

Acute Episodes of Mental Illness among the Population of Reproductive Age 1991-2005

By

Linda L Remy, MSW PhD

Geraldine Oliva, MD MPH

Ted Clay, MS

UCSF Family Health Outcomes Project
Geraldine Oliva, MD MPH, Director
Jennifer Rienks, PhD, Associate Director

500 Parnassus Ave. Room MU-337
San Francisco, California 94143-0900
Phone: 415-476-5283
Fax: 415-476-6051
Web: <https://fhop.ucsf.edu/>

November 2007

TABLE OF CONTENTS

Introduction	1
Hospital View	2
Patient Characteristics	3
Prevalence of Specific Diagnoses.....	5
Population Trends	7
Life Course Trends.....	7
Disparity Trends.....	9
Admission Patterns for Unduplicated Cases	13
Interaction between Mental Illness, Substance Abuse, and Injury	13
Impact of Mental Illness on Health	16
Summary and Discussion	19
Recommendations	21

TABLE OF TABLES

Table 1.	Hospital discharges and emergency department encounters - age 15-44 - 2005	3
Table 2.	Patient characteristics (Column % Total) by diagnosis group and setting – 2005	4
Table 3.	MISA diagnostic classifications - 2005	5
Table 4.	Percent of injury cases by diagnosis class, setting, and intent - 2005	6
Table 5.	Comparison of distribution of discharges and individuals by race/ethnicity and diagnosis group- 1991-2005	14
Table 6.	Person-level relationship between substance abuse and mental illness by race/ethnicity	15
Table 7.	Diagnosis class rate per 1,000 people by diagnosis group sumdxfh0	17

TABLE OF FIGURES

Figure 1.	Emergency department admissions by diagnosis group (%) - 2005	5
Figure 2.	Percent of MISA with injury by diagnosis class and hospital unit - 2005	6
Figure 3.	Hospital admissions with MISA as a principal diagnosis per 10,000 population by sex, age, and race-ethnicity, 1994 and 2005	8
Figure 4.	Hospital admissions with MISA or injury diagnosis per 10,000 population, by sex, age group, and race/ethnicity 1991 to 2005	10
Figure 5.	Self injury per 10,000 population by sex, age group, and race/ethnicity 1991-2005	12
Figure 6.	Average number of discharges per person by diagnosis group and race/ethnicity	14
Figure 7.	Co-occurrence of mental illness, substance abuse, and injury among the MISA population at the person and discharge level	15
Figure 8.	Co-occurrence of mental illness, substance abuse, and injury among the injury population at the person and discharge level	16
Figure 9.	Years of life lost by diagnosis group and race/ethnicity	18
Figure 10.	Percent of deaths by diagnosis group and race/ethnicity	18

Suggested Citation

Remy L, Oliva G, Clay T. (2007) Acute Episodes of Mental Illness among the Population of Reproductive Age 1991-2005. San Francisco, CA: University of California, San Francisco, Family Health Outcomes Project. Available at: <http://fhop.ucsf.edu/fhop-publications-hospitalizations-trends-and-outcomes>

ACRONYMS

AHRQ	Agency for Healthcare Research and Quality
CCS	Clinical Classification System
DRG	Diagnosis Related Group
DX	Diagnosis code
E-Code	External cause of injury code
ED	Emergency Department
FHOP	Family Health Outcomes Project
INJ	Injury
ICD-9	International Classification of Diseases, 9th Revision, Clinical Modification
MI	Mental illness
MISA	Mental illness or substance abuse
NIMH	National Institute for Mental Health
OSHPD	Office of Statewide Health Planning and Development
PD or PDD	Patient Discharge (Data)
PDX	Principal Diagnosis
PPX	Principal Procedure
PX	Procedure code
SAMSA	Substance Abuse and Mental Health Services Agency
SDX	Secondary diagnosis
UCSF	University of California, San Francisco

Acute Episodes of Mental Illness among the Population of Reproductive Age 1991-2005

INTRODUCTION

During the last 40 years, health providers learned a great deal about how to deliver recovery-oriented mental health care, improve service quality, achieve desired improvements in quality of life outcomes, and implement needed care systems in each community in America [1]. Today, our goal is a healthy life in the community for everyone.

As treatment knowledge increased, significant changes occurred in the number, capacity, structure, and operation of hospitals providing mental health services. Today, many people find services are inaccessible due to distance, cost, or coverage limitations [2,3]. A separate report addressed changes in California's hospital infrastructure to treat the reproductive age population afflicted with mental illness and/or substance abuse (MISA) [4]. Between 1994 to 2005, that study showed that the number of admissions remained steady even as the absolute number of hospitals declined and remaining hospitals lost both beds and staff to treat the MISA population.

While inpatient capacity was decreasing, expansions in Federal Community Mental Health Services Block Grants during the 1990's allowed more people to access outpatient public mental health services. However, services may not be evidence based; of the highest quality; respectful of the recipient's culture, race, and ethnicity; or recovery oriented [1]. In this paper, we investigate both Emergency Department (ED) visits and hospital admissions as potential indicators of lack of access to adequate outpatient mental health services.

This report analyzes hospital-based care in the reproductive age (15-44) population for acute episodes of MISA between 1991 and 2005. It explores differences by age group, gender and race/ethnicity. At this life stage, MISA can have a particularly negative impact on family formation, family functioning, and intergenerational family health. The National Institute for Mental Health (NIMH) estimated that 67% of women and 76% of men in the MISA population are parents, and that men with MISA are more likely to be fathers than men not so afflicted. The proportion of parents among men and women living in the community who meet diagnostic criteria for MISA is the same as that for individuals who do not meet these criteria [5].

The Agency for Healthcare Research and Quality (AHRQ) Clinical Classification System (CCS) groups both alcohol and substance abuse as mental disorder sub-categories [6,7]. This recognizes the significant interrelationship between these overlapping disorders as reflected in the mission of the US Substance Abuse and Mental Health Services Agency (SAMSA): "To

build resilience and facilitate recovery for people with, or at risk for, substance use and mental disorders by transforming mental healthcare in America” [8]. The literature is compelling that these can no longer be approached as separate conditions. For this report, we used the AHRQ CCS to categorize unlinked records for mental illness and substance abuse (MISA) into one group, excluding Mental Retardation and Senility and Organic Mental Disorders [9]. When looking at individual level linked data, we show the interaction of these two as separate categories.

We also compare MISA records with injury, and non-injury non-pregnancy records. Previous research shows that a significant number of injury cases involve patients who also are MISA [10-13]. Longitudinal analyses show that over time a significant proportion of injury patients are admitted for MISA conditions both before and after injury [14-16]. We use injury-only cases as a control group for the MISA population. Some analyses include admissions for all causes except MISA as a primary (PDX) or secondary (SDX) diagnosis, injury, or pregnancy.

This report examines hospital discharges (PD) and Emergency Department (ED) visits for acute episodes of MISA. We analyze these from multiple perspectives: hospital, population, and individual. We do not report results of statistical tests. However, all comparisons we emphasize are significant.

HOSPITAL VIEW

This section compares events reported in the Office of Statewide Health Planning and Development PD [17] and ED [18] datasets. PD data has been available for several decades, but we have only one complete year of ED data (2005). With one year of ED data, we are unable to compare admission and visit patterns over a longer time. Thus, we limit the analysis in this section to differentiate patterns of encounters between the two data sets in the year 2005. This provides information on the prevalence of these conditions in the study populations.

Neither the PD nor ED datasets provide information on patient paternity or maternity. For this reason, we select cases in the 15-44 year age group because this is the standard group for studying reproductive health issues.

Patient Characteristics

Table 1. Hospital discharges and emergency department encounters - age 15-44 - 2005

Diagnosis	Percent Total		Percent Admitted
	PD	ED	
Total	604,203	3,457,815	15
MISA Principal Dx	21	5	42
MISA Secondary Dx	3	5	10
Injury (E-code or Principal Dx)	13	29	7
All other non-pregnancy	63	61	15

Table 1 summarizes 2005 PD and ED data for the population age 15 to 44. It shows all records with a primary (PDX) or secondary (SDX) diagnosis of MISA, injury with no MISA diagnosis, and all other non-pregnancy cases.

Not counting pregnant women, hospitals had over 4 million encounters with people age 15 to 44 receiving hospital-based care on an inpatient or emergency basis. Overall, 15% were admitted to hospital. MISA (PDX or SDX) was 24% of PD patients and 10% of ED patients. Injury was 13% of PD cases and 29% of ED cases. MISA (PDX or SDX) patients were more likely to be admitted (52%) than injury patients (7%). Of people with MISA-SDX, almost all were preventable: 71% ambulatory-care-sensitive condition, 10% injured, and 16% non-delivery pregnancy-related. Ambulatory-care sensitive conditions are diagnoses for which "timely and effective outpatient care can help to reduce the risks of hospitalization by either preventing the onset of an illness or condition, controlling an acute episodic illness or condition, or managing a chronic disease or condition" [19].

Variable	Category	MISA-PDX		MISA-SDX		Injury		Non-Pregnancy	
		PD	ED	PD	ED	PD	ED	PD	ED
Total	Discharges	125,343	176,091	18,105	160,641	80,573	1,006,173	380,182	2,114,910
Sex	Male	54	52	40	46	69	59	44	40
	Female	46	48	60	54	31	41	56	60
Age	15-24	30	33	24	27	37	41	20	32
	25-34	28	30	33	33	29	31	27	33
	35-44	41	36	43	40	34	28	53	35
Race	White	60	50	59	59	50	51	50	45
	Black	14	11	14	11	10	10	12	13
	Hispanic	22	34	23	26	35	33	32	36
	Asian	4	4	3	2	5	5	6	4
Payor	Public	58	61	65	61	52	43	51	57
	Private	42	39	35	39	48	57	49	43
Out-of-County	No	82	91	88	91	83	88	84	91
	Yes	18	9	12	9	17	12	16	9
Outcome	Routine	85	82	93	97	84	97	93	98
	Other	15	18	7	3	16	3	7	2
	Other	15	18	7	3	15	3	6	2
	Died	0.01	0.005	0.17	0.06	1.52	0.10	1.02	0.06

Table 2 compares patient characteristics by diagnosis group and setting. In both the PD and ED, men are the majority of MISA-PDX and injury cases. Women are the largest proportion of MISA-SDX and other non-pregnancy diagnoses. MISA, both PDX or SDX, and non-pregnancy cases tended to be older than injury cases.

Among MISA-PDX cases, Whites represent the largest proportion of PD and ED events. Blacks (6% of California's population) and Whites (44% of California's population) [20] are disproportionately represented in all diagnostic categories except White ED non-pregnancy. A higher proportion of MISA cases are publicly insured, and a higher proportion of MISA-PDX are admitted outside their county of residence. Patients with MISA-PDX in PD and ED settings, and PD injury cases are discharged home (routine outcome) less often than patients with non-pregnancy medical or surgical diagnoses.

Figure 1. Emergency department admissions by diagnosis group (%) - 2005

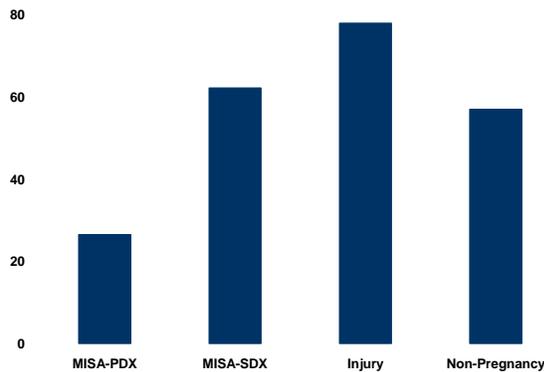


Figure 1 compares the percent of PD cases admitted through the ED. Patients admitted through the ED are not in the ED dataset. Figure 1 shows MISA-PDX cases are least likely to be admitted through the ED. Many of these patients were admitted to specialty hospitals, few of which have an ED. MISA-PDX patients are also most likely among comparison groups to be transferred from another facility.

Prevalence of Specific Diagnoses

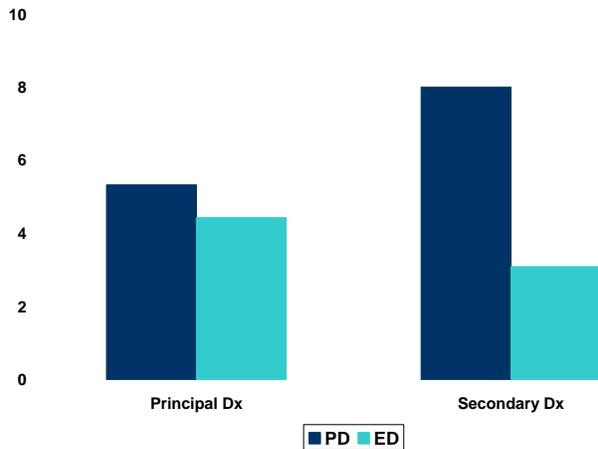
Table 3. MISA diagnostic classifications - 2005

Clinical Classification	Column Percent Total			Percent Admitted
	PD	ED	Total	
Total	125,343	176,091	301,434	41.6
Schizophrenia/related	25.9	4.4	13.4	80.6
Affective disorder	38.4	8.4	20.9	76.5
Other psychoses	8.6	7.6	8.0	44.8
Other mental condition	8.7	16.5	13.3	27.3
Preadult mental illness	0.1	0.6	0.4	15.5
Anxiety disorder	2.1	28.8	17.7	4.9
History of mental illness	0.0	1.9	1.1	1.2
Alcohol related	6.9	21.6	15.5	18.6
Substance Related	9.1	10.2	9.7	38.9

Table 3 compares PD and ED data for 2005 by major mental disorder [9] for MISA patients admitted or seen in the ED. Affective disorders (depression, mood disorders) and schizophrenia account for the largest proportions of MISA admissions. Among MISA patients, alcohol or drugs account for 16% of PD cases and 31.8% of ED cases.

Because this table displays data on events and not individuals, co-occurrence of these conditions, with or without injury, in a particular individual cannot be seen. Later, we examine patient-level data summarized over time to explore these interactions.

Figure 2. Percent of MISA with injury by diagnosis class and hospital unit - 2005



To begin to study the interaction of MISA with injury, Figure 2 shows the percent of MISA cases that also had an injury for those in the PD group compared to the ED group. For PD cases in the MISA-PDX group, 5% also had an injury diagnosis compared to about 4% of ED cases. For MISA-SDX 8% of PD cases had an injury diagnosis compared to only 3% of MISA-SDX patients seen in the ED.

Table 4. Percent of injury cases by diagnosis class, setting, and intent - 2005

MISA								
Principal			Secondary			Injury		
Total	PD	ED	Total	PD	ED	Total	PD	ED
14,465	6,672	7,793	6,803	1,845	4,958	1,086,746	80,573	1,006,173
42.4	32.5	50.8	44.2	63.7	37.0	81.1	68.1	82.2
46.2	59.1	35.1	1.2	0.8	1.3	2.1	9.2	1.6
7.7	5.5	9.6	1.1	1.6	0.9	8.5	15.1	8.0
3.7	2.9	4.4	53.5	34.0	60.8	8.3	7.7	8.3

To further clarify injury, we examined the distribution of injury by setting and intent among the three groups. Table 4 shows that the distribution of injury by intent differed among diagnoses and settings. MISA-PDX is notable in that 59% of PD injuries were intentional compared to 35% in the ED, about 1% in both PD and ED cases among MISA-SDX, and under 10% of injury only cases. Others have made similar findings.^{10 11}

In the MISA-PDX group, unintentional injuries represented a third of PD injury cases, compared with half of ED cases. In the SDX groups, unintentional injuries represented almost 64% of PD cases and only 37% of ED cases, compared to 68% of PD injuries and 82% of ED injuries.

An important finding is that among patients with an injury-only diagnosis, 9.2% (7,393) of PD and 1.6% (15,749) of ED encounters involved patients who *intentionally* harmed themselves and yet *were not coded* as MISA. In the PD data, these records would more than double the number of MISA patients who also were injured. In the ED data, it would triple the number of MISA patients who also were injured. As we shall show in the individual-level analysis, most injury records ultimately resolved over time to people classified at least once as a MISA case.

POPULATION TRENDS

Life Course Trends

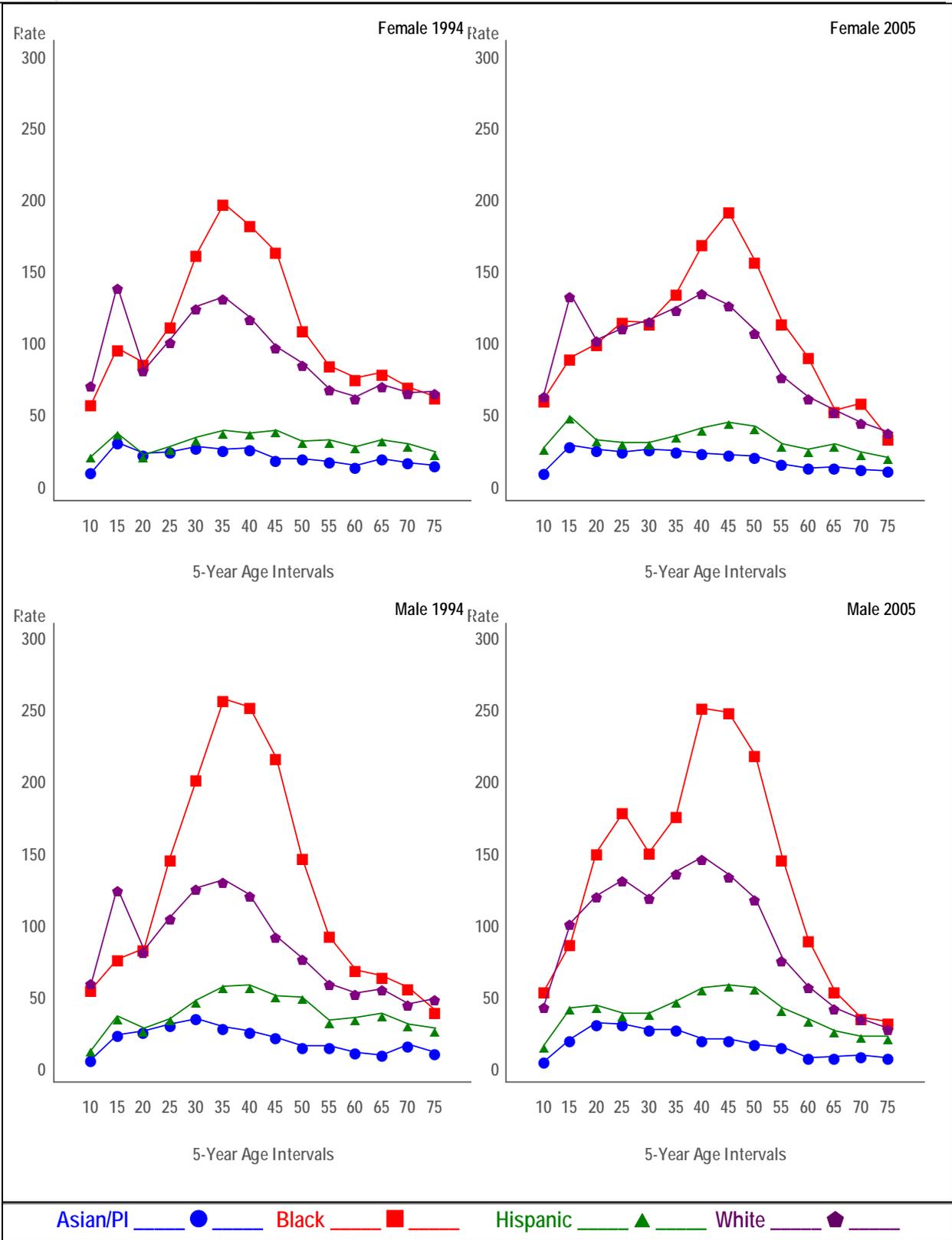
To understand the impact of MISA on population health, this section uses PD data to examine population-based rates for demographic subgroups within the population of reproductive age. By comparing age group rates we can begin to understand the life course impact of MISA. Rates were calculated using population data from the California Department of Finance [21]. In looking at these figures, keep in mind that rates are based on discharges and not people.

Figure 3 compares MISA-PDX admission rates per 10,000 population in 1994 and 2005 by age group 10 to 75, gender, and race/ethnicity. Admissions peak during the reproductive period age 15 to 44. At both times, White and Black MISA patients have much higher admission rates than Hispanics and Asians until old age. White and Black rates are 3 to 4 times higher than Asians and Hispanics during that part of the reproductive period where most births occur. Black MISA admissions peak at markedly higher rates than Whites.

Figure 3 reveals a cohort effect in the Black and White populations, reflecting the "Boomer" generation, born between 1946 and 1960, a period of great social and family upheaval.²² In 1994, peak ages for Black MISA admissions are 30 to 45. In 2005, peak ages are 40 to 55, coinciding almost exactly with the passage of a cohort through the 12-year period studied here. The White pattern is more complex with spikes in the youngest age groups, particularly young White women. Because of the spikes, the White cohort effect is less prominent.

Foreign-born Asian and Hispanic populations that did not participate in the post World War II baby boom were largely untouched by the cohort effect. Rates for Hispanics and Asians were much lower than rates for Whites and Blacks. Rates for Hispanic men peak in the older reproductive age population, Asian male rates peak during young adulthood.

Figure 3. Hospital admissions with MISA as a principal diagnosis per 10,000 population by sex, age, and race-ethnicity, 1994 and 2005



Disparity Trends

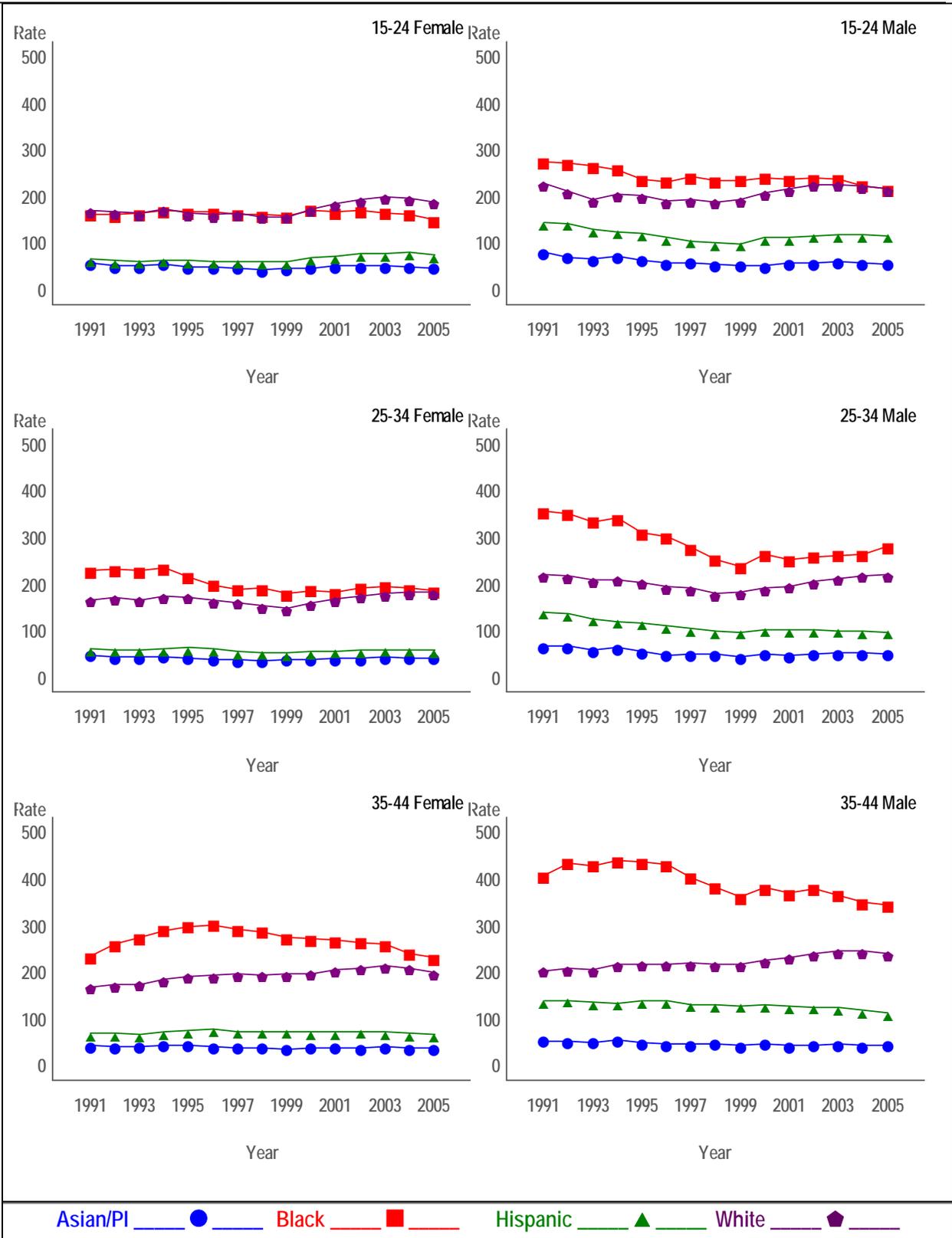
Figure 4 shows trends for the reproductive age group 15 to 44 for MISA (PDX and SDX) and injury discharges per 10,000 population. For this and subsequent analyses, the period is extended to 1991 to incorporate the period where California's mental health inpatient structural capacity was the greatest.

The disparity in MISA created by higher rates for Blacks and Whites and much lower rates for Hispanics and Asians persists over the entire 15-year period, across all age groups and for both males and females. Between 1991 and 2005, disparities between Blacks and Whites decrease because White rates increase while Black rates are dropping. The gap between Blacks and Whites compared with Hispanics and Asians increased slightly because rates for the latter groups declined slightly. Disparities at period end are particularly apparent in the population age 35-44. Black males age 35 to 44 are at greatest disadvantage in terms of combined MISA and injury admissions. This drop is occurring even though disproportionately more Blacks with MISA diagnoses are admitted to inpatient care (Table 2).

As can also be seen in this figure, the Asian rate is relatively flat, relatively equal for men and women, for all age groups. Across the 15-year span, Asians had the lowest rates among race/ethnic groups and across all sex and age combinations, around 50 total all-cause injuries or MISA admissions per 10,000 population. The Hispanic population had slightly higher rates than the Asian population in all comparisons and with a flat or decreasing pattern.

An important finding apparent in Figure 4 is that younger White women have significantly different trends than other groups. Their rates are increasing while those in other groups are decreasing or relatively stable. For the 15-24 group, White female rates moved from being the same as Blacks to being significantly higher. For the 25-34 year age group, White females moved from being significantly lower than Blacks to being the same. The youngest group of White males also showed an increase that resulted in rates changing from significantly lower than Blacks, at the beginning of the study period, to being the same at the end of the period.

Figure 4. Hospital admissions with MISA or injury diagnosis per 10,000 population, by sex, age group, and race/ethnicity 1991 to 2005



In 2005, about half of injuries coded as intentional self-injury were not coded as MISA. To understand how these cases differ from the larger MISA/injury group, Figure 5 compares the intentional self-injury rate per 10,000 population by the gender, age group, and race-ethnicity.

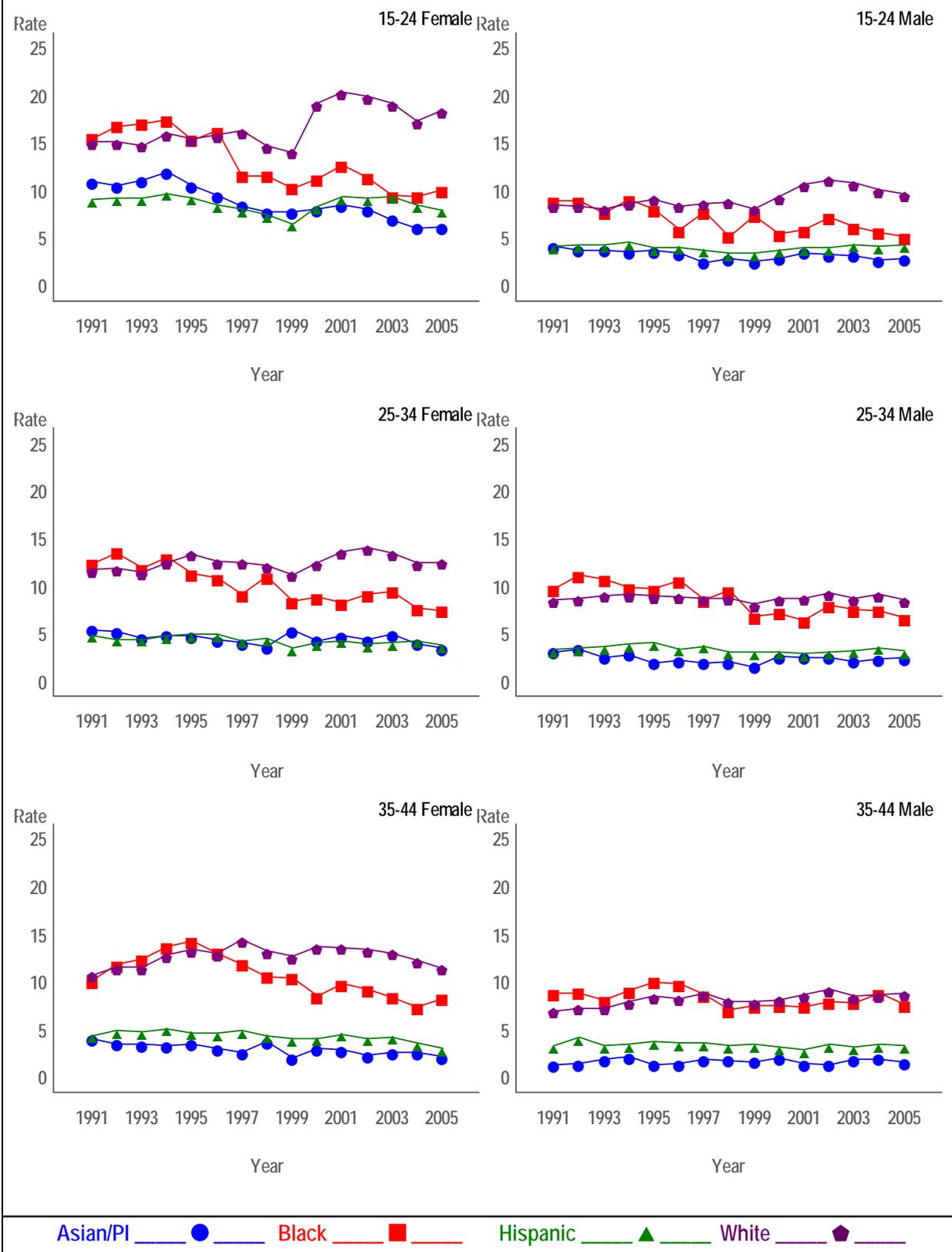
For females age 15 to 24, in every race/ethnic group, self-injury rates were higher compared to the males in this age group. In 1991, rates for White and Black females were comparable. Over the period, rates for Whites initially dropped then increased. By 2005 White females age 15-24 had the highest rates, almost twice that of Blacks. Rates for Black and Asian females dropped over the period while Hispanic rates remained stable. By period end, rates for Asian, Black, and Hispanic females age 15 to 24 were not markedly different. Among males age 15 to 24, White rates increased while Black rates dropped to within the range of Hispanic and Asian males.

Among females age 25 to 34, White, Asian, and Hispanic self-injury rates remained relatively constant throughout the period, while the Black rate dropped. By period end, White rates were higher than other groups. Similar but more modest rate changes occurred in males in this age group and their rates are lower than their female race/ethnic counterparts.

Trend graph patterns for the 35-44 year age groups for both females and males mirrored that for the 25-34 year age groups with White females emerging in 2005 as the group with the highest rates while rates for Black females dropped and other groups remained flat.

This pattern differs from that in the MISA group in that Whites for all age groups and both genders had the highest rates and, in younger age groups, the disparity between Whites and Blacks was much greater.

Figure 5. Self injury per 10,000 population by sex, age group, and race/ethnicity 1991-2005



ADMISSION PATTERNS FOR UNDUPLICATED CASES

Admission data could reflect events involving many different individuals or a smaller number of individuals with multiple admissions over the period of interest. Discharge-level analyses allow us to quantify the burden of admissions for MISA or injury to the health care system and to society but do not allow us to understand the impact on individuals or families.

To explore longitudinal patterns for individuals, analyses in this section use an unduplicated "person" level data set. To declare a set of SSN records as belonging to a "person", we required a match on SSN, gender, and year of birth. This method may undercount the Hispanic population, which may disproportionately lack an SSN. We then summarized the PD data to the "person" to explore co-morbidity patterns over time. Because analyses reported here are not based on sequential episodes of care, we are unable to know which diagnosis (mental illness, substance abuse, injury) was present in the first admission.

Interaction between Mental Illness, Substance Abuse, and Injury

The discharge-level analysis for 2005 demonstrated that many MISA records had primary or secondary injury diagnoses and that more than half of cases coded as self-inflicted injury had no mental health diagnosis. This raises the issue of the extent to which injury and MISA co-occur in an individual given sufficient time.

To explore the interaction between MISA and injury, we created three diagnosis groups based on admission history over the interval 1994 to 2005: those admitted only for injury (INJ), those admitted only for MISA, and those admitted for injury and MISA (BOTH). To explore the interaction between mental illness and substance abuse, we separated the MISA group into two groups: those with only MI diagnoses and those with only SA diagnoses.

We then searched the PD data between 1991 (three years before the first injury or MISA admission in 1994) and 2005 to find every admission for any reason for these people. For about 1.6 million people with a SSN admitted to hospital between 1994 and 2005 because of an acute episode of MISA or severe injury, we found almost 6 million records over the interval 1991 to 2005, an average of about four admissions per person.

We assigned race/ethnicity to be the one found most frequently for the same person over all admissions. Race/ethnicity found on the first admission for any reason matched assigned race/ethnicity for 97% of cases. Table 5 summarizes distribution of discharges and people by race/ethnicity and diagnosis group (Injury, MISA, Both).

Table 5. Comparison of distribution of discharges and individuals by race/ethnicity and diagnosis group- 1991-2005

Measure	Race/Ethnicity	Total Number	Race/Ethnicity %			INJ % MISA	MISA % INJ
			Injury	MISA	Both		
Discharges	White	3,695,640	20	34	47	58	70
	Black	1,003,052	18	35	47	57	72
	Hispanic	1,092,832	35	28	37	57	52
	Asian	174,703	39	26	35	57	47
People	White	952,373	42	42	17	28	29
	Black	195,720	43	40	17	30	29
	Hispanic	365,760	56	32	13	29	18
	Asian	73,316	52	36	12	24	18

About 70% of discharges for Whites and Blacks who had at least one injury admission had at least one discharge for MISA (MISA % INJ), compared to about half of Hispanics and Asians. About 3 in 5 discharges of people ever admitted for MISA also had an injury admission. Over the entire period, only about 1 in 5

discharges for Whites or Blacks were for people who only were injured, compared to more than 1 in 3 for Hispanics and Asians.

At the individual level, about 2 in 5 Whites and Blacks were admitted only for injury, compared with more than half of Hispanics and Asians. About 30% of White and Black people ever admitted with a MISA diagnosis were admitted for injury, and about 20% of Hispanics and Asians. Of those admitted for injuries, about 30% of Whites and Blacks had MISA admissions compared with about 18% of Asians and Hispanics. The discrepancy between discharge- and individual-level proportions of overlapping injury and MISA diagnoses is explained by the finding, illustrated in Figure 6, that people with both injury and MISA had a disproportionately greater average number of total admissions for all reasons than the other groups.

Figure 6. Average number of discharges per person by diagnosis group and race/ethnicity

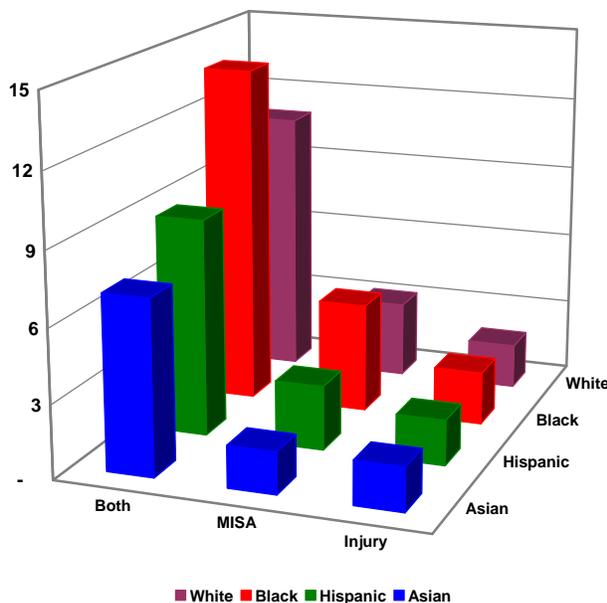


Figure 6 compares average number of discharges per person by race/ethnicity and diagnosis group. Individuals with both MISA and injury diagnoses over the period had the greatest average number of total admissions per person for all race/ethnic groups. MISA cases have more discharges than injuries alone.

In terms of race/ethnic differences, MISA Blacks carry the greatest illness burden, with MISA Whites close behind. Discharges for people only injured did not vary importantly by race/ethnicity.

Table 6. Person-level relationship between substance abuse and mental illness by race/ethnicity

Race/ Ethnicity	Total Number	Race/Ethnic Percent			MI % SA	SA % MI
		MI	SA	BOTH		
White	555,845	42	28	30	51	41
Black	111,888	42	31	27	47	39
Hispanic	161,487	46	31	22	41	32
Asian	35,172	68	16	16	49	18

Table 6 excludes injury-only cases to focus on the co-occurrence of mental illness (MI) and substance abuse (SA) at the person level. Whites (64%) dominated the MISA population compared with Blacks (13%), Hispanics (19%), and Asians (4%). About 2 in 5 Whites, Blacks,

and Hispanics were discharged for MI only compared to almost 7 in 10 Asians. About 30% of Whites, Blacks, and Hispanics were SA-only compared to 16% of Asians. Among people ever admitted for SA, 40% to 50% of all race/ethnic groups were admitted for MI. Among people ever admitted for MI, about 40% of Blacks and Whites, one-third of Hispanics, and about 1 in 5 Asians were admitted with an SA diagnosis.

Figure 7 summarizes all-race co-occurrence of MI, SA, and injury at the person and discharge level among the MISA population. The MI-only group accounts for 33% of people but only 19% of discharges. The SA-only group accounts for 18% of people but only 10% of discharges. The MISA/Injury group accounts for 11% of people and 30% of discharges. About 20% of the MISA population is admitted at least once for injury, while half of all MISA discharges involve injury. MI is clearly a greater factor than SA at both the individual and discharge levels, with important race/ethnic variation as shown in Table 5. Average ages for the MI-only and SI-only groups were 2 to 5 years younger than the other groups and had fewer admissions. Thus with time, more of the MI-only and SA-only are likely to join the other groups. These findings highlight the importance of intense early intervention.

Figure 7. Co-occurrence of mental illness, substance abuse, and injury among the MISA population at the person and discharge level

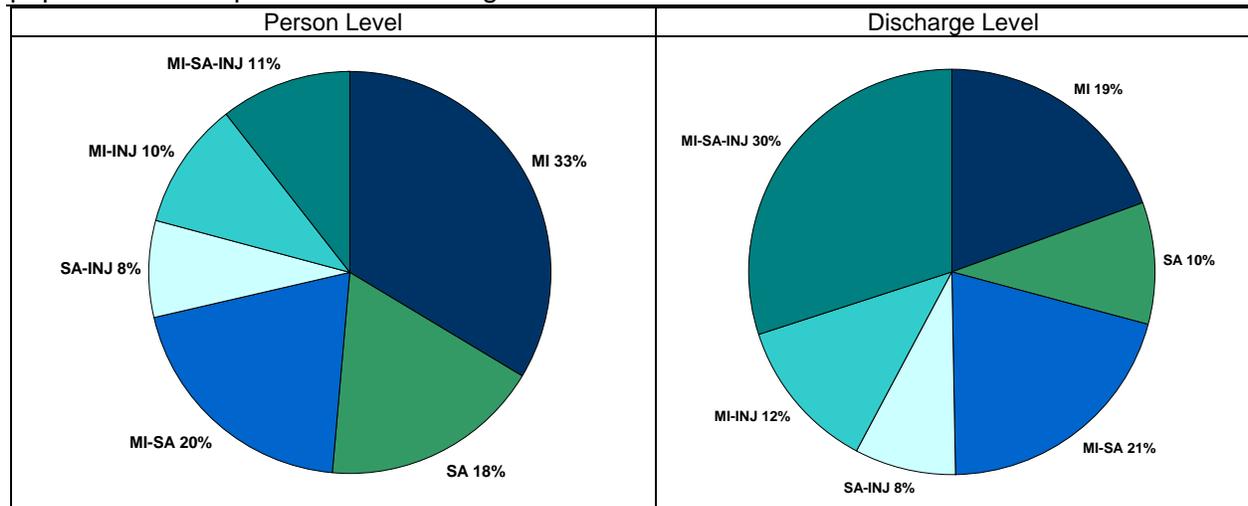
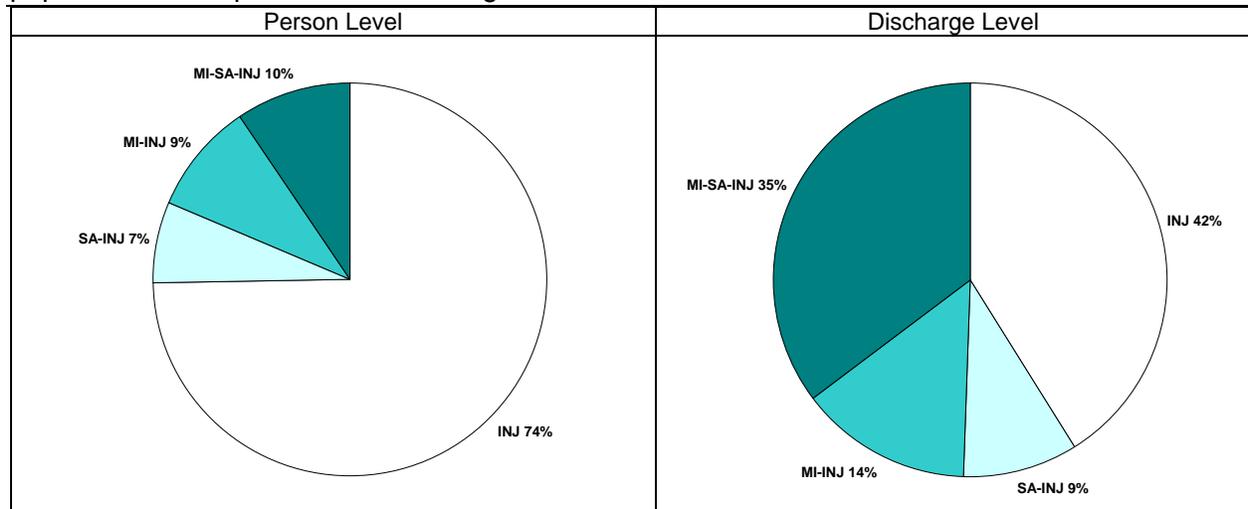


Figure 8 summarizes all-race co-occurrence of MI, SA, and injury at the person and discharge level among those ever injured. The MI group accounts for 9% of people and 14% of injury discharges. The SA group accounted for 7% of people but 9% of injury discharges. Overall, MISA accounts for 25% of people and 58% of injury discharges, with important race/ethnic variation as shown in Table 5. MI is clearly more important than SA in understanding injury admissions.

Figure 8. Co-occurrence of mental illness, substance abuse, and injury among the injury population at the person and discharge level



Impact of Mental Illness on Health

Table 7 summarizes rates per 1,000 hospitalized people for all admission causes. The first column identifies major diagnostic classes [9]. The second set of columns shows admissions per 1,000 hospitalized people. The third column set shows the likelihood patients classified as MISA or Both would be admitted for the condition compared to an injury patient. All likelihood ratios were statistically significant.

Table 7. Diagnosis class rate per 1,000 people by diagnosis group sumdxfh0

Description	Rate per 1,000			Likelihood Ratio	
	Injury	MISA	Both	MISA	Both
Total Admissions	1,875	3,117	7,898	1.7	4.2
Condition Admissions	1,156	1,760	4,514	1.5	3.9
Other Admissions	719	1,357	3,384	1.9	4.7
Ambulatory-care sensitive	101	358	894	3.6	8.9
Medical	212	388	1,595	1.8	7.5
Surgical	178	192	557	1.1	3.1
Pregnancy	519	419	337	0.81	0.65

MISA/Injury patients were far more likely to be admitted for non-pregnancy reasons.

MISA-only patients also had greater likelihood for these admissions but their risk was less than MISA/Injury.

The very high rates of ambulatory-care sensitive admissions for MISA patients compared with injury-only patients appears to indicate that the MISA population has great difficulty accessing preventive care. One possibility is that MISA interferes with the ability to seek preventive care. Another possibility is that community practice settings find it difficult to provide preventive health care to this population.

Among women, injury-only patients had more pregnancy admissions than MISA or MISA/Injury women. The pregnancy rate in Table 7 does not reflect a parenthood rate. By nature of the design, most women in the range of 40 to 44 in 1994 would be past reproductive age. By 2005, they would be 60 and almost all pregnancy admissions would be outside the time frame. A young woman age 15 to 19 in 1994 would be 12 to 16 at the beginning of the study period in 1991, and would not have completed her reproductive period by 2005.

Figure 9. Years of life lost by diagnosis group and race/ethnicity

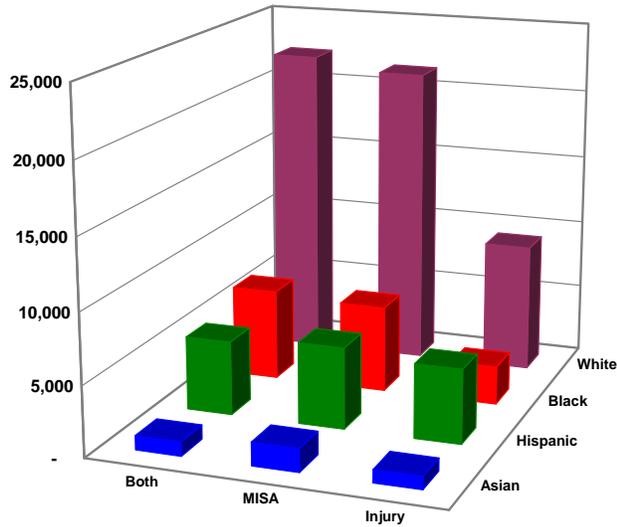


Figure 9 shows results of converting days in care for each group to Years of Life Lost (YLL) for all cause admissions.

The MISA population -- and particularly the White MISA population -- overwhelms injury in terms of YLL due to all-cause illness.

Figure 10. Percent of deaths by diagnosis group and race/ethnicity

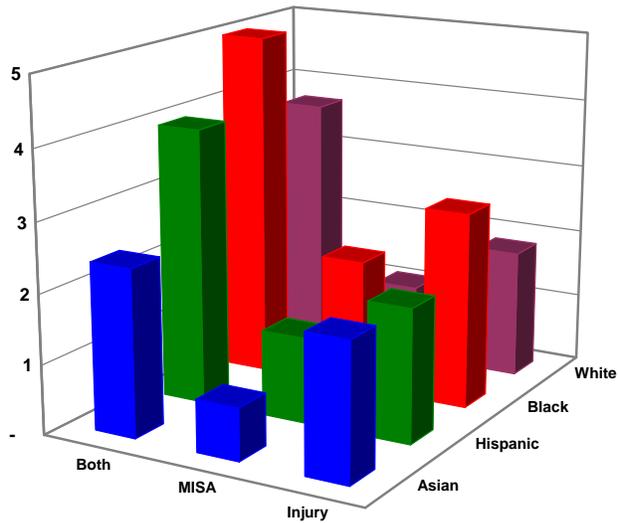


Figure 10 shows the percent of inpatient deaths during the last admission. In each group, Black patients were more likely to die.

The MISA/Injury group was 2 to 5 times more likely to die than any other group.

SUMMARY AND DISCUSSION

We began this investigation by comparing hospital admissions and emergency department encounters in 2005. This identified that men were more likely than women to receive care for MISA as a primary diagnosis and for injury. Whites and Blacks were disproportionately represented in the hospitalized population. Those with any mental health diagnosis tended to be older than the injury population. Only 1 in 8 injury patients were admitted to inpatient care, compared with about 3 in 10 MISA patients. Affective and schizophrenic disorders were the most common diagnoses for admitted patients. Patients with a mental health diagnosis were more likely to be admitted out-of-county and were less likely to be discharged to their home.

An analysis of age-group population-based rates revealed that MISA admissions were highest during the peak reproductive years. Whites and Blacks had the highest rates, disproportionate to their representation in the population. Rates for Hispanics and Asians were lower and more consistently flat. Age group trends revealed that young White women had increasing rates over time and, for the 15-24 year age group, surpassed those for Blacks. This pattern also occurred for intentional self-injury rates for young White women age 15 to 24, which were higher than other race/ethnic groups and rose throughout the period.

A cohort effect showed as a peak for MISA admission rates in 1991 for the group age 30 to 45 that shifted to age 40 to 55 in 2005. The effect was strongest in Blacks, less strong in Whites, and weakest in Hispanic males.

Although media messages and public concerns suggest that mental health problems are a youth crisis, we found the highest MISA rates in adults who were part of the baby boom generation [23]. The preponderance of Whites in the hospital population places most of the burden for the number of cases with that population.



Glynis Sweeney

In terms of unduplicated individuals, about half of all people ever admitted for SA were admitted at least once for MI. For those admitted with an MI diagnoses, about 30% were admitted at least once for SA. More people were admitted with MI diagnoses than SA and they accounted for the bulk of discharges. Thus, in terms of hospital-based care, MI was a much more important diagnosis than SA.

A very important finding of this analysis is the prevalence of co-occurring MISA and injury diagnoses. About 30% of MISA patients were admitted at least once for injury, and injuries co-occurred in half of MISA admissions. About 30% of injured people had a MISA diagnosis on at least one admission, and 58% of injury discharges involved MISA patients, with Whites and

Blacks having 70% MISA/Injury co-occurrence. The MISA population had more discharges and was older on average than the injury-only population.

The association between injury and MISA suggests that mindfulness is a critical component of personal injury prevention strategies in this population. Minds preoccupied by depression, anxiety, or delusions, with or without substance abuse, are unable to direct attention to their safety or that of others. These findings highlight the importance of effective early intervention.

Over the study interval, MISA patients lost far more years of life to illness than the Injury-only group, with Whites losing the most. MISA groups were 2 to more than 5 times more likely to die than the Injury-only group, with Blacks most likely to die in all three condition groups. These findings are consistent with the findings of others [24].

Contrary to common beliefs that hospitalizations are declining for the MISA population due to increased payment mechanisms for outpatient care, our findings show that rates for the population age 15 to 44 remained high for Whites and Blacks. While rates were low for Hispanics and Asians, they also were steady. A companion report on mental health in the adult population found that California has greater need for MISA services, yet has lower all-site mental health service penetration rates than the Western Region and the United States.²⁵ Further, unlike the US, which serves about the same proportion of seriously mentally ill across all age groups, the percent of MISA served in California's community mental health programs increases with age. This explains why admissions for the population age 15 to 44 have been stable: This age group is less likely to be treated in community programs.

California also has the nation's highest HMO penetration rates (48% compared with Connecticut, 37%, Nevada 24%, Oregon 19%) [26]. A SAMSHA-sponsored longitudinal study (1992 to 1997) found that patients in counties with the highest HMO penetration rates (46% or higher) were half as likely to receive post-discharge rehabilitation services as patients living in counties with low HMO penetration rates (27%) [27]. The authors go on to note that few public or private insurers, managed behavioral health care organizations, health care facilities, or inpatient programs assure that individuals enter community-based treatment following discharge from inpatient or residential programs. As Mark et al note, "This situation reflects missed opportunities for patients and their families, but it also reflects expenditures for services with little likelihood of improved health outcome in the long term [27]."

Another complicating factor is the gross mismatch between where hospitals and residential programs are located and where patients live. In another issue brief on mental health infrastructure, we identified significant declines in California's inpatient treatment structure between 1994 and 2005 [4]. As of 2005, 23 of California's 58 counties had no licensed inpatient capacity to treat the adult MISA population. Residents of 30 counties would have to travel out-of-county for licensed inpatient, residential, or day treatment for chemical dependency. To care for the adolescent population, 40 counties had no locally available inpatient or residential

adolescent treatment capacity. Thus, most counties lack the range of services needed to treat the MISA population locally. Out-of-county care was steadily 3 to 4 times more common among MISA patients than the general hospital population.⁴

When we evaluate the impact of mental disorders on the reproductive age population, we must bear in mind that the burden falls not only on the people studied, but also on their partners, children, and extended family and friends. The combination of multiple and lengthy hospital stays and deaths, coupled with increased rates of out-of-county care, suggests that families of the MISA population experience significant upheavals. It is multiplied in MISA families whose members are also injured and disproportionately hospitalized for many other conditions, many of which are preventable if care was available in the community.



Pervasive systemic neglect of this population has a serious detrimental impact on family formation, family functioning, and intergenerational family health. The MISA population forms the core of families whose children are in foster care, juvenile detention facilities, group homes, and residential treatment. When premature death further complicates family burden, the social burden spreads, increasing the numbers of children and youth with severe emotional, behavioral, and developmental problems, needing foster care, and served by juvenile justice.

RECOMMENDATIONS

Numerous studies have shown that early diagnosis of mental health and related conditions followed by intense effective treatment and follow-up that includes case management shortens the severity of acute episodes, lengthens the time to recurrence, and saves healthcare resources. This suggests the need for the following actions:

- Routine screening for mental health and substance abuse conditions should be part of all primary and preconception care programs.
- Patients admitted to the hospital or seen in the ER for injuries or substance abuse should be more thoroughly evaluated for mental health conditions.
- Quality improvement efforts should aim at increased identification and coding of mental health conditions in the portion of injury cases with e-codes indicating intentional self-harm that are not identified as mental health problems.
- All primary care and ER programs should have mental health consultation and training for their staff and operative linkages with mental health service providers.
- Geographic accessibility must be guaranteed by all public mental health managed care plans.

The findings that particular subsets of the population -- those with both mental health and injury and those with both substance abuse and mental health diagnoses -- account for multiple hospital admissions should be of concern not only on a humanitarian basis but on an economic one. Prevention and early intervention can prevent these costly adverse outcomes.

The finding that two-thirds of the 1.6 million people in this study had private insurance for at least one admission suggests that the public and private sectors must come together to develop common diagnosis and treatment protocols that are evidence based; of the highest quality; respectful of the recipient's culture, race, and ethnicity; and recovery oriented [1]. Private managed care plans would be wise to cover mental health screening and evidence-based treatment that could prevent the need for repeated hospital intervention because of acute mental health episodes and the onset of other conditions treatable in community settings.

ENDNOTES

- 1 Manderscheid RW, Berry JT (Eds). (2006). Center for Mental Health Services. Mental Health, United States, 2004. DHHS Pub No. (SMA)-06-4195. Rockville, MD: Substance Abuse and Mental Health Services Administration. Last accessed 29-Aug-2007 at: <http://mentalhealth.samhsa.gov/publications/allpubs/SMA04-3938/default.asp>
- 2 Forster P (2001) Psychiatric Hospital Beds in California: Reduced Numbers Create System Slow-Down and Potential Crisis. August 30, 2001 California Institute for Mental Health. Last accessed 10-Sep-2007 at: www.cimh.org/downloads/Acute_Services_Report_Final.pdf
- 3 Storz M. (2001) A Tale of Two Settings: Institutional and Community-Based Mental Health Services in California since Realignment in 1991. Oakland CA: Protection & Advocacy, Inc. Last accessed 08-Sep-2007 at: www.pai-ca.org/pubs/540301.htm
- 4 Remy L, Oliva G, Clay T. (2007) Hospital Capacity to Treat Mental Illness 1991-2005. San Francisco, CA: University of California, San Francisco, Family Health Outcomes Project. Available at: <http://fhop.ucsf.edu/fhop-publications-hospitalizations-trends-and-outcomes>
- 5 Nicholson J, Biebel K, Katz-Leavy J, et al. (2004) The prevalence of parenthood in adults with mental illness: implications for state and federal policymakers, programs, and providers, in Mental Health, United States, 2002. DHHS pub no (SMA) 3938. Edited by Manderscheid RW, Henderson MJ. Rockville MD, Substance Abuse and Mental Health Services Administration, 2004. Last accessed 29-Aug-2007 at: <http://mentalhealth.samhsa.gov/publications/allpubs/SMA04-3938/default.asp>
- 6 Williams KA, Buechner JS. (2003) Hospitalizations for Mental Health and Substance Abuse. Health By Numbers, 5(10), October 2003. Last accessed 13-Sep-2007 at: http://www.health.ri.gov/chic/statistics/hbn_oct2003.pdf.
- 7 Duffy SQ. Substance Use and Mental Disorder Discharges from U.S. Community Hospitals in the Early 1990s, Revisited. Health Services Utilization by Individuals with Substance Abuse and Mental Disorders. December 2004. Last accessed 13-Sep-2007 at: <http://oas.samhsa.gov/HSR/ch3.htm>.
- 8 From Exclusion to Belonging: Transforming Mental Health Care in America. Last accessed 13-Sep-2007 at: http://www.samhsa.gov/pubs/mhc/MHC_version.htm
- 9 Elixhauser A, Steiner C, Palmer L. Clinical Classifications Software (CCS), 2005. U.S. Agency for Healthcare Research and Quality. Available: <http://www.ahrq.gov/data/hcup/ccs.htm#download>.
- 10 Richmond TS, Hollander JE, Ackerson TH, Robinson K, Gracias V, Shults J, Amsterdam J (2007) Psychiatric Disorders in Patients Presenting to the Emergency Department for Minor Injury. Nursing Research July/August 2007 Vol 56, No 4
- 11 Wan J, Morabito DJ, Khaw L, Knudson MM, Dicker RA. (2006) Mental Illness as an Independent Risk Factor for Unintentional Injury and Injury Recidivism. Journal of Trauma Injury, Infection, and Critical Care, Volume 61 • Number 6
- 12 Gabbe BJ, Cameron PA, Graves SE, Williamson OD, Edwards ER; Victorian Orthopaedic Trauma Outcomes Registry (VOTOR) Project Group. (2007) Preinjury status: are orthopaedic trauma patients different than the general population? J Orthop Trauma. 2007 Apr;21(4):223-8.

-
- 13 Richmond TS, Hollander JE, Ackerson TH, Robinson K, Gracias V, Shults J, Amsterdam J. (2007) Psychiatric disorders in patients presenting to the Emergency Department for minor injury. *Nurs Res.* 2007 Jul-Aug;56(4):275-82
 - 14 Remy L, Clay T, Oliva G. (Aug 2000). The California Child and Youth Injury Hot Spot Project Report for the Period 1995 to 1997, Volume Three, Technical Guide. Sacramento, CA: California Department of Health Services. See: <http://fhop.ucsf.edu/fhop-publications-injury-surveillance>.
 - 15 Cameron CM, Purdie DM, Kliever EV, McClure RJ (2006) Mental health: A cause or consequence of injury? A population-based matched cohort study. *BMC Public Health* 2006, 6:114.
 - 16 Kuhn M, Ehler U, Rumpf HJ, Jutta Backhaus J, Hohagen F, Broocks A (2006) Onset and maintenance of psychiatric disorders after serious accidents. *Eur Arch Psychiatry Clin Neurosci* (2006) 256:497–503.
 - 17 State of California Office of Statewide Health Planning and Development (2006) Patient Discharge Data File Documentation January-December 2005 Non-Public Version. July 2006.
 - 18 State of California Office of Statewide Health Planning and Development (2006) Emergency Department and Ambulatory Surgery Data File Documentation January-June 2005. Non-Public Version. July 2006.
 - 19 Billings J, Zeitel L, Lukomnik J, Carey TS, Blank AE, Newman L. (1993) Impact of socioeconomic status on hospital use in New York City. *Health Affairs*, Spring 1993.
 - 20 Department of Finance, Race/Ethnic Population with Age and Sex Detail, 2000–2050. Sacramento, CA, July 2007. Last accessed 15-Sep-2007 at: <http://www.dof.ca.gov/HTML/DEMOGRAP/Data/RaceEthnic/Population-00-50/documents/Race%20Ethnic%20Population%20Totals,%202000-2050.xls>
 - 21 State of California, Department of Finance, Race/Ethnic Population with Age and Sex Detail, 1990–1999. Sacramento, CA, May 2004. Population data obtained 04-Jun-2004 at: www.dof.ca.gov/html/Demograp/DRU_datafiles/DRU_datafiles.htm. Multi-race allocation tables obtained at: <http://www.dof.ca.gov/HTML/DEMOGRAP/MultiraceAllctns2000-2040.htm>
 - 22 Strauss W, Howe N. (1991). *Generations: The History of America's Future 1584 to 2069*. New York: William Morrow and Company.
 - 23 Males M. (2007) This is your (father's) brain on drugs. *New York Times*, 17-Sep-2007, p. A23. Illustration by Glynis Sweeny
 - 24 Colton CW, Manderscheid RW. (2006). Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Public Health Research, Practice, and Policy*. Available at: http://www.cdc.gov/pcd/issues/2006/apr/05_0180.htm.
 - 25 Rienks J, Remy L, Oliva G (2007) Mental illness in the adult population. San Francisco: UCSF Family Health Outcomes project. Available at: <http://www.ucsf.edu/fhop/publications>
 - 26 http://www.statemaster.com/graph/hea_hmo_pen_rat-health-hmo-penetration-rate
 - 27 Mark TL, Dilonardo JD, Chalk M, Coffey RM (2001?) Trends in inpatient detoxification services, 1992–1997. SAMSHA. Last accessed 19-Sep-2007 at: csat.samhsa.gov/IDBSE/spendEst/reports/Trends_InDetoxSvcs.pdf