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# MENTAL HEALTH

## Statistical Note No. 184

### Characteristics of Admissions to Veterans Administration Medical Center Psychiatric Inpatient Services, United States, 1980

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#### Overview

Of the 172 Veterans Administration (VA) medical centers in the United States during 1982, 128 provided some type of separate psychiatric services (Ewalt and Lipkin 1982). Since 41 percent of American males over the age of 20, plus approximately one million women, are veterans (Ewalt and Lipkin 1982), these organizations have the potential to be a major source of psychiatric services in the United States. Given the changing nature of the U.S. veteran population, with a greater proportion being older (Ewalt and Lipkin 1982; Redick and Witkin 1982) and presenting different symptoms (Redick and Witkin 1982; Keane and Fairbanks 1983), the characteristics of current admissions assume additional import. The need for information is further highlighted by program initiatives toward partial hospitalization (Davis et al. 1978) and other community-based programs (Rogers and Grubb 1979) within the VA system.

This note focuses on the estimated 158,931 admissions to VA separate inpatient psychiatric services in 1980. Prior reports have both speculated on the characteristics of persons treated in VA psychiatric services (Ewalt and Lipkin 1982) and carefully analyzed the characteristics of the residents in the mid-to-late seventies (Redick and Witkin 1982). This report examines data gathered in the National Institute of Mental Health's (NIMH) 1981 survey of admissions to all separate inpatient psychiatric services of VA organizations. The survey was conducted during the period February 1981 to May 1981 by the Survey and Reports Branch, NIMH, in cooperation with the VA. The sources and limitations of the data, together with estimated sampling errors, are presented in the technical appendix.

#### Sociodemographic Characteristics of Admissions

In 1980, an estimated 158,931 persons were admitted to VA separate inpatient psychiatric services. Table A shows the percent distribution of 1980 admissions by military service era for whites and persons from all other races. Vietnam era veterans represented the largest percentage of admissions to VA medical centers (42 percent), followed by veterans of World War II (WWII) (25 percent). The relative percentages of admissions who served in these two wars differed considerably by race. Whereas 59 percent of admissions from all races other than white served in the Vietnam era, only 37 percent of white admissions served in this time period. In contrast, although 28 percent of whites served in WWII, only 11 percent of admissions from all other races served in this war. In fact, it is seen in chart A that admissions to VA inpatient psychiatric services who served in the military

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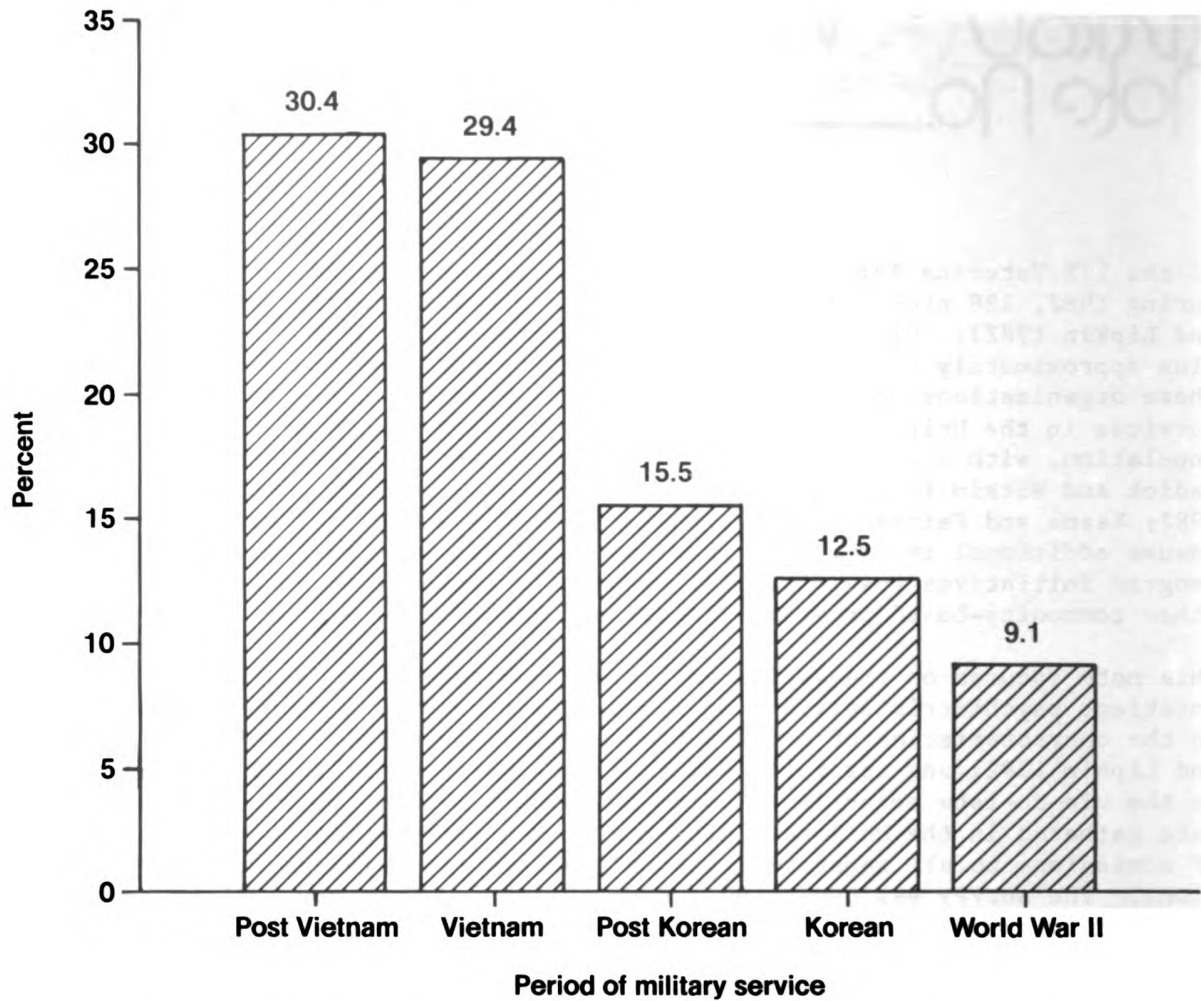
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**Chart A. Percent of admissions from races other than white<sup>1</sup> to Veterans Administration medical center inpatient psychiatric services, by period of military service: United States, 1980**



<sup>1</sup>Veterans may have served in more than one period and only races other than white are included; therefore, percentages may not add to 100%.

during the Vietnam or post-Vietnam eras were more likely to be from races other than white, when compared with veterans who served in earlier time periods. Persons from all races other than white comprised 9 percent of admissions who were veterans of WWII, 12 percent of Korean veteran admissions, 15 percent of post-Korean admissions, 29 percent of admissions from Vietnam era service, and 30 percent of admissions from post-Vietnam era service.

**Table A. Percent distribution of admissions to Veterans Administration medical center inpatient psychiatric services, by period of military service and race: United States, 1980**

Period of military service	Total	Race	
		White	All other
Total .....	158,931	125,966	32,965
Post-Vietnam era ....	10.9%	9.6%	16.0%
Vietnam era .....	41.9	37.3	59.3
Post-Korean Conflict.	11.3	12.0	8.4
Korean Conflict .....	13.8	15.3	8.3
World War II .....	24.8	28.5	10.8
World War I .....	0.5	0.5	*
Other <sup>1</sup> .....	1.0	1.1	0.7
Not a veteran <sup>2</sup> .....	0.2	0.2	*

<sup>1</sup>Includes other era and unknown service era.

<sup>2</sup>Includes persons on active military duty.

\*Five or fewer sample cases; estimate not shown because it does not meet standards of reliability.

**Note:** Patients may have served in more than one period of service; thus, percentages may add to more than 100%.

Data in table 1 show that fully 97 percent (154,583) of the admissions to VA medical center inpatient psychiatric services were males. With respect to sex, the 1980 admissions closely resembled 1975, 1977, and 1979 residents of VA inpatient psychiatric services, who also were comprised of 97 percent males (Redick and Witkin, 1982). Consistently large percentages of males were found for both racial groups and for all age groups.

Comparison of the age of male and female admissions (table 1), shows that males were somewhat less likely to be in the 18-24 year old group than females (7 percent vs. 17 percent). This pattern held among whites, but it is unclear if it held among admissions from all other races due to the small number of sample cases for females.

Differences also were noted in the distribution of age for white admissions and those from all other races. White admissions tended to be clustered in the older age groups, and admissions from all other races in the younger age groups. Although 69 percent of admissions from races other than white were in the 25-44 age category, only 46 percent of white admissions were in this age group. When this age group is combined with the 18-24 year olds,

79 percent of admissions from all other races were under 45 years of age. By contrast, only 53 percent of the white admissions were less than 45 years of age.

These sex and age patterns are apparent in the rates of admission per 100,000 U.S. veterans (table 1). For persons from all other races aged 25-44, the rate of male admissions was 1860.8 per 100,000 U.S. veterans, compared with a rate of 656.0 per 100,000 U.S. veterans for white males. Likewise, in the 18-24 age category, the rate for males from all other races was 1795.8 per 100,000 U.S. veterans, compared with the white male rate of 1122.6. Among male admissions between 45 and 64, there was less difference between the admissions rates for whites and all other races (412.5 and 576.5 per 100,000 U.S. veterans). For male admissions 65 years of age and over, admissions rates were almost the same for whites and all other races (222.9 and 203.5 per 100,000 U.S. veterans). In sum, white male admissions to VA separate inpatient psychiatric services in 1980 were considerably older than male admissions from all other races. Because of the small number of females from all other races admitted to VA separate inpatient psychiatric services, it is difficult to determine whether this finding was consistent among both males and females.

In table B, it is seen that about one-third of admissions to VA separate inpatient psychiatric services were married at the time of the survey (30 percent), about one-third had never been married (31 percent), and slightly more than one-third had been divorced or separated (36 percent). These patterns in marital status were relatively consistent among both male and female admissions.

**Table B. Percent distribution of admissions to Veterans Administration medical center inpatient psychiatric services, by marital status and sex: United States, 1980**

Marital status	Total	Sex	
		Male	Female
Total .....	158,931	154,583	4,348
Married .....	30.2%	30.5%	22.6%
Never married .....	30.9	31.0	29.7
Widowed .....	3.2	3.1	6.9
Separated/divorced ..	35.7	35.5	40.8

**Note:** Percentages may not add to 100% due to rounding.

#### Clinical Characteristics of Admissions

As shown in table C, just over half (53 percent) of all admissions to VA separate psychiatric inpatient services were self-referrals. Family or friends accounted for another 18 percent. Police or courts, psychiatric clinics or CMHCs, psychiatrists or other physicians, and State and county mental hospitals or other inpatient psychiatric services each referred about equal percentages of admissions for VA inpatient psychiatric services (between 4 and 5 percent). Source of referral did vary somewhat by age. Although 53 percent of all admissions were self-referrals, only 34 percent of the over 65 year old admissions referred themselves for treatment. As

expected, compared with the middle age groups (25-64), family or friend were the referral sources more often associated with geriatric admissions. Comparison of referral source by race indicates that substantial differences were not observed between whites and persons from all other races (data not shown).

**Table C. Percent distribution of admissions to Veterans Administration medical center inpatient psychiatric services, by referral source and age: United States, 1980**

Referral source	Total	Age group			
		Under 25 <sup>1</sup>	25-44	45-64	65+
Total .....	158,931	11,226	81,213	60,003	6,489
Self .....	53.4%	48.9%	56.8%	51.9%	33.7%
Family/friend .....	17.7	20.0	16.0	18.5	28.3
Police/court .....	5.3	3.9	6.1	4.6	3.9
Clinic/CMHC .....	5.0	4.3	5.2	5.0	4.5
Psychiatrist/ other physician .	4.5	3.6	3.3	6.0	8.4
State/county mental hospital .	4.2	7.6	4.1	3.5	7.1
Other psychiatric inpatient .....					
Other .....	9.8	11.8	8.6	10.6	14.2

<sup>1</sup>Includes an estimate of 41 white female admissions under 18 years of age.

**Note:** Percentages may not add to 100% due to rounding.

Fully 89 percent of all 1980 admissions to VA inpatient psychiatric services had prior mental health treatment of some type (table D). Moreover, 86 percent had experienced prior inpatient care, either solely (42 percent) or in conjunction with outpatient treatment (44 percent). Only 4 percent of the admissions had received only outpatient treatment prior to admission in 1980. Only minor differences were observed in prior mental health care by race, none of which were statistically significant.

As shown in table 2, alcohol-related disorders (34 percent), schizophrenia (30 percent), and affective disorders (14 percent) were the three most frequent diagnoses among 1980 admissions. Only 2 percent of the 1980 admission were diagnosed with organic disorders.

As expected, diagnostic distributions varied by age group (table 2). Organic disorders were diagnosed among 23 percent of admissions over age 65, even though these disorders comprised only 2 percent of all admitting diagnoses. Similarly, the over 65 group had the largest proportion of affective disorders (20 percent), followed successively in decreasing magnitude by each younger age group. Alcohol-related disorders were less often found among admissions under 25 years of age (17 percent) than among older groups, particularly among the 45-64 age group (44 percent). Personality disorders, drug-related disorders, and schizophrenia were more commonly found diagnoses among younger age groups of admissions. Results show that 43 percent of admissions under the age of 25 were diagnosed with schizophrenia, as were 35 percent of those between 25-44,

compared with 23 percent of those between 45-64 and only 9 percent of those over age 65.

**Table D. Percent distribution of admissions to Veterans Administration medical center inpatient psychiatric services, by prior mental health care and race: United States, 1980**

Prior mental health care	Total	Race	
		White	All other
Total .....	158,931	125,966	32,965
No prior mental health care .....	10.8%	11.3%	8.6%
Prior inpatient care only .....	42.0	42.3	40.7
Prior inpatient and outpatient care .	43.7	42.7	47.5
Prior outpatient care only .....	3.6	3.6	3.3

**Note:** Percentages may not add to 100% due to rounding.

The distribution of diagnosis within age categories was fairly consistent across racial groups, but the overall pattern of diagnoses differed somewhat between the two racial categories (table 2). Among white admissions, 26 percent were diagnosed with schizophrenia and 16 percent with affective disorders. By contrast, among admissions from all other races, 43 percent were diagnosed with schizophrenia and 7 percent with affective disorders. The difference between the races with respect to the percentage diagnosed with schizophrenia was particularly pronounced among admissions under age 25. For this group, schizophrenia represented 35 percent of white admissions, compared with 60 percent of those from all other races. Alcohol-related disorders tended to be more frequently diagnosed among white admissions, and drug disorders among admissions from all other races.

### Service Characteristics of Admissions

To provide a description of service patterns for admissions to VA medical center inpatient psychiatric services, the survey was designed to sample a cohort of admissions during a 1-month period. A followup form was completed for each sampled admission, either at the end of the survey period or at the time of discharge from the inpatient service, whichever occurred first. Data were collected on the types of treatment received by a sample patient during the study period. Table E shows the types of treatments received by admissions with selected primary diagnoses. Individual therapy showed the highest overall relative frequency (65 percent), in part because it was provided to a large percentage of admissions in each diagnostic group. Group therapy was provided to slightly over half of all admissions (57 percent); drug and activity therapies each were provided to about half of all admissions (52 percent and 49 percent, respectively).

Some striking differences occurred among diagnostic groups in the distribution of types of treatment received (table E). As expected, detoxification services were provided for about half of admissions diagnosed with alcohol- or drug-related disorders, but only 3 percent of those with affective disorders and 2 percent of those with schizophrenia. Conversely, drug therapies were provided less often for those with alcohol or drug-related disorders (31 percent and 42 percent, respectively), compared with those receiving diagnoses of schizophrenia or affective disorders (68 percent and 65 percent, respectively). Those with affective disorders more frequently received individual therapy (71 percent) than those with schizophrenia, alcohol-related disorders, or drug-related disorders (65 percent, 60 percent, and 55 percent, respectively).

**Table E. Percent distribution of admissions to Veterans Administration medical center inpatient psychiatric services, by type of treatment received for selected diagnoses: United States, 1980**

Type of treatment	Total	Selected diagnoses			
		Alcohol-related disorders	Drug-related disorders	Affective disorders	Schizophrenia
Total .....	158,931	54,791	8,067	22,960	47,493
Individual therapy ..	64.9%	59.7%	54.5%	71.2%	64.8%
Family/couple therapy	7.7	6.1	12.6	10.6	6.0
Group therapy .....	57.4	61.4	63.9	58.4	51.6
Drug therapy .....	51.9	30.7	42.5	65.0	68.2
Detoxification .....	23.5	56.1	48.3	3.0	2.3
Self-care skill training .....	13.1	11.2	13.9	12.4	16.2
Social skill training	22.0	19.4	19.1	21.2	25.1
Activity therapies ..	49.1	41.9	42.4	55.7	53.5
Other .....	23.4	29.0	25.1	21.6	17.3

**Note:** Patients may receive more than one type of treatment; thus, percentages may add to more than 100%.

The median length of stay (LOS) for all 1980 admissions was 22 days (table F). Data in table 3 show that nearly one-quarter of all admissions (25 percent) were released within 1 week. Few differences occurred in the distribution of LOS by race, but several differences by age did occur. Higher percentages of younger admissions tended to be released within 1 week. Among admissions under age 25, 30 percent were released within 1 week, compared with only 16 percent of those over age 64. Similarly, although only 9 percent of admissions under 25 were hospitalized more than 90 days, 19 percent of those over age 64 remained in inpatient care over 90 days.

### Summary

Most of the admissions to the VA medical center psychiatric inpatient services were male, white, between the ages of 25-44, diagnosed with either alcohol-related disorders or schizophrenia, and served in the Vietnam era. Over half of the admissions were released from inpatient treatment within

4 weeks of care; the median LOS was 22 days. During this inpatient care, most of the admissions received individual therapy, group therapy, drug therapy, or activity therapies.

**Table F. Median days of stay for admissions<sup>1</sup> to Veterans Administration medical center inpatient psychiatric services, by age and selected diagnoses: United States, 1980**

Age	Total	Selected diagnoses					
		Alcohol-related disorders	Drug-related disorders	Affective disorders	Schizophrenia	Personality disorders	Organic disorders
Total .....	22	21	13	26	24	19	33
Under 25.	16	21	12	19	21	11	*
25-44 ...	21	22	13	22	21	19	22
45-64 ...	26	21	15	31	32	25	31
65+ .....	32	25	*	42	41	*	49

<sup>1</sup>Patients who died while in treatment are excluded.

\*Based on five or fewer sample cases, therefore, median not shown.

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**Table 1. Number, percent distribution, and rate per 100,000 U.S. veterans of admissions to Veterans Administration medical center inpatient psychiatric services by race, sex, and age: United States, 1980**

Race and sex	Age group <sup>1</sup>				
	Total	18-24	25-44	45-64	65+
		<b>Number</b>			
Total, all races	158,931	11,185	81,213	60,003	6,489
Male .....	154,583	10,464	79,246	58,580	6,293
Female .....	4,348	721	1,967	1,423	196
White .....	125,966	7,867	58,552	53,513	5,993
Male .....	122,390	7,200	57,185	52,173	5,832
Female .....	3,576	667	1,367	1,340	161
All other races.	32,965	3,318	22,661	6,490	496
Male .....	32,193	3,264	22,061	6,407	461
Female .....	772	*	600	*	*
		<b>Percent distribution</b>			
Total, all races	100.0%	7.0	51.1	37.8	4.1
Male .....	100.0%	6.8	51.3	37.9	4.1
Female .....	100.0%	16.6	45.2	32.7	4.5
White .....	100.0%	6.2	46.5	42.5	4.8
Male .....	100.0%	5.9	46.7	42.6	4.8
Female .....	100.0%	18.7	38.2	37.5	4.5
All other races.	100.0%	10.1	68.7	19.7	1.5
Male .....	100.0%	10.1	68.5	19.9	1.4
Female .....	100.0%	*	77.7	*	*
		<b>Rate per 100,000 U.S. veterans<sup>2</sup></b>			
Total, all races	558.8	1218.6	793.1	421.6	213.6
Male .....	565.4	1271.2	800.2	425.8	221.4
Female .....	394.0	761.0	583.2	301.0	100.3
White .....	492.5	1101.2	651.2	409.4	214.6
Male .....	496.9	1122.6	656.0	412.5	222.9
Female .....	377.0	913.2	498.5	317.2	91.1
All other races.	1151.1	1630.8	1814.9	558.7	202.3
Male .....	1188.5	1795.8	1860.8	576.5	203.5
Female .....	497.6	*	951.8	*	*

<sup>1</sup>An estimate of 41 white females under age 18 years of age is not shown because it is based on five or fewer sample cases and does not meet standards of reliability.

<sup>2</sup>Population estimates used as denominators for rate computations are from the U.S. Bureau of the Census, 1980 Census of the Population "A" sample.

\*Five or fewer sample cases; estimate not shown because it does not meet standards of reliability.

**Note:** Percentages may not add to 100% due to rounding.

**Table 2. Percent distribution of admissions to Veterans Administration medical center inpatient psychiatric services, by race, diagnosis, and age: United States, 1980**

Race and diagnosis	Total	Age group			
		Under 25 <sup>1</sup>	25-44	45-64	65+
Total .....	158,931	11,226	81,213	60,003	6,489
Alcohol-related disorders	34.5%	17.3%	29.7%	44.3%	33.4%
Drug-related disorders ..	5.1	9.7	7.8	0.9	*
Affective disorders .....	14.4	9.4	12.0	18.0	20.0
Schizophrenia .....	29.9	42.6	34.9	22.9	9.3
Personality disorders ...	4.7	9.6	6.1	2.3	*
Organic disorders .....	2.5	*	0.8	3.0	23.1
Other .....	8.9	10.6	8.6	8.5	12.2
White .....	125,966	7,908	58,552	53,513	5,993
Alcohol-related disorders	36.7%	18.9%	31.9%	44.7%	35.4%
Drug-related disorders ..	3.5	10.8	5.5	0.5	*
Affective disorders .....	16.4	12.2	14.1	19.2	20.6
Schizophrenia .....	26.4	35.2	31.4	21.5	9.0
Personality disorders ...	4.8	11.5	6.4	2.5	*
Organic disorders .....	2.6	*	0.9	2.8	20.1
Other .....	9.6	10.1	9.8	8.9	12.7
All other races .....	32,965	3,318	22,661	6,490	496
Alcohol-related disorders	26.1%	13.5%	24.1%	40.9%	*
Drug-related disorders ..	11.0	6.9	13.6	4.8	-
Affective disorders .....	6.8	*	6.7	8.9	*
Schizophrenia .....	43.3	60.2	44.0	34.3	*
Personality disorders ...	4.3	*	5.2	*	*
Organic disorders .....	2.1	-	*	4.7	59.5
Other .....	6.4	11.7	5.9	5.4	*

<sup>1</sup>Includes an estimate of 41 white female admissions under 18 years of age.

**Note:** Percentages may not add to 100% due to rounding.

**Table 3. Percent distribution of admissions<sup>1</sup> to Veterans Administration medical center inpatient psychiatric services, by length of stay and age: United States, 1980**

Race and length of stay	Total	Age group			
		Under 25 <sup>1</sup>	25-44	45-64	65+
Total .....	158,677	11,226	81,175	59,837	6,439
7 days or less ....	24.7%	30.0%	26.6%	21.9%	16.0%
8-28 days .....	34.9	36.3	36.5	33.0	30.7
29-90 days .....	30.5	25.1	28.4	33.9	34.3
91 days or more ...	9.9	8.6	8.5	11.2	19.0
White .....	125,724	7,908	58,514	53,359	5,943
7 days or less ....	23.9%	29.2%	25.3%	22.5%	16.3%
8-28 days .....	34.0	35.7	36.1	31.8	30.4
29-90 days .....	31.6	25.9	29.3	34.4	35.8
91 days or more ...	10.5	9.2	9.3	11.3	17.6
All other races .....	32,953	3,318	22,661	6,478	496
7 days or less ....	27.5%	32.1%	30.1%	17.3%	*
8-28 days .....	38.4	37.7	37.4	42.6	34.1
29-90 days .....	26.4	23.1	26.0	30.3	*
91 days or more ...	7.6	7.1	6.5	9.8	*

<sup>1</sup>Includes an estimate of 41 white female admissions under 18 years of age.

\*Five or fewer sample cases; estimate not shown because it does not meet standards of reliability.

**Note:** Percentages may not add to 100% due to rounding.



## Technical Appendix

### 1981 Sample Survey Admissions to Psychiatric Inpatient Services Veterans Administration Medical Centers

#### Survey Design and Procedure\*

##### A. Survey Design

###### Scope of the survey

This survey was conducted during the period February 1981 to May 1981 by the Survey and Reports Branch, National Institute of Mental Health (NIMH), in cooperation with the Veterans Administration (VA). The target population included all patients admitted to the psychiatric inpatient services of VA medical centers located in the 50 States and the District of Columbia. Excluded were other public psychiatric inpatient organizations, such as military hospitals, Public Health Service hospitals, territorial hospitals, and State and county mental hospitals.

###### Sampling frame and sample size

The sampling frame (universe) for the survey consisted of all VA medical centers reported in the January 1978 NIMH Inventory of General Hospital Psychiatric Services. This inventory collected data on services, caseload, staffing, and expenditures for the previous fiscal year. The caseload data on admissions formed the basis for the stratification of the universe of VA medical center psychiatric inpatient services, as described below.

The original universe for the survey consisted of 121 centers with psychiatric inpatient services. The target sample consisted of all 121 centers. Of these, four refused to participate. Thus, 117 centers participated in the 1981 survey and provided data for 4,751 sample inpatient admissions.

###### Sample design

This survey used a one-stage stratified probability design. All centers were stratified by size into three primary strata, defined by the annual number of inpatient admissions reported in the 1978 Inventory, as shown in table I. Each center was asked to list all inpatient admissions during the month of February 1981 on a form provided by NIMH and to complete patient questionnaires for each admission appearing on one of the predesignated sample lines. The listing booklets were designed with differential sampling fractions, ranging from a 100-percent sample to a 20-percent sample, so that larger programs sampled a smaller proportion of their admissions, thus maintaining approximately equal reporting levels among all centers.

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\*Prepared by Survey and Reports Branch, Division of Biometry and Applied Sciences, National Institute of Mental Health.

For those centers sampling every third or fifth admission, sampling of admissions was systematic, with a random start within the first sampling interval.

### **Data collection and instrument**

The centers completed patient questionnaires on each designated sample patient. Most items were obtained from the medical records by medical records administrator staff. The data collection instrument was a two-part form. The first part of the form requested information pertaining to the admission of the patient and was completed either at the time of admission, upon discharge, or at the end of the study period. The second part of the form requested data about the treatment of the patient, as well as a discharge summary if the patient was discharged. This second part was completed at the end of the 3-month study period or at the time of the patient's discharge from the inpatient service, whichever occurred first. Both the individual patient questionnaires and the listing booklet for the month's admissions were mailed to NIMH for editing and processing.

## **B. Limitations of Design**

### **Nonresponse**

As in any survey, there were three possible types of nonresponse:

1. failure of a center to participate in the survey
2. failure to obtain data on an admission designated as a sample case
3. failure to obtain specific items of information (age, diagnosis, etc.) for individual sample patients.

Estimates presented in this report were adjusted for the failure of a center to respond through the use of an adjustment factor (number of centers divided by number of respondent centers). The number of centers that did not respond to the survey is detailed in table I, by strata. Data were adjusted for failure to obtain data on patients designated as sample cases (48 cases), by use of an adjustment factor (number of designated sample cases divided by the number of respondent sample cases within the same center). Data were adjusted for nonresponse to specific items as follows: records were sorted on a core set of variables, such as sex, age-category, diagnostic-category, stratum, region, and patient number; and the value of the variable from the previous record was substituted for the unknown value. Unless otherwise footnoted, the percentage of cases with missing data was 5 percent or less for any given variable.

### **Seasonality**

The survey data were inflated to represent the annual number and characteristics of admissions to the psychiatric inpatient services of VA medical centers in 1980, as described below. However, patients were sampled only for a 1-month period. Seasonal variations in the number

and characteristics of patient admissions were not considered in the estimation or variance calculations for this survey.

### C. Estimation

Estimation was carried out in three steps:

1. Within each primary stratum, patient records were weighted by the product of the inverse of the sampling fraction, the nonresponse adjustment factors (described above), and the ratio of total annual admissions (described below) to total sample-month admissions. This weight has the effect of inflating sample cases to annual facility totals and inflating sample facility totals to stratum totals.

2. Within each primary stratum, weights developed in step one were multiplied by a stratum-level ratio adjustment factor defined as the ratio of the total annual admissions in 1980 (reported as part of the editing procedures for the survey) for all centers in the stratum, to the inflated total count of admissions, as calculated from the procedure described in step one. The purpose of this ratio adjustment was to take into account all relevant information in the estimation process, thereby reducing the variability of the estimate. The effect of this ratio adjustment was to bring the estimates derived from the sample into agreement with the known total number of admissions.

3. Resulting stratum-level estimates were summed across strata to derive totals and subtotals for different domains of interest.

### D. Reliability of Estimates

#### Background

Because estimates presented in this report are based on sampling, they are likely to differ from figures that would have been obtained from a complete enumeration of the universe using the same instruments. Results are subject to both sampling and nonsampling errors. Nonsampling errors include biases due to inaccurate reporting, processing, and measurement, as well as errors due to nonresponse and incomplete reporting. These types of errors cannot be measured, but have been minimized to the extent possible through the procedures used for data collection, editing, and quality control.

The sampling error (standard error) of a statistic is inversely proportional to the square root of the number of observations in the sample. Thus, as the sample size increases, the standard error decreases. The standard error measures the variability that occurs by chance, because only a sample rather than the entire universe is surveyed. The chances are about two out of three that an estimate from the sample differs by less than one standard error from the value that would be obtained from a complete enumeration. The chances are about 95 out of 100 that the difference is less than twice the standard error, and about 99 out of 100 that it is less than three times as large.

In this report, statistical inference is based on the construction of 95-percent confidence intervals for estimates (0.05 level of

significance). All statements of comparison in the text relating to differences such as "higher than," "less than," etc., indicate that the differences are statistically significant at the 0.05 level or better. Terms such as "similar to" or "no difference" mean that statistically, no difference exists between the estimates being compared. Lack of comment on the difference between any two estimates does not imply that a test was completed and there was a finding of no significance.

### Calculation of Standard Errors

Standard errors were calculated for a broad range of subtotals within age, sex, and race subclasses through the use of SESUDAAN: Standard Errors Program for Computing of Standardized Rates from Sample Survey Data developed at the Research Triangle Institute by B.V. Shah. This procedure computes estimated sampling variance through the use of a Taylor series approximation. As applied to data from the present survey, variance estimates for subtotals were calculated for each primary stratum and then summed across strata to derive standard errors for domains of interest. The variance estimate for each primary stratum includes both the between-facility and the within-facility components of variance, with corrections for finite populations applied at both stages. Since preliminary work suggested that use of stratum-level ratio adjustment did not appreciably affect the variance estimates, all variance estimates were calculated on ratio-adjusted subtotals.

### Relative standard errors of subtotal estimates

The relative standard error of a subtotal estimate is obtained by dividing the standard error of the estimate by the estimate itself and is expressed as a percent of the estimate. Approximate relative standard errors for aggregate subtotal estimates are presented in figure I. Approximately 30 curves were generated by inputting the relative variance and the inverse of weighted aggregate totals obtained from SESUDAAN into the GLM (General Linear Models) procedure from the Statistical Analysis System (SAS). GLM uses the method of least squares to obtain the a and b parameters (listed in table II) and the predicted relative variance. From this, the predicted relative standard error was calculated and plotted against aggregate subtotal estimates using the GPLOT procedure in SAS/GRAPH. The 30 curves generated were very similar, and the generalized curve presented in figure I represents the most conservative of this set of curves. This generalized relative standard error curve indicates the magnitude of the relative standard error for estimates of various sizes and should be interpreted as approximate rather than exact for any specific estimate.

Alternatively, the relative standard error,  $RSE(x)$ , for a subtotal estimate may be calculated directly using the following formula, where  $x$  is the size of the estimate and  $a$  and  $b$  are the parameters listed in table II. Direct computation will produce more precise results than use of the approximations in figure I.

$$RSE(x) = \sqrt{a + \frac{b}{x}} \cdot 100$$



### Relative standard errors of rates

The approximate relative standard error for a rate, in which the denominator is the United States population or one or more of the age-sex-race subgroups of the United States population, is equivalent to the relative standard error of the numerator of the rate, as presented in figure I.

### Relative standard errors of estimated percentages

The approximate relative standard error of an estimated percentage, expressed in percentage terms, may be determined by use of figure II. The relative standard error of the percent is obtained from the appropriate curve, and may be interpolated for percentages based on denominators not shown in the figure. These relative standard errors should be interpreted as approximate rather than exact for any specific percentage.

Alternatively, relative standard errors for percents,  $RSE(p)$ , may be calculated directly using the following formula, where  $p$  is the percentage of interest,  $x$  is the base of the percentage, and  $b$  is the parameter listed in table II.

$$RSE(p) = \sqrt{\frac{b}{x} \cdot \frac{(100-p)}{p}} \cdot 100$$

### Relative standard errors of medians

In this report, medians were calculated on ungrouped data using the PROC UNIVARIATE procedure from SAS. The sampling variability of an estimated median depends on the form of the distribution as well as the size of the base upon which it is calculated. An approximate method for calculating the standard error of the median when the underlying population is normally distributed is to multiply the standard error of the mean by a factor of 1.2538. For estimated medians in this report, estimates were converted into logs in order to normalize distributions, and standard errors of the mean were calculated. The antilogs were then taken, and the resultant standard errors were multiplied by 1.2538 to obtain an approximate standard error for the median. Confidence intervals were then calculated around the median obtained from PROC UNIVARIATE using this estimated standard error.

Alternatively, 95-percent confidence intervals for medians may be approximated as follows:

1. Determine the relative standard error, expressed in percentage terms, of the estimate of 50 percent from the relevant distribution in figure II;
2. Convert the relative standard error to the standard error, i.e.,

$$\frac{RSE \cdot EST}{100}$$

3. Add to and subtract from 50 percent twice the standard error determined in step (2);

4. Using the distribution of the characteristic, calculate the values from the distribution corresponding to the two points established in step (3). These values will be the upper and lower limits for the 95-percent confidence interval.

**Estimates of differences between two statistics**

The standard error of a difference is approximately the square root of the sum of the squares of each standard error considered separately. This formula will represent the actual standard error quite accurately for the difference between separate and uncorrelated characteristics, although it is only a rough approximation in most other cases.

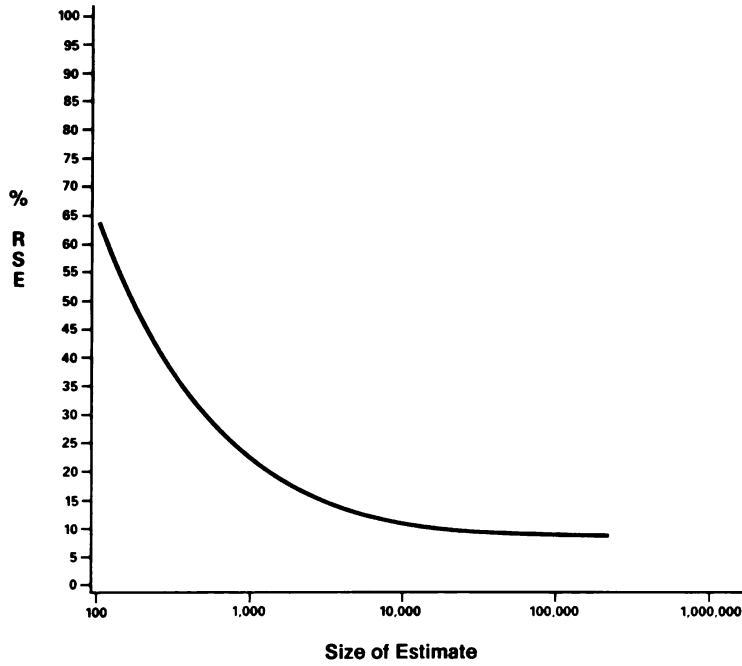
**Table I. Number of Veterans Administration medical centers in the universe and in the sample, by response status and primary strata; and number of patients in the sample, by primary strata**

Primary size strata (annual admissions)	Number of centers			Number of patients in actual sample
	Universe	Responding	Non-responding	
Total, all strata	121	117	4	4,751
< 1,000 .....	52	50	2	2,171
1,000-2,499 ...	47	45	2	1,725
2,500+ .....	22	22	-	855

**Table II. Parameters for calculating approximate standard errors of estimated numbers and percentages for major characteristics for the 1981 sample survey of admissions to psychiatric inpatient services of Veterans Administration medical centers**

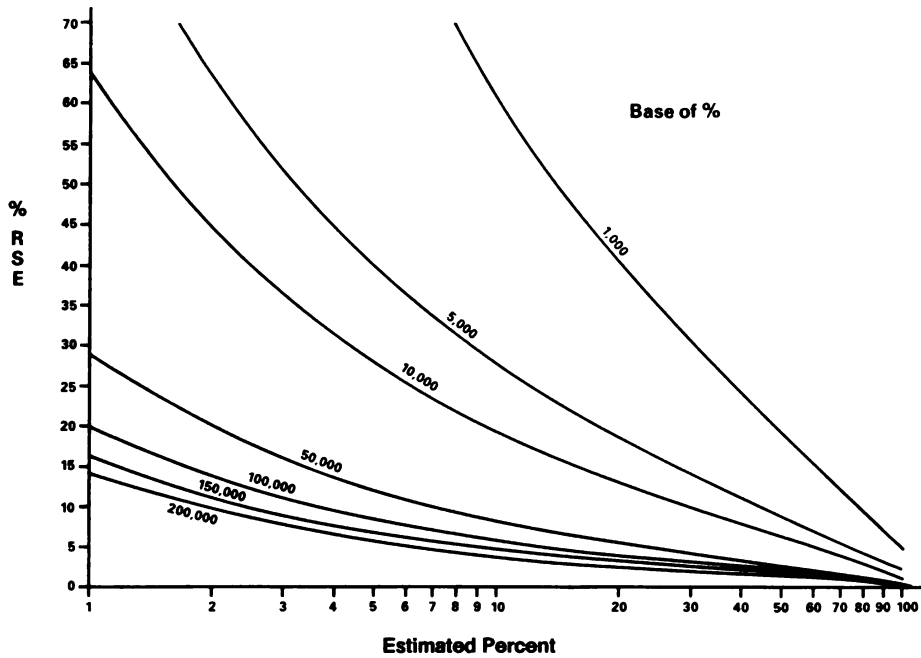
Type of Characteristic	Parameter	
	a	b
Age by sex by race .....	0.00130	39.737
Age by sex and race by:		
Diagnosis .....	-0.00524	46.270
Length of stay .....	0.00512	40.630
Veteran status .....	0.00245	39.796

**Figure I**  
**Relative Standard Errors for Estimated Subtotals**  
**Veterans Administration Medical Centers**



**Example:** An estimate of 10,000 admissions (on scale at bottom of figure) has a relative standard error of approximately 11% (read from scale at left side of figure), or a standard error of 1,100 (11% of 10,000).

**Figure II**  
**Relative Standard Errors for Estimated Percentages**  
**Veterans Administration Medical Centers**



**Example:** An estimate of 20% (on scale at bottom of figure) for a base of 50,000 has a relative standard error of approximately 7% (read from scale at left side of figure). The standard error in percentage points is equal to 20% x 7%, or 1.4 percentage points.

**DEPARTMENT OF  
HEALTH & HUMAN SERVICES**

**Public Health Service  
Alcohol, Drug Abuse, and  
Mental Health Administration  
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