

---

# Trends Across Two Time Periods in the Diagnosis of Substance Abuse Comorbidity at the Hawaii State Hospital

Vijayalakshmy Patrick MD, Earl S. Hishinuma PhD and Joseph Pehm MSW, LSW

## Abstract

*This study investigates the changes from the late 1980s to early 1990s of comorbidity (mental illness plus substance abuse) at the Hawaii State Hospital. For the 1990s, a prevalence rate ranging from 14.2% to 30% was estimated, with the latter figure based on a closer review of the records. A higher proportion of comorbid clients were single, and compared to the non-abusers (i.e., patients diagnosed with only schizophrenia or affective disorder), a higher percentage were male and had an educational level less than high school. There was an increase in the percent of non-abusers and substance abusers, but a decrease in the dual diagnosed. The implications of these findings are discussed.*

## Introduction

Dual diagnosis of mental illness and substance abuse has been clinically well-recognized and there is a substantial literature on prevalence, diagnosis, and treatment. For individuals with substance abuse comorbidity, varying rates of prevalence have been reported in different client groups. In the general population among those with mental disorders, 28% had an addictive illness.<sup>1</sup> Individuals with drug disorders had a 53% rate of dual diagnosis, and alcoholics had a 37% rate of comorbidity. In the psychiatric population, prevalences have ranged from 30-80%<sup>2-5</sup> with an even higher rate of 94% being reported in a prison population.<sup>6</sup> A trend towards increased admissions of comorbid patients has been seen among veterans from 23% in 1976 to 44% in 1988.<sup>7</sup> The characteristics of the dual diagnosed have been as follows: young, male, homeless, tendency to use emergency services frequently, and higher hospitalization and incarceration rates.<sup>8-14</sup> However, no differences have been found on educational level and marital status.<sup>11</sup>

These and other previous studies have provided a wealth of important findings. However, more research is needed on at least two fronts: more investigations are necessary that examine population changes across time, and the effects of institutional and societal changes that may affect admission rates need to be researched more closely.

The circumstances associated with the Hawaii State Hospital (HSH) provided the opportunity to study these areas. First,

admission and discharge records at the HSH are intact such that a study could be conducted examining admission rates across time. Second, four events occurred between 1990-92: (a) The HSH went through an organizational transition where direct admissions from emergency rooms ceased. Prior to that time, the HSH accepted referrals from emergency rooms and the Hawaii Correctional System, resulting in patients being admitted who were homeless, chronically mentally ill, or forensic in nature. Subsequent to 1990, however, only patients referred by the correctional system were admitted. The purpose of this change was to decrease the patient-to-staff ratio and limit over-crowding. Subsequently, the bed occupancy decreased by approximately 30% (b) Another related change was that the HSH went under a U.S. Department of Justice mandate requiring improvement of services. This facilitated the reduction of the patient-to-staff ratio. The decreased patient loads enabled staff to complete more extensive assessments and to provide more effective treatments (c) The HSH became a university-based institution and a training site for medical students and psychiatric residents. As a result, a more systematic approach to diagnosis was implemented (e.g., standardized screening methods). And (d) external to the HSH, throughout the past decade, there has been a trend of increased substance abuse in Hawaii especially with highly addictive substances (e.g., crystal methamphetamine, crack cocaine).<sup>15-16</sup>

The specific purposes of the present investigation were as follows: (a) To examine admission rates at the HSH and compare these figures for Period 1 (1984-89; prior to changes in the institution) vs. Period 2 (1990-94). It is hypothesized that Period 1 will have a significantly higher rate of admissions than Period 2 due mainly to the institutional policies at that time.

(b) To investigate the relative rates between periods for patients with the following diagnoses: non-substance abuse (i.e., schizophrenic and/or affective disorder), substance abuse (only), dual diagnosis (mental disorder plus substance abuse), and other. It is hypothesized that there will be a significant increase in the percent of admissions for substance abusers and for the dual diagnosed from Period 1 to Period 2 due mainly to the exclusive forensic referrals, more systematic assessments, and increased substance use in Hawaii for Period 2.

(c) To determine whether there are any age-based trends for the comorbid group across periods. It is hypothesized that there will be no significant trends in age across periods and that the majority of subjects will be in the younger age ranges.

(d) To investigate, on an exploratory level, the relationship

Correspondence to:  
Vijayalakshmy Patrick MD,  
Associate Professor,  
Department of Psychiatry,  
John A. Burns School of Medicine,  
1356 Lusitana Street, 4th Floor,  
Honolulu, Hawaii, 96813

between groups without substance abuse and those dual diagnosed as a function of gender, marital status, and educational attainment across periods. Based on prior research findings, there should be a higher ratio of males, but no other differences should be found.

(e) To study the substances abused, Axis I disorders, and Axis II disorders of the dual diagnosed across periods. It is hypothesized that one of the highest rates of mental disorders comorbid with substance abuse will be antisocial personality disorder, as reported in the literature.<sup>17-19</sup>

## Methods

### Participants

Subjects consisted of patients admitted to the HSH from 1984-94. The HSH is the only state psychiatric facility in the Hawaiian Islands, and thus, serves a multicultural population reflective of Asian-Pacific Islanders. Although ethnicity data were not coded for each subject for this study, the approximate breakdown of the patient population at the HSH is as follows: 32% Caucasian, 3% Chinese, 13% Filipino, 21% Hawaiian/Part-Hawaiian, 17% Japanese, and 14% mixed or other.

### Procedures

Medical records were examined and admission frequencies were obtained for each year from 1984-94. The data were coded to represent two different time periods: (a) Period 1 = 1984-89, and (b) Period 2 = 1990-94. It should be noted that during the 1990s, a more systematic approach was used to assess patients. For example, the use of reliable and valid instruments became standard.

Patients who were admitted, discharged, and then readmitted all within the same calendar year were represented in the data only once. Participants who were admitted in one year and discharged, and then readmitted in a following calendar year were represented as many times as readmissions occurred in different calendar years. This set of circumstances occurred due to the manner in which the HSH's records were organized. However, the percentage of such patients was only 9-12%, thus unlikely to affect the major conclusions of this study.

For discharged patients, diagnoses were based on the discharge summaries. For inpatients not yet discharged, their diagnoses were based on current psychiatric assessments. Axis I diagnoses were categorized into four groups: (a) non-abusers (i.e., schizophrenia and/or affective disorders only), (b) substance abusers only, (c) dual diagnosis (i.e., mental illness plus substance abuse), and (d) "other" for those not falling into any of the previous categories. For all dual-diagnosed patients, basic demographics of age range and year of admission were recorded. Five age ranges were utilized: 19-30, 31-40, 41-50, 51-60, and 61-70.

A subgroup of subjects were randomly selected from the larger pool of dual-diagnosed and non-abusing clients. However, in reviewing the records for the non-abusers, substance abuse was mentioned in the assessment and progress notes, but was not reflected in the final diagnosis. These subjects were not included in the random sample (37% from Period 1; 31% from Period 2). For the remaining subjects, the following were recorded: gender, marital status, and educational attainment. For the dual-diagnosed subgroup, additional data were gathered: substance that was abused, Axis I comorbid diagnosis, and Axis II comorbidity.

## Results

For each year from 1984-94, the following numbers of patients were admitted: Period 1 = 612, 591, 675, 642, 766, & 841; Period 2 = 460, 339, 452, 357, & 223. Significantly more admissions occurred per year during Period 1 (1984-89) with an average (mean) of 687.8 patients than Period 2 (1990-94) with an average of only 366.2 clients ( $t[9] = 5.48, p < .001$ ).

Table 1 includes the number and percent of types of patients by period. A test of significance revealed that the diagnostic percentages were different across the two periods ( $\chi^2[3] = 169.9, p < .001$ ). Subsequent analyses indicated that there was a statistically lower percentage of patients with schizophrenia and/or affective disorder in Period 1 (34.0%) as compared to Period 2 (47.8%), and for clients who were substance abusers in Period 1 (5.8%) as opposed to Period 2 (9.8%). However, this trend was reversed for dual-diagnosed patients where a larger percentage was obtained in Period 1 (23.0%) as opposed to Period 2 (14.2%). The proportion of "other" diagnoses was also higher for Period 1 (37.2%) than Period 2 (28.2%).

Table 2 presents the number of dual-diagnosed participants by age range and period. There was a significant difference in the age proportions across the two periods ( $\chi^2[4] = 44.8, p < .001$ ). Subsequent analyses revealed that of the dual diagnosed falling in the 19-30 age range, a significantly greater proportion was admitted in Period 1 (55.1%) as compared to Period 2 (33.8%). However, the converse was found for the 31-40 and 41-50 age ranges whereby significantly higher percentages were found in Period 2 (40.8% and 18.8%, respectively) than in Period 1 (27.0% and 10.0%, respectively). No significant differences were found between periods for the 51-60 and >60 age ranges.

In examining the random sample of non-abusers vs. dual diagnosed (see Table 3), the ratio of males to females was larger for the dual diagnosed than for the non-abusers in Period 2 and for both periods combined. Although there were no significant differences in the marital-status proportions across the two time periods, there was a significant difference in the marital-status ratios when examining the dual-diagnosed only, with a higher ratio for those who were single (i.e., 5 married, 22 separated or divorced, and 70 single;  $\chi^2[2] = 70.4, p < .001$ ). In addition, the ratio of those who graduated from high school (or above) to those who did not was larger for non-abusers than for patients with dual diagnosis. This finding was statistically significant for each period examined alone, and for both periods combined. Overall, the high school graduation rate for the dual diagnosed was only 43% in comparison to the 79% rate for non-abusers.

Table 4 presents the frequency, percent, and confidence interval of substances abused for the dual-diagnosed subgroup. Polysubstance, alcohol, and marijuana abuse occurred most frequently. There was a significant increase in *self-reported* use of alcohol (44.4% for Period 1 vs. 67.4% for Period 2) and for marijuana (20.4% for Period 1 vs. 46.5% for Period 2).

The frequencies and percents of Axis I comorbidity are presented in Table 5 for the dual-diagnosed subgroup. Schizophrenia was the most frequent diagnosis followed by affective disorder. No significant difference was found between periods for all comorbid diagnoses. Table 6 displays the data on Axis II comorbidity. Period 2 (25.6%) had a greater percent of patients with anti-social personality

disorder as compared to Period 1 (9.3%). No other significant difference was found.

### Discussion

A dramatic decrease in overall admissions was confirmed by the

results. This was not surprising given the changes that occurred across the two time periods. To limit over-crowding and to increase the quality of services provided by the HSH, direct admissions from emergency rooms ceased and only patients referred by the correctional system were admitted.

Table 1. — Frequency, Percent, and Confidence Interval by Diagnosis and Period

Psychiatric Diagnosis	Period 1 (1984-89)			Period 2 (1990-94)			$\chi^2$ (df = 1)	p value if <.05
	Freq.	%	Confidence Interval (95%)	Freq.	%	Confidence Interval (95%)		
Schizophrenia &/or affective disorder	1404	34.0%	32.6-35.5%	875	47.8%	45.5-50.1%	101.8	< .001
Substance abuse	240	5.8%	5.1-6.6%	180	9.8%	8.5-11.3%	31.2	< .001
Dual diagnosis	948	23.0%	21.7-24.3%	260	14.2%	12.7-15.9%	60.4	< .001
Other	1535	37.2%	35.7-38.7%	516	28.2%	26.2-30.3%	45.6	< .001
Total	4127	100%		1831	100%			

Table 2. — Frequency, Percent, and Confidence Interval of Dual-Diagnosed Patients by Age Range and Period

Age Range	Period 1 (1984-89)			Period 2 (1990-94)			$\chi^2$ (df = 1)	p value if <.05
	N	%	Confidence Interval (95%)	N	%	Confidence Interval (95%)		
19-30	522	55.1%	51.9-58.2%	88	33.8%	28.4-39.8%	36.7	< .001
31-40	256	27.0%	24.3-29.9%	106	40.8%	35.0-46.8%	18.4	< .001
41-50	95	10.0%	8.3-12.1%	49	18.8%	14.6-24.0%	15.1	< .001
51-60	48	5.1%	3.8-6.6%	11	4.2%	2.4-7.4%	0.3	
>60	27	2.8%	2.0-4.1%	6	2.3%	1.1-4.9%	0.2	
Total	948	100%		260	100%			

Table 3. — Frequency of Randomly Selected Non-Abusing and Dual-Diagnosed Patients by Period Based on Sex, Marital Status, and High School Education

Variable	Period 1		Period 2		Periods Combined	
	Non- Abusers (N = 42)	Dual- Diagnosed (N = 54)	Non- Abusers (N = 36)	Dual- Diagnosed (N = 43)	Non- Abusers (N = 78)	Dual- Diagnosed (N = 97)
<b>Gender</b>						
Male	25	38	24	37	49	75
Female	17	16	12	6	29	22
(df = 1)	$(\chi^2 = 1.2; p > .05)$		$(\chi^2 = 4.2; p < .05)$		$(\chi^2 = 4.4; p < .05)$	
<b>Marital status</b>						
Married	4	3	3	2	7	5
Separated, divorced	6	13	10	9	16	22
Single	32	38	23	32	55	70
(df = 2)	$(\chi^2 = 1.7; p > .05)$		$(\chi^2 = 1.0; p > .05)$		$(\chi^2 = 1.0; p > .05)$	
<b>Education</b>						
Less than high school graduate	10	35	6	20	16	55
High school graduate or greater	32	19	30	23	62	42
(df = 1)	$(\chi^2 = 16.0; p < .001)$		$(\chi^2 = 7.9; p < .01)$		$(\chi^2 = 23.5; p < .001)$	

Table 4. — Frequency, Percent, and Confidence Interval of Substance Abused by Period for the Randomly Selected, Dual-Diagnosed Patients

Substance Abused	Period 1 (1984-89)			Period 2 (1990-94)			$\chi^2$ (df = 1)	p value if <.05
	N	%	Confidence Interval (95%)	N	%	Confidence Interval (95%)		
Polysubstance	28	51.9%	38.9-64.6%	19	44.2%	30.4-58.9%	0.6	
Alcohol	24	44.4%	32.0-57.6%	29	67.4%	52.5-79.5%	5.1	< .05
Marijuana	11	20.4%	11.8-32.9%	20	46.5%	32.5-61.1%	7.5	< .01
Methamphetamine	10	18.5%	10.4-30.8%	6	14.0%	6.6-27.3%	0.4	
Cocaine	9	16.7%	9.0-28.7%	12	27.9%	16.7-42.7%	1.8	
Phencyclidine (PCP)	1	1.9%	0.3-9.8%	3	7.0%	2.4-18.6%		
Heroin	1	1.9%	0.3-9.8%	3	7.0%	2.4-18.6%		
Barbiturates	1	1.9%	0.3-9.8%	3	7.0%	2.4-18.6%		
Lysergic Acid Diethylamide (LSD)	1	1.9%	0.3-9.8%	3	7.0%	2.4-18.6%		
Anticholinergics	0	0.0%	0.0-6.6%	1	2.3%	0.4-12.1%		
Total	54*			43*				

[Note: \*Sums of columns do not add up to the total indicated because patients could be categorized with more than one substance abuse. Rows with a percent equal to or greater than 10% were tested with chi square.]

Table 5. — Frequency, Percent, and Confidence Interval of Axis I Comorbidity by Period for the Radnomly Selected, Dual-Diagnosed Patients

Psychiatric Diagnosis	Period 1 (1984-89)			Period 2 (1990-94)			$\chi^2$ (df = 1)	p value if <.05
	N	%	Confidence Interval (95%)	N	%	Confidence Interval (95%)		
Schizophrenia	22	40.7%	28.7-54.0%	23	53.5%	38.9-67.5%	1.6	
Affective disorder	15	27.8%	17.6-40.9%	10	23.3%	13.2-37.7%	0.3	
Organic brain disorder	6	11.1%	5.2-22.2%	2	4.7%	1.3-15.5%	1.3	
Schizo-affective	6	11.1%	5.2-22.2%	2	4.7%	1.3-15.5%	1.3	
Mental retardation	4	7.4%	2.9-17.6%	4	9.3%	3.7-21.6%		
Dysthymic disorder	1	1.9%	0.3-9.8%	0	0.0%	0.0-8.2%		
Anxiety disorder	1	1.9%	0.3-9.8%	0	0.0%	0.0-8.2%		
Schizophreniform disorder	1	1.9%	0.3-9.8%	1	2.3%	0.4-12.1%		
Adjustment disorder	0	0.0%	0.0-6.6%	3	7.0%	2.4-18.6%		
Total	54*			43*				

[Note: \*Sums of columns do not add up to the total indicated because patients could be categorized with more than one psychiatric disorder. Rows with a percent equal to or greater than 10% were tested with chi square.]

Table 6. — Frequency, Percent, and Confidence Interval of Axis II Comorbidity by Period for the Randomly Selected, Dual-Diagnosed Patients

Psychiatric Diagnosis	Period 1 (1984-89)			Period 2 (1990-94)			$\chi^2$ (df = 1)	p value if <.05
	N	%	Confidence Interval (95%)	N	%	Confidence Interval (95%)		
Antisocial	5	9.3%	4.0-19.9%	11	25.6%	14.9-40.2%	4.6	< .05
Mixed	3	5.6%	1.9-15.1%	0	0.0%	0.0-8.2%		
Histrionic	2	3.7%	1.0-12.5%	1	2.3%	0.4-12.1%		
Schizotypal	2	3.7%	1.0-12.5%	0	0.0%	0.0-8.2%		
Passive aggressive	2	3.7%	1.0-12.5%	1	2.3%	0.4-12.1%		
Borderline	2	3.7%	1.0-12.5%	0	0.0%	0.0-8.2%		
Dependent	1	1.9%	0.3-9.8%	0	0.0%	0.0-8.2%		
Narcissistic	0	0.0%	0.0-6.6%	3	7.0%	2.4-18.6%		
Schizoid	0	0.0%	0.0-6.6%	1	2.3%	0.4-12.1%		
<b>Total</b>	<b>54*</b>			<b>43*</b>				

[Note: \*Sums of columns do not add up to the total indicated because patients could be categorized with more than one psychiatric disorder. Rows with a percent equal to or greater than 10% were tested with chi square.]

The hypothesis that there would be an increase in substance abuse and dual diagnosis was only partially supported. A greater percent of patients was admitted with substance abuse in Period 2 as compared to Period 1, but the converse was found for dual diagnoses. It is difficult to determine the exact reasons for these findings given the factors that may have affected the admission rates and diagnoses. Assuming that these findings are valid, they indicate that in the 1990s, the courts referred a larger proportion of patients to the HSH who were either schizophrenic, had an affective disorder, or had a substance abuse problem, and that these diagnoses may be more representative of the prison population.

However, for both periods, the figures on substance abusers and the dual diagnosed may be under-estimates because the data were based on patient self-reports.<sup>20-22</sup> The exclusive forensic population of Period 2 would be expected to have provided even greater under-estimates. Galletly et al.<sup>21</sup> found considerable discrepancies between patients' self-report of recent drug intake and the results of urine drug screening. As possible causes, Drake, Alterman, and Rosenberg<sup>23</sup> discussed minimization and distortion due to cognitive impairment or psychosis. The less systematic assessment approach in Period 1 may have resulted in under-estimates of substance abuse. Further, substance-induced delusional, hallucinatory, and mood disorders could have been misdiagnosed as schizophrenia or affective disorder. Several investigators have alluded to the difficulty in making an accurate diagnosis.<sup>13,24</sup>

Another factor to consider in Period 2 is that because the HSH ceased to admit directly from emergency rooms, there was the possibility that many patients were "criminalized" in order to gain access to the HSH. This would explain the increase in admissions

for non-abusers in Period 2. Consequently, this increase in non-abusers would have indirectly decreased the percent of dual-diagnosed patients.

A final mechanism for under-estimations involves the finding that approximately one-third of the randomly selected non-abusers had some indication of substance abuse (e.g., these patients were provided treatments consistent with substance abuse). Although this under-estimation was expected to have been greater for Period 1 than Period 2, approximately the same percent was found for both periods. Drake, Alterman, and Rosenberg<sup>23</sup> included lack of awareness, inattention to substance abuse as a problem, and unfamiliarity with standard modes of assessment by mental health clinicians as factors contributing to the failure to report substance abuse in psychiatric populations. In the case of the HSH, because of its university collaboration and in spite of better assessment by university psychiatrists, it is more likely that under-diagnosis was due simply to failure to include substance abuse as a diagnosis in the patients' discharge summaries.

It is suggested that the effects of 9-12% of the patients who were counted more than once within a period was negligible with regard to the relative prevalence rates. In other words, if the distribution of the 9-12% was similar to the overall rates for each of the four categories of patients, then the rates for each type of patient would remain approximately the same. Even if the distribution was dissimilar between the 9-12% and the overall population, the rates of the four categories should not change considerably (i.e., only by 1-2%).

With these factors in mind, the 14.2% prevalence rate for substance abuse comorbidity for the more recent Period 2 is probably an

under-estimation. Perhaps a figure closer to 30% would be more accurate for this culturally diverse population at the HSH.

With regard to age effects, there was a relative increase of the dual-diagnosed admitted in the 31-40 and 41-50 age ranges in Period 2 indicating that an older group was abusing drugs and being referred and admitted to the HSH. This finding was contrary to that found in the literature.

The present study found that the dual diagnosed were primarily single males who did not complete high school. In comparison to non-abusers, a higher ratio of males-to-females and noncompletion-of-high-school to completion was found for patients who had substance abuse comorbidity.

Polysubstance, alcohol, and marijuana were the most frequently abused drug categories. In examining across periods, an increase in both alcohol and marijuana use was found. However, this may have been a result of the more systematic approach to assessment in Period 2. In particular, every patient was assessed about his or her use of drugs.

Schizophrenia was the most commonly diagnosed category in both periods among the dually diagnosed population, but no differences were found across periods for all of the Axis I diagnostic categories. Axis II antisocial personality disorder was the most commonly diagnosed personality disorder which was consistent with findings of other researchers. A significant increase in the percentage of patients with antisocial personality disorder was found across periods perhaps due to the exclusive referrals from the correctional system in Period 2.

## Conclusion

There are several implications of the results of this study for clinicians. Prevalence rates of comorbid diagnoses must be made cautiously in light of various factors that may cause either an under- or over-estimation. Taking into account such variables, the present investigation suggests a prevalence rate of dual diagnosis at approximately 30% of this culturally diverse, forensic population at the HSH. This means that about one-third of the entire patient population may have both a mental disorder and substance abuse. This has serious implications for program development, implementation, and evaluation.

Additional factors that may have important ramifications regarding intervention programs include the relatively higher proportion of the dual diagnosed having an educational level less than high school. The type of treatment and rehabilitation may have to be altered given the educational achievement level, and there may be a need for greater emphasis on academic and vocational retraining for this comorbid group. The older age, diagnosis of schizophrenia, increased use of alcohol and marijuana, and increased comorbid prevalence of antisocial personality disorder may also be possible factors to consider in programming.

When an institution like a state psychiatric hospital exclusively admits only forensic patients, further research is needed on such effects including the possibility of "criminalizing" the mentally ill. What are the effects on the clients when they are "criminalized?" If there are adverse effects, how can the system be changed? Longitudinal studies may be necessary in this regard.

A final implication is related to substance-abuse diagnosis. Mental health clinicians should be more meticulous in their record

keeping of formal diagnoses such as substance abuse. In addition, structured diagnostic interviews rather than retrospective review of medical records should allow one to make more definitive statements. In conjunction with self-reports and standardized screening instruments, it may be prudent to include laboratory evidence for substance use in diagnostic assessments. Given that there could be a time lag between arrest and admission to the hospital, laboratory assessments may need to be conducted at different points in time: at the time of the arrest, upon admission, and when psychotic symptoms stabilize.

## Acknowledgments

The authors would like to thank Dr. Dennis Nolan of the clinical staff at the Hawaii State Hospital, and Ms. Deborah Goebert and Dr. Alan Buffenstein of the Research Task Force of the Department of Psychiatry, University of Hawaii, for their helpful comments, and the Native Hawaiian Mental Health Research Development Program (NHMRDP) for the project's partial support of this research. Appreciation is also extended to Dr. John J. McArdle, Professor, Department of Psychology at the University of Virginia for providing statistical feedback on this project.

## References

1. Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, Goodwin FK. Comorbidity of mental disorders with alcohol and other drug abuse: results from the epidemiologic catchment area study. *JAMA*. 1990;21:2511-2518.
2. Brady K, Casto S, Lydiard RB, Malcolm R, Arana G. Substance abuse in an inpatient psychiatric sample. *Am J of Drug & Alcohol Abuse*. 1991;17(4):389-397.
3. Crowley TJ, Chesluk D, Dills S, Hart R. Drug and alcohol abuse among psychiatric admissions: A multi-drug clinical-toxicologic study. *Arch of General Psychiatry*. 1974;30:13-20.
4. Kosten, TR, Kleber HD. Differential diagnosis of psychiatric comorbidity in substance abusers. *J Substance Abuse Treatment*. 1988;5:206-201.
5. Toner BB, Gillies LA, Prendergast P, Cote FH, Browne C. Substance use disorders in a sample of Canadian patients with chronic mental illness. *Hospital & Community Psychiatry*. 1992;43(3):251-254.
6. Chiles JA, Von Cleve E, Jemelka RE, Trupin, EW. Substance abuse and psychiatric disorders in prison inmates. *Hospital & Community Psychiatry*. 1990;41(10):1132-1134.
7. Rosenheck R, Massari L, Astrachan B, Suchinsky R. Mentally ill chemical abusers discharged from VA inpatient treatment: 1976-1988. *Psychiatric Quarterly*. 1990;61:237-249.
8. Bartels SJ, Teague GB, Drake RE, Clark RE, Bush PW, Noordsy DL. Substance abuse in schizophrenia: service utilization and costs. *Journal of Nervous & Mental Disease*. 1993;181(4):227-232.
9. Carpenter MD, Mulligan JC, Bader IA, Meinzer AE. Multiple admissions to an urban psychiatric center: a comparative study. *Hospital & Community Psychiatry*. 1985;36:1305-1308.
10. Drake RE, Osher FC, Wallach MA. Homelessness and dual diagnosis. *Am Psychologist*. 1991;46(11):1149-1157.
11. Drake RE, Wallach MA. Substance abuse among the chronic mentally ill. *Hospital & Community Psychiatry*. 1989;40(10):1041-1046.
12. Eisen SV, Grobe MC, Dill DL. Substance abuse in an inpatient psychiatric population. *McLean Hospital J*. 1989;14:1-22.
13. Miller NS, Ries RK. Drug and alcohol dependence and psychiatric populations: the need for diagnosis, intervention and training. *Comprehensive Psychiatry*. 1991;32(3):268-276.
14. Zitlin A, Hardesty AS, Burdock EL, Drossman AK. Crime and violence among mental patients. *Am J of Psychiatry*. 1976;13:142-149.
15. Ikeda M. *Impact of crystal methamphetamine on inpatient psychiatry*. Presentation at the Grand Rounds Seminar of the Department of Psychiatry, University of Hawaii, Honolulu, HI. 1997 (May).
16. Wood W. Illicit drug use in Honolulu and the State of Hawaii. In: U.S. Department of Health & Human Services, ed. *National Institute on Drug Abuse: epidemiologic trends in drug abuse, Vol. II: Proceedings: community epidemiology work group*. Washington, DC: U.S. Department of Health & Human Services. 1994.
17. Abram KM, Teplin A. Co-occurring disorders among mentally ill jail detainees. *Am Psychologist*. 1991;46:1036-1045.
18. Blume SB. Dual diagnosis: psychoactive substance dependence and the personality disorders. *J of Psychoactive Drugs*. 1989;21:139-144.
19. Lewis CE, Rice J, Helzer JE. Diagnostic interactions: alcoholism and antisocial personality. *J of Nervous & Mental Disease*. 1983;171(2):105-113.
20. Ananth J, Vandewater S, Kamal M, Brodsky A, Gamal R, Miller, M. Missed diagnosis of substance abuse in psychiatric patients. *Hospital & Community Psychiatry*. 1989;40(3):297-299.
21. Galletly CA, Field CD, Prior M. Urine drug screening of patients admitted to a state psychiatric hospital. *Hospital & Community Psychiatry*. 1993;44(6):587-589.
22. Woodward B, Fortgang J, Sullivan-Trainor M, Stojanov H, Mirin SM. Underdiagnosis of alcohol dependence in psychiatric inpatients. *Am J of Drug & Alcohol Abuse*. 1993;17(4):373-388.
23. Drake RE, Alterman AI, Rosenberg SR. Detection of substance use disorders in severely mentally ill patients. *Community Mental Health J*. 1993;29(2):175-191.
24. Zweben JE, Smith DE, Stewart P. Psychotic conditions and substance use: prescribing guidelines and other treatment issues. *J of Psychoactive Drugs*. 1991;23(4):387-395.