejection by the health care system due to the social stigma and labeling associated with substance abuse and mental disorders, confidentiality concerns, perception of symptoms as somatic rather than psychiatric in origin, and difficulty negotiating the health care system due to a psychiatric diagnosis [Mickus, et al., 2000; Copeland, 1997].

Recent analyses focusing on behavioral health care have also identified factors which appear to improve access to such care. One example is greater health maintenance organization (HMO) presence [Gresenz, et al., 2000; Norquist and Wells, 1991; Manning, et al., 1987]. Greater HMO presence was originally feared to lower access to specialty care. It is conjectured that HMO's may affect access by changing help-seeking patterns, educating the community through advertising, or fostering increased competition among doctors vying for fee-for-service patients, resulting in reduced fees. Factors which improve access to care for patients discharged from Department of Veterans Affairs (VA) psychiatric units include receipt of VA compensation payments, discharge from a facility with greater resources devoted to medical-surgical care, and prompt mental health follow-up [Druss and Rosenheck, 1997].

Few studies, however, are able to obtain a complete picture of all the health services utilized by a given patient because many patients use multiple systems of care, such as veterans using both VA and non-VA systems of care. In a study of ten surgical procedures commonly performed in the elderly, Fleming, et al. [1992] demonstrated that VA patients in the New England region and in New York state receive from 17.6 to 37.4 percent of their hospital care outside the VA system. The problem of dual use was a limitation documented by Virgo, et al. [1999] in a recent study which demonstrated that drug use, depression, and psychiatric care seeking were important predictors of VA health services utilization over the two-decade period after discharge from military service in Vietnam. All predictors were selected from data collected either at discharge from military service in 1971, one year after discharge, or three years after discharge. It was shown that Vietnam veterans who had substance use problems prior to or immediately after the Vietnam war used VA health care services more intensively during the next two decades than Vietnam veterans without these behaviors. Without a complete picture of all the health services utilized by a given patient, however, it is difficult to assess whether access to care is compromised and barriers to care exist.

The current study extends previous research through the use of recently collected self-reported VA and non-VA health services utilization data. Irrespective of the type of facility where the services were received, all health services utilized by the study sample are recorded, thereby improving the generalizability of the results. Many of the other limitations present in the earlier study, such as lack of a health status measure, a functional limitations measure, and health-system-specific measures, have been resolved in the current study. The first objective of the current study is to measure the impact of behavioral health problems, such as posttraumatic stress disorder, depression, drug use, and alcohol use, on access to care and health services utilization for veterans and non-veterans. The second objective is to determine the relative contribution of system measures in the prediction of self-reported health services utilization for veterans and non-veterans and identify any differences in that contribution between inpatient utilization and outpatient utilization.

Conceptual Model

Aday and Anderson's expanded behavioral model provided the conceptual framework for the analysis in which health services utilization is depicted as a function of the characteristics of the population at risk, as well as health system characteristics [Andersen, 1995; Andersen, 1968; Aday and Awe, 1997]. The characteristics of the population at risk include an individual's predisposition to use services, factors which enable or impede use, and need for care. The domains of the predisposing factors are demographics, health beliefs, and social structure. The domains of the enabling factors are personal and family resources and community resources. Need consists of perceived health and evaluated health. Health system characteristics refer to the resources and organization utilized to render patient care. The process is that health policy affects characteristics of the health care system and population at risk to facilitate changes in health services utilization and patient satisfaction.

More recently, two new vulnerable domains, sexual orientation and childhood characteristics, have been incorporated under predisposing characteristics. In addition, measures of vulnerability have been added under existing domains. These include literacy, acculturation, hunger, ability to negotiate the system, telephone, transportation, public benefits, and self-help skills [Gelberg, et al., 2000]. The model is depicted as dynamic, with use influencing outcomes, such as health status and satisfaction with care. Outcomes are depicted as influencing the characteristics of the population at risk (predisposing, enabling, and need factors) and health behaviors (personal health practices and use of health services).

It was hypothesized in the current study that behavioral health needs, such as posttraumatic stress disorder, depression, drug use, and alcohol use, would be more prominent among Vietnam veterans, due to the effects of wartime service and the manner in which these veterans were received upon their return to the U.S. It was further hypothesized that access to care and thus, health services utilization would be negatively impacted by the presence of such disorders which often have a social stigma attached to them. The impact on health services utilization was predicted to be larger for Vietnam veterans than for non-veterans, due to greater vulnerability among Vietnam veterans.

Methods

Data Sources

The study sample consisted of a cohort of Vietnam veterans who participated in both the original Vietnam Drug User Study (September 1971 Army discharges surveyed in 1972 and 1974) and the Vietnam Era Study in 1996-97 (VES-III) (N=642), as well as a matched non-veteran cohort for both studies (N=197). The Vietnam Drug User Study, conducted in 1971-74 as requested by the White House Special Action Office for Drug Abuse Prevention,

involved interviews with two veteran samples [Robins, Davis, and Goodwin, 1974; Nace and Meyers, 1974; Robins, et al., 1975; Robins, Davis, and Nurco, 1974; Helzer, et al., 1979]. The veteran samples were selected so that at least 50 percent had positive urine tests for opiates, amphetamines, or barbiturates at service discharge. Thus, drug-positive veterans were overrepresented. The first sample consisted of 512 Army enlisted men whose urine tested drug positive at service discharge, representing 10.5 percent of the September 1971 discharges. The second sample consisted of 470 Army discharges representing the general population of Army enlisted men, with an overlap between samples of 39 men. Of the 943 potential interviewees, 900 were interviewed in 1972, with urine samples obtained for 898. The non-veteran control sample was ascertained from Selective Service registrations and was individually matched to the target general sample for the 1974 survey rather than being matched to the entire sample. The criteria used for the match were draft eligibility, draft board location, age, and education completed by the time their matched veteran counterparts entered service [Price, Risk, and Spitznagel, 2001].

The VES-III is a 25-year follow-up study which assessed long-term outcomes of those who participated in the Vietnam Drug User Study. The original survey instruments used in 1972 and 1974 were combined with several additional instruments to expand the assessment of timing of reported behaviors and update assessment techniques, as well as language to match contemporary terminology. The VES-III surveyed these individuals in 1996-97, collecting data on demographics, family history [Washington University, Department of Psychiatry, 1993], significant life events [John Hopkins University School of Hygiene and Public Health, 1993; Lyketsos, et al., 1994], military experience, posttraumatic stress disorder [Kulka, et al., 1991; American Psychiatric Association, 1994], social networks [Price, 1988], substance use [Robins and Cottler, 1990], antisocial personality traits, depression [Robins, et al., 1989], physical health, and health services utilization [National Center for Health Statistics, 1992; Edwards and Berlin, 1989]. By the time of the survey, 10.5 percent of the cohort had died [Price, Risk, and Murray, 2001]. Over 93 percent of the surviving members (N=1024) were located after two decades without contact. Once the ascertainment goal of 830 interviews was surpassed, achieving an 82.1 percent interview rate (N=841), further interviewing was discontinued. Two cases missing responses on most measures of interest were dropped [Price, Risk, and Spitznagel, 2001].

Dependent Variables

The dichotomous dependent variables were self-reported inpatient contact in the past five years and outpatient contact in the past six months. The discrete dependent variables were self-reported number of admissions in the past five years and outpatient visits in the past six months. Detailed information was collected for the four most recent hospital admissions and the four most recent doctor visits. Information collected included the condition for which treatment was received, whether counseling or treatment was received for alcohol or drug use, whether treatment was received for emotional problems, such as anxiety or nerves, whether a surgery was performed, and the type of facility where treatment was delivered. Two additional variables, length of stay and type of health care professional, were also collected, each unique to different types of health services utilization (inpatient and outpatient, respectively). For those patients with either no inpatient admissions in the last five years or no outpatient visits in the last six months, the same detailed information described above was collected on the last usage of health services prior to the five-year or six-month periods.

The volume of health services use was measured by the total number of admissions in the last five years and total number of outpatient visits in the last six months. Both were winsorized at the 98th percentile to correct for the high degree of skewness associated with

health services utilization data.

Independent Variables

Independent variables examined included 15 predisposing measures, 13 enabling measures, over 50 need measures, and 20 system measures. Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM IV) definitions were used to identify individual behavioral health problems [1994]. Subsequently, a summary measure of behavioral health problems was computed for use in reducing the multivariate analysis to only those patients with behavioral health problems. A positive response on any of the following resulted in the behavioral health problem summary measure being coded as a yes: 1) used drugs in the past 90 days; 2) used any drug greater than five times since 1972; 3) drugs used when not prescribed; 4) received outpatient treatment for drug use in the past six months; 5) received inpatient treatment for drug use in the past five years; 6) alcohol abuse (required a positive response on any one of four symptoms: alcohol-related problems at work, school, or home; hazardous situations with alcohol; alcohol-related legal problems; drinking despite social or interpersonal problems); 7) three or more symptoms of alcohol dependence; 8) received inpatient treatment for alcohol use in the past five years; 9) received outpatient treatment for alcohol use in the past six months; 10) saw a physician in the past year for cirrhosis of the liver; 11) saw a physician in the past year for hepatitis due to alcohol use; 12) five or more symptoms of depression since 1972 in conjunction with impairment in social, occupational, or other area necessary for diagnosis; 13) received inpatient treatment for anxiety in the past five years; 14) received outpatient treatment for anxiety in the past six months; and 15) post traumatic stress disorder event ever.

The relationship between the dependent variables (inpatient contact, outpatient contact, number of admissions, or number of outpatient visits) and each of the approximately 100 candidate variables for the various regression models was analyzed, using either simple logistic or simple least squares regression analysis as appropriate. Only those variables with $p < 0.2$ were retained for inclusion in subsequent models.

Data Analytic Procedures

The statistical package used to analyze the data was Stata 7.0 [2001]. All variables selected for analysis (both dependent and independent) were initially weighted to correct for oversampling of drug positives at service discharge. Each measure was then compared by veteran status using the full sample ($N=839$) to determine whether veterans were disproportionately affected by behavioral health problems or barriers to care. All further analyses were limited to those with behavioral health problems only ($N=749$) and were performed without weights. Secondary multivariate analyses of epidemiological data derived from multistrata sampling schemes have often been conducted without weights, since the effect of weighting can be difficult to interpret [Robins and Price, 1991]. Stepwise logistic regression with backward elimination was used to model self-reported inpatient contact in the last five years and outpatient contact in the last six months. Standard measures of logistic regression model fit, such as the c -statistic and the Hosmer-Lemeshow goodness-of-fit statistic, were calculated. In addition, R^2 , the coefficient of determination, was calculated for each model to allow estimation of the proportion of variation in the dependent variable explained by the model.

Two versions of each model were tested. In the first model, both veterans and non-veterans were included in the analysis. The second model was restricted to Vietnam veterans only. A set of nine Vietnam-specific measures (mostly dichotomous) were added to the model measuring: closeness to people in their unit; combat duty; less than honorable discharge; drug status at discharge; enlistment status; number of months served; meets with other veterans

often to discuss Vietnam; served in Vietnam, Laos, or Cambodia; and time in Vietnam was best or both best and worst time in life.

Poisson maximum-likelihood regressions were conducted for the non-negative count variables which measure the volume of health services used (number of admissions in the last five years and number of outpatient visits in the last six months). For those models where goodness of fit was rejected (i.e. overdispersion was present), negative binomial maximum-likelihood regression was applied. Though the volume of health services utilization has often been analyzed using linear regression models, such models are not really appropriate because the data violate assumptions of normality. Event count data are discrete rather than continuous and only continuous data can be normally distributed.

Results

Even with weighting to correct for oversampling of drug positives, veterans were significantly more likely than non-veterans in the bivariate analysis to have had anti-social personality since 1972, a greater number of ever diagnosed major medical problems, self-reported fair or poor current health status, PTSD ever, PTSD based on an event since 1972, been treated for emotional problems, anxiety, or nerves at their last hospital admission, been arrested, had family members with job or police problems ever, and traveled further for physician visits (Table 1). Veterans were also more likely to have been alcohol dependent (had at least three symptoms of alcohol dependency) since 1972, consumed a greater maximum number of drinks in a single day since 1972, and had medical problems caused by drinking since 1972. Veterans were also more likely to have been drug dependent since 1972, specifically with relation to marijuana, cocaine, hallucinogens, sedatives, and stimulants [Price, Risk, and Spitznagel, 2001]. Veterans reported significantly greater heavy drug use since 1972 than non-veterans, were older when last used any drug, and were more likely to have abused sedatives since 1972. Veterans were less likely to have obtained physician appointments within one to two weeks of seeking care and were less likely to have undergone surgery at their last hospital admission. They were also less likely to be white, to have attended any college, to have worked in 1996, and to have worked continuously for the five years preceding the interview (1992-96). Though Vietnam veterans and non-veterans did not differ in availability of a regular source of care (75.4 percent *versus* 77.2 percent) or availability of insurance coverage (93.1 percent *versus* 88.3 percent), they did differ in regular source of care type. Veterans were significantly more likely to use hospital outpatient clinics (VA, military, and non-VA) as their regular source of care, as opposed to private physicians' offices. Non-veterans were significantly more likely to visit private physicians, or belong to either health maintenance organizations or prepaid health plans. For inpatient care, veterans were more likely to have used VA, military, or federal government sources at their most recent admission. Non-veterans were more likely to have used for-profit facilities.

Of the 839 study participants, 24.7 percent had inpatient contact over the previous five years. Veterans were significantly more likely than non-veterans to have had inpatient contact during the five-year period. (Table 2). Though the average number of admissions in the past five years for veterans was significantly greater than for non-veterans, the difference is quite small. The same was true if only those individuals with utilization were compared. As inpatients, veterans were significantly more likely than non-veterans to have been treated for emotional problems, anxiety, or nerves.

Approximately 54.2 percent of the study participants had outpatient contact over the previous six months. The average number of outpatient visits among patients was similar when veterans were compared to non-veterans. There were no differences by type of psychiatric

treatment received or whether surgery was required.

TABLE 1
Weighted Comparison of Population at Risk Characteristics
Between Veterans and Non-Veterans (N=839)^a

Independent Variables	Veterans (N=642)	Non-Veterans (N=197)
<u>Predisposing</u>		
White Race	80.0	88.8†
Attended Any College	46.3	58.4†
Ever Arrested	41.1	21.3‡
Anti-Social Personality Since 1972	26.8	14.7†
Family Members with Job or Police Problems Ever	22.8	14.9*
<u>Enabling</u>		
Employed in 1996	81.6	93.4†
Worked Continuously for the Five Years Prior to Interview	78.4	89.3†
<u>Need</u>		
Fair or Poor Current Health Status	20.2	8.7‡
Number of Diagnosed Major Medical Problems	(1.5, 1.6)	(1.1, 1.4)*
PTSD Ever	22.1	11.2†
PTSD Based on Event Since 1972	20.7	10.7†
Consumed Greater Max. No. of Drinks Daily Since 1972	(16.0, 13.1)	(10.2, 8.2)‡
Alcohol Dependency Since 1972	32.5	11.7‡
Medical Problems Caused by Drinking Since 1972	16.0	6.6†
Age When Last Used Any Drug	(23.4, 18.7)	(15.0, 17.9)‡
Drug Dependence Since 1972	19.3	9.6†
Marijuana Dependence Since 1972	10.4	1.5‡
Cocaine Dependence Since 1972	9.2	3.6*
Hallucinogen Dependence Since 1972	2.1	0.0*
Sedative Dependence Since 1972	6.6	2.5*
Stimulant Dependence Since 1972	8.1	2.0†
Drugs Used Heavily Since 1972	45.3	30.5†
Sedative Abuse Since 1972	7.7	2.5*
Underwent Surgery at Last Admission	39.3	48.2*
Treated for Emotional Problems, Anxiety, or Nerves at Last Admission	8.3	3.6*
<u>System</u>		
Hospital Outpatient Clinic as Source of Care	15.7	1.5‡
Private MD, Health Maintenance Organization, or Prepaid Health Plan as Usual Source of Care	54.4	74.1‡
Last Admission at For-Profit Hospital	20.2	28.9*
Last Admission at VA, Military, or Federal Government Hospital	23.3	1.5‡
Miles Traveled to See MD	(8.6, 15.3)	(5.7, 7.1)†
Able to See MD Within 1 Week of Making Appointment	48.5	60.0†
Able to See MD Within 2 Weeks of Making Appointment	55.2	66.2*

Notes: ^aTo correct for oversampling of drug positives, veterans who were drug positive at discharge from Vietnam are weighted by 7.64; drug negatives are weighted by 100. Only significant relationships are displayed above. Values in parentheses represent means and standard deviations. All other values represent percentages. *p < .05, †p < .01, ‡p < .001.

TABLE 2
Weighted Comparison of Health Services Utilization
Between Veterans and Non-Veterans (N=839)^a

	Veterans (N=642)	Non-Veterans (N=197)
Inpatient Contact in Last Five Years	27.6	19.3*
Treated for Alcohol Use ^b	8.5	5.1
Treated for Drug Use ^b	5.2	3.1
Treated for Emotional Problems, Anxiety, or Nerves ^b	10.5	4.6*
Underwent Surgery ^b	42.2	50.3
Number of Admissions in Last Five Years	(1.1, 1.0)	(0.9, 0.8)*
Number of Admissions Winsorized at the 98th Percentile	(1.1, 0.9)	(0.9, 0.7)*
Outpatient Contact in Last Six Months	56.0	50.8
Treated for Alcohol Use ^c	3.9	2.0
Treated for Drug Use ^c	1.5	1.0
Treated for Emotional Problems, Anxiety, or Nerves ^c	10.5	5.6
Underwent Surgery ^c	10.5	7.6
Number of Visits in Last Six Months	(2.3, 6.0)	(1.9, 3.0)
Number of Visits Winsorized at the 98th Percentile	(2.0, 2.4)	(1.8, 2.1)

Notes: ^aTo correct for oversampling of drug positives, veterans who were drug positive at discharge from Vietnam are weighted by 7.64; drug negatives are weighted by 100. Values in parentheses represent means and standard deviations. All other values represent percentages. ^bAbstracted from the four most recent hospital admissions within the past five years. ^cAbstracted from the four most recent outpatient visits within the past six months. * $p < .05$.

Approximately 89.3 percent of the study participants had some type of behavioral health problem, such as posttraumatic stress disorder, depression, drug use, or alcohol use. To measure the impact of behavioral health problems on access to care and health services utilization for veterans and non-veterans in a multivariate framework, which is the primary research objective, all further analyses were conducted on only those patients with behavioral health problems (N=749).

Models Predicting Contact with Health Services

Controlling for veteran status, significant positive predictors of inpatient contact in the veteran and non-veteran model included five need measures (alcohol-related medical problems since 1972, depression since 1972, number of ever diagnosed major medical problems, PTSD based on a post-Vietnam event, and drug positive status at service discharge) and three system measures (ability to see a physician within two weeks of making an appointment, hospital outpatient clinic as usual source of care, and last admission at a for-profit hospital) (Table 3). Unexpectedly, one predisposing measure (full-time employment in 1996) predicted negatively. Possible reasons for the negative effect of employment were examined, such as disability and receipt of a pension, but their addition to the model did not change the negative effect of employment. Thus, there is one remaining theory left as to why those who were fully employed were less likely to receive care compared to other men in the sample. This theory is related to availability of leave time. The terms of employment may not include paid sick leave or job tenure may have been too short to qualify for paid sick leave. However, there are no data to substantiate this theory other than the knowledge that veterans of lower socioeconomic status are probably overrepresented due to the time period of the sample. With the exception of employment, the sign of all coefficients was in the expected direction. The need measures had the greatest impact on inpatient contact. For example, the odds of

inpatient contact were 2.3 times greater for patients with posttraumatic stress disorder based on a post-Vietnam event, 2.3 times greater for patients with depression since 1972, and 1.7 times greater for patients who were drug positive at service discharge. The system measures were strong contributors as well with odds ratios of 2.1 for ability to see a physician within two weeks of making an appointment, 1.9 for last admission at a for-profit hospital (reference group: last admission at non-profit hospital), and 1.7 for hospital outpatient clinic as the usual source of care. The variation in inpatient contact explained by the model was 31.2 percent and the percentage correctly classified was 76.5 (using a cutoff of 0.5).

TABLE 3
 Logistics Regression Predicting Inpatient Contact in Last Five Years
 From Selected Predisposing, Enabling, Need, and System Characteristics:
 Veterans and Non-Veterans with Behavioral Health Problems (N=749)

Independent Variables	Contact	
<u>Predisposing</u>	Coefficients (S.E.)	Odds Ratio (CI)
Veteran Status ^a	-0.14(0.27)	0.87(0.51, 1.49)
<u>Enabling</u>		
Employed in 1996	-1.20(0.22)	0.30(0.19, 0.47)‡
<u>Need</u>		
Medical Problems Caused by		
Drinking Since 1972	0.32(0.11)	1.38(1.11, 1.70)†
Drug Positive Status at Service Discharge	0.55(0.21)	1.73(1.16, 2.60)†
Depression Since 1972	0.83(0.29)	2.29(1.30, 4.03)†
No. of Ever Diagnosed Major Medical Problems	0.19(0.06)	1.20(1.07, 1.36)†
PTSD Based on a Post-Vietnam Event	0.83(0.25)	2.29(1.41, 3.71)†
<u>System</u>		
Able to See MD Within 2 Weeks of Making Appointment	0.74(0.19)	2.10(1.44, 3.06)‡
Hospital Outpatient Clinic as Usual Source of Care	0.53(0.26)	1.69(1.02, 2.82)*
Last Admission at a For-Profit Hospital	0.65(0.21)	1.91(1.28, 2.85)†
Constant	-1.37‡	-
c-statistic	76.5%	-
Pseudo R ²	22.2%	-
Maximum-Rescaled R ²	31.2%	-
Hosmer-Lemeshow Chi-Square (df=8)	9.13(p = 0.33)	-

^aForced into the model prior to the stepwise consideration of all other candidate variables. *p < .05, †p < .01, ‡p < .001.

Once again controlling for veteran status in a veteran and non-veteran model, the significant positive predictors of outpatient contact consisted of one enabling factor (regular source of care) and two need factors (number of ever diagnosed major medical problems and surgery at last admission) (Table 4). One need factor (surgery at last physician visit) and one system factor (total admissions at non-profit hospitals) were negative predictors. The conflicting results for surgery at last admission and surgery at last physician visit may be explained by severity of illness. Medical conditions requiring surgery as an inpatient are more severe and much more likely to require prolonged outpatient contact than medical conditions treated with outpatient surgery. All remaining coefficients were in the expected direction. For outpatient contact, the need measures had the greatest impact, as was the case for the inpatient analysis. In addition, patients with the enabling factor, access to a regular source of care, were three times more likely to have outpatient contact than patients without access to a regular source. The variation in outpatient contact explained by the model was 16.2 percent and the percentage correctly classified was 67 (using a cutoff of 0.5).

TABLE 4
 Logistics Regression Predicting Outpatient Contact in Last Six Months
 From Selected Predisposing, Enabling, Need, and System Characteristics:
 Veterans and Non-Veterans with Behavioral Health Problems (N=749)

Independent Variables	Contact	
Predisposing	Coefficients (S.E.)	Odds Ratio (CI)
Veteran Status ^a	0.05(0.20)	1.05(0.71, 1.55)
<u>Enabling</u>		
Regular Source of Care	1.09(0.19)	2.97(2.06, 4.29)‡
<u>Need</u>		
No. of Ever Diagnosed Major Medical Problems	0.28(0.05)	1.32(1.18, 1.47)‡
Underwent Surgery at Last MD Visit	-0.53(0.26)	0.59(0.35, 0.98)*
Underwent Surgery at Last Admission	0.53(0.16)	1.71(1.24, 2.35)†
<u>System</u>		
Total Non-Profit Hospital Admissions	-0.56(0.27)	0.57(0.34, 0.96)*
Constant	-1.15‡	-
<i>c</i> -statistic	66.9%	-
Pseudo R ²	12.1%	-
Maximum-Rescaled R ²	16.2%	-
Hosmer-Lemeshow Chi-Square (df=8)	10.23(<i>p</i> = 0.25)	-

^aForced into the model prior to the stepwise consideration of all other candidate variables. **p* < .05, †*p* < .01, ‡*p* < .001.

Though not presented in tabular form, veteran-only models were also examined (available from the author upon request). Significant predictors of inpatient and outpatient contact in the veteran-only models were basically similar to those which were significant in the veteran and non-veteran models, with a few exceptions. Need for an appointment to see a physician was the only variable which was significant in the veteran-only inpatient contact model but not in the veteran and non-veteran model. Two variables which were significant in the veteran and non-veteran inpatient model were no longer significant in the veteran model: ability to see a physician within two weeks of making an appointment and hospital outpatient clinic as the usual source of care. The variation in inpatient contact explained by the model was 34.8 percent and the percentage correctly classified was 81.0. The number of limitations in activities of daily living was the only variable significant in the veteran-only outpatient contact model but not in the veteran and non-veteran model. Two variables which were significant in the veteran and non-veteran model were no longer significant in the veteran-only model: surgery at last outpatient visit and surgery at last admission. The variation in outpatient contact explained by the model was 13.6 percent and the percentage correctly classified was 69.

Models Predicting Volume of Health Services Used

Preliminary analyses which attempted to predict the number of hospital admissions in the past five years did not reject the assumption that the mean of the distribution is equal to the variance (i.e. that the distribution is Poisson). Therefore, the number of admissions was modeled using Poisson regression (Table 5). Because models for inpatient and outpatient contact were similar between the veteran and non-veteran versions and veteran-only versions, only veteran and non-veteran models were examined to predict the volume of health services utilization. Controlling for veteran status, significant positive predictors of the number of hospital admissions in the past five years included three need measures (number of ever diagnosed major medical problems, surgery at last admission, and sought care for alcohol problems) and three system measures (last admission at a for-profit hospital, last admission at state, county, and city hospital, last admission at VA, military, and federal government

TABLE 5
 Regressions Predicting Volume of Health Services Utilization in Last Five Years
 From Selected Predisposing, Enabling, Need, and System Characteristics:
 Veterans and Non-Veterans with Behavioral Health Problems

Independent Variables	Dependent Variables	
	No. of Admissions in Last 5 Years (N=749) Poisson Method	No. of Visits in Last 6 Months (N=735) Negative Binomial Method
<u>Predisposing</u>	Coefficients (S.E.)	Coefficients (S.E.)
Veteran Status ^a	-0.04(0.10)	-0.03(0.09)
<u>Enabling</u>		
Employed Full-Time in 1996	-0.32(0.08)‡	-0.26(0.09)†
VA Insurance Coverage	-	0.21(0.08)†
<u>Need</u>		
No. of Limitations in Activities of Daily Living	-	0.05(0.02)*
No. of Ever Diagnosed Major Medical Problems	0.12(0.02)‡	0.10(0.02)‡
Worse Health Now	-	0.32(0.09)†
Depression Since 1972	-	0.33(0.10)†
Sought Care for Alcohol Problems	0.18(0.08)*	-
Underwent Surgery at Last Admission	0.18(0.07)*	-
Total Admissions Involving Surgery of the Four Most Recent Admissions in the Last Five Years	-	0.12(0.05)*
<u>System</u>		
Last Admission at For-Profit Hospital	0.81(0.12)‡	-
Last Admission at State, County, or City Hospital	0.76(0.12)‡	-
Last Admission at VA, Military, or Federal Government Hospital	0.84(0.12)‡	-
Able to See MD Within One Week of Making Appointment	-	0.32(0.07)‡
Last MD Visit With Surgical Specialist	-	0.34(0.10)†
Constant	-7.24(0.15)‡	-6.33(0.13)‡
R ²	11.1%	7.3%
Maximum Likelihood R ²	24.7%	24.5%
Likelihood Ratio Chi-Square	212.88‡	206.24‡
Likelihood Ratio Test of Alpha=0 (chi ²)	-	195.13‡

^aForced into the model prior to the stepwise consideration of all other candidate variables. *p < .05, †p < .01, ‡p < .001.

hospital) (reference group: last admission at non-profit hospital). An enabling measure (full-time employment in 1996) was the only significant negative predictor. All relationships were in the expected direction, with the exception of full-time employment. The negative sign for employment occurred in both the inpatient contact and volume models and, as explained earlier, the authors theorize this is due to the availability of paid sick leave but do not have the data to test the theory. The system measures had the greatest impact on the number of admissions. The variation in the dependent variable explained by the model was 24.7 percent. The high level of significance associated with hospital type was not unexpected. As

portrayed in Table 1, non-veterans were more likely to be seen at for-profit facilities. Hospital type may be acting as a proxy for socioeconomic status if the use of for-profit facilities is related to higher income. Veterans were more likely to be seen in VA, military, and federal government facilities (as well as state, county, and city hospitals, though not significant) which are generally seen as safety net hospitals. It may be that Vietnam veterans are disproportionately affected by the following combination of circumstances: personal income is too high to qualify for Medicaid; inability to afford insurance or current employment does not include health benefits; diagnosed with substance abuse or PTSD, both of which carry a social stigma; and too young to qualify for Medicare. Vietnam veterans seek out safety net hospitals because of barriers to care at for-profit hospitals.

Unlike the inpatient analyses, the preliminary models attempting to predict number of outpatient visits did not support the assumptions necessary for use of a Poisson model. This was expected since outpatient visits are sporadic or isolated events rather than randomly distributed events and the use of a health service may increase the rate of future health services utilization. Thus, negative binomial maximum likelihood regression was used because this method permits the variance to exceed the mean (i.e. overdispersion is allowed). Controlling for veteran status, significant positive predictors of the number of outpatient visits in the past six months included one enabling measure (VA insurance coverage), five need measures (number of ever diagnosed major medical problems, number of limitations in activities of daily living, worse health now, depression since 1972, and the total admissions involving surgery of the four most recent admissions in the last five years), and two system measures (ability to see an MD within one week of making an appointment and last outpatient visit with a surgical specialist). Significant negative predictors included one enabling measure (full-time employment in 1996). All relationships were in the expected direction, with the exception of full-time employment in 1996. The need measures had the greatest impact on number of outpatient visits. The variation in the dependent variable explained by the model was 24.5 percent.

Conclusions

The current study was part of a long-term follow-up of Vietnam veterans with a history of substance abuse. Several limitations need to be introduced prior to drawing conclusions. For example, the sample is not representative of all Vietnam veterans for two reasons. First, the original sample excluded women, officers, non-Army military personnel, and Army enlisted men discharged from service in Vietnam other than in September 1971 (when public concern was highest regarding drug use). Therefore, drug use rates are higher than if these groups had been included [Jordan, et al., 1991; Alonso, 1973; Frenkel, et al., 1977; Bray, et al., 1989; Boscarino, 1995]. Second, veterans discharged in September 1971 represent a later cohort of Vietnam veterans. Thus, veterans of lower socioeconomic status are probably overrepresented.

A second limitation of this study is its use of patient self report to measure inpatient and outpatient utilization of health services. It has been demonstrated, however, that as long as the recall period is kept short, the data obtained from self report is reliable. Thus, well-accepted recall periods of six months for outpatient visits and five years for inpatient admissions were used. The shorter recall period for outpatient visits is particularly important for patients with behavioral health problems, as some diagnoses require weekly or even daily visits for a period of time. Because inpatient admissions are generally infrequent, the recall period can be as long as five years and still be quite reliable.

A third limitation is the somewhat low predictive ability of the outpatient contact model (maximum rescaled $R^2 = 16.2$ percent). This was due primarily to the less-than-optimal power of the outpatient contact model. Originally powered to detect a difference of 13 percent in the probability of outpatient contact between veterans and non-veterans, the actual difference in outpatient contact was only 3 percent when the dataset were restricted to only those patients with behavioral health problems ($N=749$). Thus, the results of the outpatient contact model may not be replicable with a larger N . Though perhaps minor in comparison, a secondary reason for the somewhat low predictive ability may be the proliferation of HMOs and their potential impact on improving access to health care. It is possible that the addition of HMO penetration data by metropolitan statistical area could improve the predictive ability of the model. Though usual source of care, which included HMO as a choice, was measured, it was clear that respondents were somewhat unsure of the distinctions between different sources of care (i.e. doctor's office or clinic where two or more doctors work *versus* HMO or other prepaid health plan to which you belong where visits to a group of doctors are paid for ahead of time). The same lack of clarity in the respondents' minds was present when asked about health benefits to which they were entitled. Therefore, self-reported measures of benefits were not included in the models. Unfortunately, there were no direct measures of benefits to which the respondents were officially entitled. The availability of such measures in future studies may greatly improve predictive ability.

A potential fourth limitation is that the dependent variable (self-reported health services utilization measured as inpatient admissions and outpatient visits) was not limited to behavioral-health-related admissions and visits. Obviously, predictive ability would have been higher if the dependent variable had been focused in this manner. However, it was believed that access to care, in general, may be impeded for patients with behavioral health conditions, not just access to behavioral-health-related care. Thus, the sample was restricted to only those with behavioral health conditions, but the dependent variable was not focused on only behavioral health care use.

Though not a limitation, one might question why different variables were predictive between the logistic regressions and the negative binomial regressions. One should expect some differences between the two types of models because two totally different types of decisions were being made. The first decision is whether to use health services at all (contact coded as yes or no). The second decision is contingent on the answer to the first question being yes. The motivation behind the response to the second question is quite different from the motivation behind the response to the first. The second question is simply, how many times to use services beyond the first time (volume coded as a continuous variable). Thus, one would expect differences between the predictors of contact in the logistic regressions and the predictors of volume in the negative binomial regressions. However, there were some similarities. Having been employed in 1996 was a significant negative predictor in both the inpatient contact and volume models. Similarly, the number of ever diagnosed major medical problems and the last admission at a for-profit hospital were significant positive predictors in both models. On the outpatient side, the number of ever diagnosed major medical problems was a significant positive predictor in both models, as one might expect.

One might also question why positive drug status at departure from Vietnam service was only predictive of inpatient contact. It is possible, as studies with other populations have demonstrated, that this cohort may have large unmet or under-met needs, perhaps due to difficulties navigating the health care system and understanding health benefits to which they were entitled. The social stigma associated with drug use and other associated conditions may serve as a barrier to care. Future studies focused on measuring unmet needs

and barriers to care using in-person interviews of this cohort are needed and are planned by the investigators.

Another interesting finding was that VA insurance coverage was only predictive of outpatient volume and was not predictive of inpatient volume or either of the contact variables. The most plausible explanation stems from the focus of the multivariate analysis, which was restricted to those patients with behavioral health problems. VA hospitals are specifically geared to treating patients with diagnoses, such as post traumatic stress disorder (particularly if combat related), depression, drug use, and alcohol use. Many non-VA hospitals would prefer not to treat patients with such diagnoses, due to the social stigma associated with these diagnoses in the minds of the public and the presumption that such patients would have a higher likelihood of being charity cases. These are all diagnoses primarily treated on an outpatient basis, thus, explaining why VA insurance coverage would be predictive of outpatient volume and not inpatient volume.

In conclusion, the current study has measured the impact of behavioral health problems on access to care and health services utilization for veterans and non-veterans. The study has also measured the relative contribution of system measures in the prediction of self-reported health services utilization. Though the weighted comparison showed that Vietnam veterans and non-veterans did not differ in availability of a regular source of care or insurance coverage, Vietnam veterans had a significantly greater number of behavioral health problems, traveled farther to receive care, waited longer to obtain appointments, and used outpatient clinics as their regular source of care, rather than private physicians' offices. This is suggestive of barriers to care, supporting the need for further research.

Interestingly, in the multivariate analysis restricted to those with behavioral health problems only, veteran status was no longer predictive of either contact or volume. In the presence of behavioral health problems, whether a patient is a veteran or not apparently does not affect access to health services. The number of major medical problems was the only variable consistently significant in all models. As was expected in the authors' previous work [Virgo, et al., 1999], of the four categories of predictors in Aday and Anderson's expanded behavioral model, the need and system measures had the greatest impact on health services utilization across models. Though a single behavioral health need variable was not predictive across all contact and volume models, behavioral health need variables (such as alcohol-related medical problems, drug positive status at service discharge, depression, PTSD based on a post-Vietnam event) were each significant predictors of health services utilization in at least one model. As in the bivariate analysis, the multivariate analysis may also suggest barriers to care specifically for behavioral health problems. The sample restricted to those with behavioral health problems is still predominantly a veteran sample. For the veteran sample, which differed so widely from the non-veteran sample in the bivariate analysis on presence of behavioral health conditions, to show so little utilization of services directly related to such diagnoses, suggests barriers to care as one plausible cause.

Policy Implications

The study's findings have important implications for health care administrators and policy makers. The finding that Vietnam veterans have a significantly greater number of behavioral health problems, must travel farther to receive care, wait longer to schedule appointments, and use outpatient clinics as their regular source of care rather than private physicians' offices suggests opportunities for intervention. Particularly within the VA sector, the number of community outreach clinics has increased to over 300 since 1995 and telephone-linked care has been established at all hospitals [VHA, 1999]. The percentage of patients receiving

cancer screening for early detection of various types of cancer has increased substantially (i.e. for colorectal cancer screening from approximately 34 percent to 74 percent). This transformation within the VA was just beginning when the interviewing for the current study was being conducted. Therefore, many veterans may not have been aware of newly opening clinics much closer to their residences where outpatient care and preventive screenings could be conducted more conveniently and with less waiting time.

Another implication relates to the finding that the need and system measures had the greatest impact on health services utilization across models. The condition-specific need measures which were associated with contact and volume were related to alcohol, depression, and emotional problems, anxiety, and nerves. That drug use measures were almost totally absent as predictors of utilization among individuals with a history of heavy drug use, may suggest an underlying unmet need related to either system-imposed barriers to care or self-imposed barriers to care. Further investigation is needed to clarify the nature of the system-imposed barriers to care which is demonstrated by the finding that even the limited system measures measured in the current study were highly predictive of health services utilization.

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