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Illness Severity and Psychiatric Hospitalization Rates Among Asian Americans and Pacific Islanders

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Abstract

Objective—The study objective was to fill research gaps about inpatient psychiatric service utilization among Asian Americans and Pacific Islanders (AA/PIs).

Methods—Rates of psychiatric hospitalization, illness severity, and length of stay were compared among AA/PI adults overall and across diagnoses (schizophrenia, depression, bipolar, anxiety, and other psychiatric disorders identified by All Patient Refined Diagnosis Related Groups) by using discharge data from all hospitalizations in Hawaii from December 2006 to 2010. Multivariable models adjusted for gender, age, payer, and residence.

Results—In multivariable analyses of total psychiatric hospitalizations, Chinese (rate ratio [RR]=.22), Japanese (RR=.23), Filipinos (RR=.30), and Native Hawaiians (RR=.37) had significantly lower rates than whites. Native Hawaiians had significantly higher hospitalization rates compared with other AA/PI groups. Length of stay was significantly longer for Chinese (length of stay ratio [LOSR]=1.53), Filipinos (LOSR=1.20), and Japanese (LOSR=1.19) compared with whites, whereas severity of illness was significantly higher for Japanese (odds ratio [OR]=1.36) and Filipinos (OR=1.30). Within specific diagnoses, Native Hawaiians had higher hospitalization rates than other AA/PI groups for depression, bipolar disorder, and anxiety disorder. Chinese, Japanese, and Filipinos had significantly higher illness severity or longer stays than whites for at least one diagnostic category.

Conclusions—AA/PI subgroups had lower psychiatric hospitalization rates than whites, but rates varied across AA/PI subgroups. Native Hawaiians had higher hospitalization rates for many diagnoses. Chinese, Japanese, and Filipinos had greater illness severity or longer stays than whites overall and for some diagnoses, whereas Native Hawaiians did not. Disaggregating AA/PI groups provides important insight into mental health services utilization and need.

Findings from this study were presented at the Advancing Native Health and Wellness Conference, July 31 through August 5, 2012, Anchorage, Alaska, and at the American Public Health Association Conference, October 27–31, 2012, San Francisco.

The authors report no competing interests.

Inpatient psychiatric care is costly (1) and often less desirable than outpatient mental health care (2). Racial-ethnic disparities in inpatient psychiatric service use have been found for blacks and Hispanics compared with whites (3,4), yet relatively little is known about psychiatric inpatient service use among Asian Americans and Pacific Islanders (AA/ PIs) (4). These racial-ethnic groups represent significant and rapidly increasing proportions of the U.S. population (5).

Because AA/PI populations include heterogeneous groups with distinct cultural experiences, divergent sociodemographic patterns, and unique health profiles, the health care utilization of AA/PI subgroups should be considered separately (6-8). This is particularly true in mental health because of the important intersection of history and culture with diagnosis, symptom expression, treatment preferences, and other factors predicting mental health services utilization (9,10). However, small samples in most population-based studies do not permit AA/PI subanalyses (4,6).

The few studies of psychiatric inpatient utilization disaggregating Asian-American subgroups have revealed distinct patterns for these subgroups (11,12), but the studies were conducted more than three decades ago (4). Since then, the organization and financing of the U.S. mental health care system (2), as well as the composition of the U.S. AA/PI population, have changed considerably (5).

Often when persons of Asian or Pacific descent are considered in psychiatric inpatient services research, they are combined into one category (13-16). In this categorization scheme, Native Hawaiians and other Pacific Islanders are often included with Asian Americans, despite considerable differences in culture, geographic origin, and demographic profiles. This aggregation often masks disparities for Pacific Islanders (17), who, on average, have worse health status than many Asian groups. Previous work identifying notably high rates of some mental health issues of Native Hawaiians and Pacific Islanders (18-20), coupled with poor access to mental health services in these groups (21,22), suggests a need for additional psychiatric services research on this topic. Yet limited research considers psychiatric hospitalizations of people from these specific groups.

There is a clear need for better data on inpatient mental health utilization among AA/PI subgroups. Hawaii, a multicultural state with large percentages of many AA/PI subgroups, is an excellent location to study this issue (23). [Detail on the major AA/PI ethnic groups in Hawaii is provided in appendix A of the online data supplement to this article.] Data from the diverse racial-ethnic population of Hawaii also provides useful insight for the United States as the nation undergoes demographic change, particularly for the many locations with growing percentages of AA/PI residents. Study goals were to compare psychiatric hospitalization rates, severity of illness, and length of stay for AA/PI subgroups and whites overall and across diagnostic categories.

Methods

The Hawai'i Health Information Corporation (HHIC) data

HHIC collects, cleans, and verifies detailed patient-level inpatient discharge data from hospitals for all payers in the state. HHIC data elements include patient demographic characteristics, length of stay, and primary and secondary *ICD-9-CM* diagnostic codes. HHIC data used in this study were deidentified, and the study was deemed exempt by the University of Hawai'i Committee on Human Studies.

Sample

All Hawaii hospitalizations of patients 18 years old from December 2006 through December 2010 were initially considered. Hospitalizations with the Department of Defense (DoD) as payer were excluded, because DoD did not consistently report race-ethnicity. We excluded 5,605 hospitalizations lacking valid race-ethnicity data. We also excluded hospitalizations if the database did not indicate that patients were from one of the five major racial-ethnic groups in Hawaii (Japanese, Chinese, Native Hawaiian, Filipino, or white) (N=72,640) or if it indicated that patients were not residents of Hawaii (N=11,542), because population figures for Hawaii residents were used as rate denominators. After exclusions, the total number of hospitalizations eligible for analysis was 303,621.

Race-ethnicity

The HHIC race-ethnicity variable was created from the race-ethnicity categories available consistently across all hospitals in Hawaii from December 2006 through December 2010. Only one primary race is reported, typically from patient self-report at intake. Individuals of mixed race were categorized by their primary racial-ethnic identity.

Psychiatric diagnoses

Mental health hospitalizations were identified by All Patient Refined Diagnosis Related Groups (APR-DRG) codes with 3M Grouper version 29 (24). APR-DRGs are clinically useful combinations derived from meaningful groupings of discharge *ICD-9-CM* codes (25). Options were schizophrenia, APR-DRG code 750; depression, codes 751 and 754; bipolar disorder, code 753; anxiety disorders, codes 755 and 756; and other, codes 740, 752, and 757–760. Depression was a combination of major depression (APR-DRG code 751) and other depression (code 754) because of small sample sizes of the “other depression” category.

Severity of illness was defined with 3M classification methods, which examine “the extent of physiological decomposition or organ system loss of function” within APR-DRG (26). The 3M severity-of-illness classification method considers primary and secondary diagnoses and procedures from *ICD-9-CM* discharge codes, as well as age, sex, and discharge disposition (26). Possible illness severity scores range from 1 to 4, with higher scores indicating greater severity (26).

Length of stay was measured by number of days the patient was hospitalized, as reported in administrative data.

Control variables

Multivariate models included gender, age (grouped as 18–39, 40–64, and 65), payer (Medicare, Medicaid, private, and other), and location of residence (Oahu or another Hawaiian island, because health care is generally more readily available on Oahu).

Annual rates

Annual rates of psychiatric hospitalizations overall and for each diagnosis were calculated according to patients' race-ethnicity. Racial-ethnic population totals were calculated by applying population percentage totals by race-ethnicity from the 2008 Hawaii Health Survey (HHS) (23) to 2010 U.S. Census population totals (27). The HHS is a continuous statewide household survey conducted by the Hawai'i Department of Health. Its racial-ethnic categorization is more congruent with HHIC racial-ethnic categorization than with the U.S. Census. The total estimated adult population in 2010 from the U.S. Census was 1,046,583. Using HHS percentages to calculate adult (> 18 years) population size by race-ethnicity yielded 249,013 (23.6%) white, 251,654 (23.8%) Japanese, 218,164 (20.7%) Native Hawaiian, 162,170 (15.4%) Filipino, and 68,671 (6.5%) Chinese adults. (The remaining 10% were of other race-ethnicity and were thus not relevant to this study.)

After calculating annual rates, we obtained rate ratios (RRs) for each AA/PI group compared with whites. Multivariate negative binomial regression models were then used to calculate RRs adjusted for gender, age, payer, and Oahu residence. These models accounted for overdispersion resulting from possible correlations from multiple visits by the same individual. Although we used whites as the comparison group to facilitate comparability with other studies, we also contrasted AA/PI subgroups with the Japanese because in Hawaii, Japanese have a better health profile than whites (28).

Other statistical methods

Descriptive statistics were summarized by race-ethnicity and compared with chi square tests and analysis of variance. For severity of illness, proportional odds models were used to estimate odds ratios (ORs) overall and for each psychiatric diagnosis for each AA/PI subgroup, with whites as the reference group. For multivariable analysis of length of stay, we used negative binomial regressions to model individual visit data. Adjusted length-of-stay ratios for subgroups compared with whites were calculated from the regression model for each psychiatric diagnosis type, with adjustment for control variables. Analyses for both the severity of illness and length of stay included additional statistical consideration of multiple visits by unique patients. All analyses were conducted with SAS, version 9.3.

Results

Descriptive results for all psychiatric hospitalizations within each racial-ethnic group are summarized in Table 1. Out of a total of 303,621 hospitalizations, 10,831 (3.6%) were primarily for a mental health problem. Mean length of stay for psychiatric hospitalizations overall was lowest among whites (7.05 days), followed by Native Hawaiians (7.23), Filipinos (8.82), Japanese (10.25), and Chinese (11.44) ($p < .001$). Severity of illness for psychiatric hospitalizations overall was also lowest among whites (1.58) as well as Native

Hawaiians (1.58), followed by Filipinos (1.67), Chinese (1.71), and Japanese (1.82) ($p < .001$). Hospitalizations for specific disorders varied in length of stay and severity-of-illness scores across racial-ethnic groups. The exception was anxiety, with the shortest length of stay and lowest severity of illness of all diagnoses, which did not vary significantly across groups.

Hospitalization rates

Table 2 shows the number of psychiatric hospitalizations, annual hospitalization rates per 10,000 patients, and rate ratios across racial-ethnic groups for all psychiatric hospitalizations and for specific diagnostic groups. Fully adjusted RRs are summarized in Table 3. Chinese had the lowest rate (11.4 per 10,000) of psychiatric hospitalization overall and for all diagnoses except for schizophrenia, which was lowest among Japanese (4.4). Whites had the highest rate of hospitalization for all diagnoses. Among AA/PI groups, Native Hawaiians had the highest psychiatric hospitalization rate overall and for all diagnoses except schizophrenia, which was equally high for Native Hawaiians and Filipinos.

After analyses controlled for age, gender, payer, and living in Oahu, we found that Chinese, Japanese, Filipinos, and Native Hawaiians compared with whites had significantly ($p < .001$) lower rates of hospitalization overall and for all diagnoses. The only exception was the “other mental disorder” category, which was not significantly different for Chinese compared with whites (Table 3). [The control variables and their significance are listed in appendix B of the online data supplement.]

Although psychiatric hospitalization rates were lower for AA/PI groups than for whites, contrasts with Japanese (results not shown in tables) revealed important differences across AA/PI subgroups. For example, compared with all other AA/PI groups, Native Hawaiians had significantly higher rates of hospitalization overall ($p = .012$) and for depression ($p = .002$), bipolar disorder ($p = .045$), and anxiety disorder ($p < .001$). Compared with Japanese, the adjusted RRs for Native Hawaiians were 1.60 (95% confidence interval [CI] = 1.11–2.31) for all psychiatric hospitalizations, 1.84 (CI = 1.24–2.72) for depression, 1.47 (CI = 1.01–2.14) for bipolar disorder, and 1.96 (CI = 1.32–2.91) for anxiety disorders. Filipinos (RR = 1.72, CI = 1.22–2.42, $p = .009$), Chinese (RR = 1.70, CI = 1.14–2.54, $p = .002$), and Native Hawaiians (RR = 1.70, CI = 1.21–2.37, $p = .002$) all had significantly higher adjusted rates of hospitalization for schizophrenia compared with Japanese. Chinese had significantly higher rates of hospitalization for other disorders compared with Japanese (RR = 2.18, CI = 1.04–4.58, $p = .04$).

Length of stay and severity of illness

Table 4 shows results from the multivariable models for length of stay and severity of illness. Length of stay was significantly longer for Chinese (OR = 1.53), Filipinos (OR = 1.20), and Japanese (OR = 1.19) compared with whites, whereas severity of illness was significantly higher for Japanese (OR = 1.36) and Filipinos (OR = 1.30).

Within specific psychiatric diagnoses, Chinese and Japanese with schizophrenia had significantly longer stays, and Filipinos with schizophrenia and Japanese with depression both had significantly greater severity of illness compared with whites.

Discussion

This study provides important, current detail about psychiatric hospitalizations in AA/PI subgroups. Key findings include the following: AA/PI subgroups had lower rates of psychiatric hospitalization than whites overall and for specific psychiatric diagnoses; Native Hawaiians had the highest rates of hospitalization among AA/PI groups for many disorders, including depression, bipolar disorder, and anxiety disorders; and Japanese, Chinese, and Filipinos had higher severity of illness or longer stays relative to whites overall and for several specific psychiatric diagnoses.

The finding that, overall, Asian-American subgroups had lower rates of psychiatric hospitalizations compared with whites is consistent with previous research (4,13,14) and with findings about ethnic differences in mental health services utilization in the 1970s and 1980s (11,12). This is notable because the financing and structure of the mental health system have changed considerably. The lower rates of psychiatric hospitalizations among Asian-American groups are difficult to interpret because need for mental health services is not fully known. However, the consistency of the inverse relationship between an ethnic group's rate of hospitalization and length of stay or illness severity suggests that culture plays an essential role in determining perceived thresholds for acute psychiatric treatment.

Research suggests that Asian Americans are less likely than whites to report need for mental health services (10). Also, the decision to obtain inpatient mental health care is not an individual decision but depends on providers and is influenced by family (4,29). Thus Asian Americans may be less likely to be admitted for psychiatric reasons, may seek care in other venues, or may be cared for at home. Other researchers have found that Asian Americans are less likely than whites to seek mental health care and that Asian families may consider hospitalizing a family member only after other measures fail (4). Many Asian cultures consider mental illness to be shameful and something that should be kept secret and managed within families (29). Some Asian groups are more likely to somaticize mental health problems, presenting with headaches, stomachaches, and dizziness rather than depression and anxiety (12,15,29). Cultural factors likely remain strong in Hawaii and may affect population-level inpatient psychiatric utilization.

Although Native Hawaiians had lower rates of psychiatric hospitalization than whites, they had the highest rates of hospitalization among the four AA/PI subgroups overall and for depression, bipolar disorder, and anxiety disorders. This finding emerged in analyses with Japanese as the reference group. The higher rate of psychiatric hospitalization among Native Hawaiians compared with other AA/PI groups has not been noted and may be of concern. Importantly, in population-level studies where Native Hawaiians are combined with Asian-American groups, this significant difference in utilization would be hidden. Other researchers have found a high need for, but low access to, mental health services among Native Hawaiians (18-22). This could indicate that Native Hawaiians are not accessing needed mental health services generally (whether due to lack of availability or to social-cultural factors) or that those receiving services are receiving the bulk of their mental health care in hospitals, or both.

Hospitalization rates for schizophrenia showed an interesting pattern by AA/PI group. Although schizophrenia hospitalization rates were lower for all AA/PI groups compared with whites, they were significantly and substantially higher for Filipinos, Chinese, and Native Hawaiians in adjusted comparisons with Japanese as the reference. This detail may highlight an important mental health care utilization issue that would be hidden in combined AA/PI studies.

Our findings suggest that the low rates of psychiatric hospitalization among some AA/PI groups may not indicate a reduced need for mental health services. Asian-American groups had higher severity of illness and longer stays than whites overall and for specific psychiatric diagnoses, particularly depression and schizophrenia. Thus interventions may be needed to increase both awareness about mental health and access to outpatient mental health services among AA/PI groups (4,14).

Hawaii has unique characteristics that may not be generalizable to other locations. In particular, many AA/PIs living in the continental United States may lack the strong AA/PI cultural context of Hawaii; thus trends for AA/PI psychiatric inpatient service use may differ between island and mainland communities. Although some factors may vary, the Hawaii study setting also offered some strengths. Lack of insurance is low and did not vary among groups. Also, no racial-ethnic group forms a majority culture, making discrimination-based explanations for differences less likely. Also, as the United States becomes more diverse, the multicultural nature of Hawaii represents the future of much of the nation, particularly in states such as California and in urban communities such as New York City, where Asian populations are high or rapidly growing.

Compared with the national psychiatric hospitalization rates described by Blader (2), Hawaii's psychiatric hospitalization rates were significantly lower. Perhaps an explanation for this difference is that we used only specific APR-DRG mental health categories to define psychiatric hospitalizations, whereas Blader used the National Hospital Discharge Survey, a national sample that used a sampling frame that included psychiatric hospitals and dementia diagnoses (2). We used, instead, a methodology similar to that used by Saba and colleagues (30) in a study with the Nationwide Inpatient Sample, which found that 3.4% of stays primarily resulted from hospitalization associated with a mental disorder, similar to our rate of 3.6%.

Although we adjusted in statistical models for individuals with multiple psychiatric admissions, the issue of readmission is important to consider in future studies, given that the readmission "door may turn faster for some minorities, especially new immigrants because they possess fewer resources ... to maintain them in the community" (4).

Another study limitation is that some AA/PI groups are getting care for mental health needs under somatic diagnoses (15). Also, variation in the *ICD-9-CM* codes indicated by clinicians could affect racial-ethnic classification by APR-DRG. Because of these factors and other cultural differences discussed above, the patterns of psychiatric inpatient services may not truly represent the need for mental health care across these AA/PI communities. Another possibility is that whites are overutilizing services.

There also may be an issue with the denominators used in rate calculations (31). We used the HHS, which has higher population estimates for Native Hawaiians than does the U.S. Census (31). If we were to use U.S. Census estimates as denominators, the hospitalization rates for Native Hawaiians would be even higher, because the U.S. Census estimated that 10% of Hawaii's population was Native Hawaiian (27) (versus 21% by HHS).

Recent studies that have considered differences in AA/PI subgroups in mental health service utilization have not addressed inpatient utilization specifically and have focused on sociodemographic factors, such as nativity, and discrimination in relation to utilization (9,32). These factors would be useful to consider in relation to hospitalization, although they are not typically included in administrative data. This is an important area for further research.

Another important area to consider in future research is pathways to care (8), particularly through psychiatric emergency services, which are affected by race-ethnicity, age, substance abuse and dependence, and other factors (33). Considering how AA/PI race-ethnicity affects utilization of these services and how such use affects inpatient admission by race-ethnicity for a mental health problem may be an important area for further research.

Conclusions

Inpatient services are a particularly costly setting for mental health services, indicative of failures in primary mental health care. These services are also quite common (4) and increasing, despite the goals of both policy and clinical practice to reduce the need for inpatient stays (2). Racial-ethnic disparities have been found in inpatient mental health services use, with blacks being overrepresented relative to their population proportions and Hispanics being underrepresented (3,4). This study found that although AA/PI subgroups had lower rates of psychiatric hospitalization than whites overall and among specific psychiatric diagnostic categories, important variation was seen among AA/PI groups both in terms of rates and demographic characteristics associated with those stays. Notably, Native Hawaiians had the highest rates of psychiatric hospitalization among AA/PI subgroups. Asian-American groups had higher severity of illness and longer stays compared with whites.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Disclosures

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Table 1
Description of all psychiatric hospitalizations in Hawaii of Asian-American and Pacific Islander subgroups and whites, December 2006–December 2010^a

Characteristic	Total		Chinese		Filipino		Native Hawaiian		Japanese		White		p
	N	%	N	%	N	%	N	%	N	%	N	%	
Patients	6,385		196		706		1,176		850		3,457		
Hospitalizations	10,831		319		1,154		1,984		1,395		5,979		
Hospitalizations per patient (M±SD)	1.70±1.62		1.63±1.65		1.65±1.60		1.66±1.55		1.65±1.6		1.73±1.65		.47
Demographic													
Female	3,152		106	54.1	364	51.6	573	48.7	455	53.5	1,654	47.8	.015
Age at first visit													
18–39	2,643		66	33.7	337	47.7	643	54.7	214	25.2	1,383	40.0	<.001
40–64	2,902		79	40.3	272	38.5	453	38.5	341	40.1	1,757	50.8	<.001
65	840		51	26.0	97	13.7	80	6.8	295	34.7	317	9.2	<.001
Payer													
Medicare	1,768		74	37.8	201	28.5	266	22.6	422	49.7	805	23.3	<.001
Medicaid	2,200		50	25.5	209	29.6	527	44.8	120	14.1	1,294	37.4	<.001
Private	1,873		55	28.1	230	32.6	295	25.1	269	31.7	1,024	29.6	.003
Other	544		17	8.7	66	9.4	88	7.5	39	4.6	334	9.7	<.001
Live on Oahu	3,719		173	88.3	467	66.2	652	55.4	663	78.0	1,764	51.0	<.001
Severity of illness (M±SD) ^b													
Any mental disorder	1.62±.63		1.71 ±.66		1.67±.64		1.58±.60		1.82±.71		1.58±.60		<.001
Schizophrenia	1.60±.57		1.59±.57		1.65±.55		1.62±.57		1.68±.63		1.56±.55		.015
Depression	1.65±.64		1.75±.70		1.71±.70		1.58±.60		1.86±.73		1.61±.61		<.001
Bipolar	1.59±.59		1.80±.59		1.62±.64		1.58±.58		1.79±.67		1.56±.58		.002
Anxiety	1.41±.59		1.43±.60		1.43±.65		1.40±.58		1.52±.70		1.40±.56		.66
Other mental disorder	2.05±.77		2.26±.73		2.06±.77		1.93±.72		2.37±.70		1.90±.78		<.001
Length of stay (M±SD days)													
Any mental disorder	7.81±16.23		11.44±12.80		8.82±15.25		7.23±21.05		10.25±17.36		7.05±14.26		<.001
Schizophrenia	10.60±23.94		14.40±15.87		10.62±18.93		10.70±33.76		12.85±25.79		9.44±19.33		.028
Depression	5.96±8.92		7.51±7.51		6.34±7.79		5.10±8.40		7.64±7.36		5.72±9.52		<.001
Bipolar	8.15±14.52		10.87±8.33		10.02±13.02		6.53±6.18		11.10±10.81		7.85±16.49		<.001

Characteristic	Total		Chinese		Filipino		Native Hawaiian		Japanese		White		P
	N	%	N	%	N	%	N	%	N	%	N	%	
Anxiety	3.55±4.24		3.38±2.29		3.60±7.87		3.40±2.84		3.57±4.59		3.61±3.80		.94
Other mental disorder	11.76±18.12		14.52±12.99		16.62±23.67		8.93±14.76		15.01±19.68		9.75±17.12		.016

^a N=10,831 psychiatric hospitalizations out of 303,621 total hospitalizations

^b Possible scores range from 1–4, with higher scores indicating greater severity.

Table 2

Unadjusted rates and ratios for psychiatric hospitalizations in Hawaii by race-ethnicity across all hospitalizations, December 2006–2010^a

Measure and variable	All (949,672 pop)	Chinese (68,671 pop)	Filipino (162,170 pop)	Native Hawaiian (218,164 pop)	Japanese (251,654 pop)	White (249,013 pop)
Number						
Total hospitalizations	303,621	15,637	56,544	60,726	72,827	97,887
Any mental disorder	10,831	319	1,154	1,984	1,395	5,979
Schizophrenia	3,210	141	502	690	455	1,422
Depression	4,026	81	376	669	527	2,373
Bipolar	1,983	45	121	314	187	1,316
Anxiety	1,036	21	102	230	91	592
Other mental disorder	576	31	53	81	135	276
Annual rate per 10,000 population						
Total hospitalizations	782.97	557.65	853.89	681.67	708.72	962.69
Any mental disorder	27.93	11.38	17.43	22.27	13.58	58.80
Schizophrenia	8.28	5.03	7.58	7.75	4.43	13.99
Depression	10.38	2.89	5.68	7.51	5.13	23.34
Bipolar	5.11	1.60	1.83	3.52	1.82	12.94
Anxiety	2.67	.75	1.54	2.58	.89	5.82
Other mental disorder	1.49	1.11	.80	.91	1.31	2.71
Rate ratio (reference: whites)						
Total hospitalizations	.81	.58	.89	.71	.74	1.00
Any mental disorder	.47	.19	.30	.38	.23	1.00
Schizophrenia	.59	.36	.54	.55	.32	1.00
Depression	.44	.12	.24	.32	.22	1.00
Bipolar	.40	.12	.14	.27	.14	1.00
Anxiety	.46	.13	.26	.44	.15	1.00
Other mental disorder	.55	.41	.29	.33	.48	1.00

^aRate denominators were determined with race-ethnicity percentages from the 2008 Hawaii Health Survey of adults age 18 applied to 2010 census population totals.

Table 3

Adjusted rate ratios from multivariate models for psychiatric hospitalizations in Hawaii, by Asian-American/Pacific Islander subgroup compared with whites, December 2006–December 2010^a

Variable	Chinese (68,671 pop)		Filipino (162,170 pop)		Native Hawaiian (218,164 pop)		Japanese (251,654 pop)	
	ARR	95% CI	ARR	95% CI	ARR	95% CI	ARR	95% CI
Any mental disorder	.22***	.15–.32	.30***	.21–.42	.37***	.26–.52	.23***	.16–.32
Schizophrenia	.56**	.38–.83	.57***	.42–.78	.56***	.41–.76	.33***	.24–.46
Depression	.23***	.15–.38	.30***	.21–.43	.33***	.24–.47	.27***	.18–.39
Bipolar	.27***	.17–.44	.22***	.15–.32	.30***	.22–.41	.20***	.14–.29
Anxiety	.33***	.19–.57	.35***	.24–.49	.51***	.37–.69	.26***	.18–.37
Other mental disorder	1.10	.53–2.29	.48**	.29–.82	.42**	.27–.66	.51**	.31–.83

^aMultivariable models controlled for gender, age, payer, and living in Oahu. Rate denominators were determined with race-ethnicity percentages from the 2008 Hawaii Health Survey of adults age 18 applied to 2010 census population totals.

** p<.01,

*** p<.001

Table 4
Adjusted estimates of length of psychiatric hospitalization and severity of illness among Asian-American and Pacific Islander subgroups versus whites in Hawaii, December 2006–December 2010^a

Measure and variable	Chinese		Filipino		Native Hawaiian		Japanese	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Severity of illness								
Any mental disorder	1.51	.87–1.46	1.30***	1.12–1.52	1.12	1.00–1.26	1.36***	1.16–1.58
Schizophrenia	.95	.64–1.39	1.43**	1.09–1.87	1.19	.96–1.48	1.30	.97–1.74
Depression	1.19	.72–1.99	1.26	1.00–1.60	1.05	.87–1.26	1.29*	1.03–1.62
Bipolar	1.40	.78–2.54	1.20	.81–1.77	1.23	.91–1.65	1.40	.98–1.99
Anxiety	1.01	.41–3.01	1.12	.70–1.81	1.14	.81–1.60	1.34	.80–2.23
Other mental disorder	.93	.38–2.26	.89	.48–1.66	.83	.51–1.35	1.24	.77–2.01
Length of stay								
Any mental disorder	1.53***	1.29–1.80	1.20**	1.07–1.35	1.02	.92–1.14	1.19**	1.05–1.36
Schizophrenia	1.51**	1.20–1.89	1.15	.96–1.37	1.10	.91–1.33	1.31**	1.07–1.62
Depression	1.08	.86–1.35	.98	.87–1.11	.92	.82–1.03	1.00	.89–1.12
Bipolar	1.18	.88–1.58	1.22	.95–1.58	.91	.78–1.06	1.08	.86–1.37
Anxiety	.85	.65–1.13	1.02	.65–1.61	.98	.86–1.13	.89	.69–1.15
Other mental disorder	.99	.67–1.44	1.41	.92–2.16	.83	.58–1.19	.96	.72–1.29

^aThe reference group is white for all comparisons. The multivariate models for severity of illness and for length of stay controlled for gender, age, payer, and living in Oahu; modeling for length of stay also adjusted for severity of illness.

* p<.05,

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p<.01,

*** p<.001