June 2001

A Retrospective Descriptive Analysis of Primary Diagnoses and Dual Diagnosis Pairs

Jason William Ryan

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A Retrospective Descriptive Analysis of
Primary Diagnoses and Dual Diagnosis Pairs

Jason William Ryan
B. S., Lehigh University, 1994
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A Thesis
Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Public Health
at the
University of Connecticut
2001
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Introduction

“Dual diagnosis” is a term that has been used in the psychiatric literature for over a quarter of a century to refer to patients with a psychiatric disorder and a co-occurring substance abuse disorder. It has been well documented that these patients utilize significantly greater amounts of health care resources than single diagnosis patients and have relatively poor treatment outcomes. Through recognition of the prevalence of these dual diagnosis patients, their demographics, and treatment outcomes, behavioral health care delivery systems have been able to tailor treatment programs to their unique needs.

Currently, however, there is little data in the health services literature on patients with other dual diagnoses, such as two co-occurring psychiatric disorders. It would be beneficial to know about other combinations of diagnoses, their prevalence, demographics, and resource utilization patterns.

Also, by using a reliable outcomes assessment tool, it would be helpful to determine which dual diagnosis pairs (including but not limited to psychiatric plus substance abuse) have significantly different outcomes when compared to patients with only a single diagnosis. It is possible that the addition of a second diagnosis results in no change in some instances while in others it significantly affects outcome. By investigating this, new dual diagnosis pairs might be identified with specific needs that could be targeted by treatment facilities much like patients with substance abuse and co-occurring psychiatric disorders have been in recent years. Potential interactions between various psychopathologies may also be elucidated.
The purpose of this investigation is a descriptive analysis of psychiatric patients with single diagnoses and dual diagnoses including co-occurring psychiatric disorders and psychiatric disorders with substance abuse disorders. The treatment outcomes and lengths of stay at treatment facilities will be described for these patients. Through this analysis it may be possible to describe new pairs of dual diagnoses that occur at significant rates and have significant effects on outcome and length of stay. This may ultimately lead to more effective and targeted behavioral interventions for these patients.

Background

The co-occurrence of drug abuse with psychiatric disorders has been noted in the scientific literature since at least the 1960s. Cohn and Klein, in one early study in December of 1966, used a chart review of patients admitted to a psychiatric hospital to show that 31 percent of patients had a history of drug abuse. Many other authors at the time reported similar findings. In the late 1980s, the problem magnified as state psychiatric institutions began to downsize and many patients who would have previously been hospitalized were now living in the community. This gave patients much greater access to drugs of abuse and clinicians were faced with increasing numbers of psychiatric patients who were substance abusers. Also in the 1980s, the Epidemiologic Catchment Area program completed a large population-based, multi-center study to determine incidence and prevalence of psychiatric disorders. Analysis of these data showed that substance abuse and psychiatric disorders were co-occurring at rates higher than would be
predicted by chance alone. The study found the prevalence of substance abuse in
the general population was 17 percent, while it was 48 percent among
schizophrenics, 56 percent among bipolar patients, and 24 percent among anxiety
disorder patients.

Many other studies since that time have defined the demographics of
psychiatric patients who are also substance abusers. These patients are most likely
to be male, young, single, and less educated. It has also been shown that for
mentally ill persons, homelessness, incarceration, and presentation to an emergency
room are associated with increased risk of a co-existing substance abuse disorder.
Other studies have shown that patients with substance abuse and a psychiatric
disorder are at significantly higher risk for many adverse events including
homelessness, violence, incarceration, significantly higher than average
use of mental health services, treatment non-compliance, and even HIV
infection.

In the 1980s, the literature began to denote these patients as having a “dual
diagnosis.” Studies also revealed that these patients had relatively poor treatment
outcomes compared to single diagnosis patients. A study in 1983 by Mclellan
showed that presence of a psychiatric disorder was a major predictor of poor
outcome from a substance abuse program. Using a symptom list that included
presence or absence of symptoms, frequency, and duration, the authors compared
outcomes of patients with only a substance abuse disorder (alcohol or other drugs)
to those with various severities of concomitant psychiatric disorders. Analysis
revealed that patients with low psychiatric severity had good outcomes regardless of
which type of treatment program they entered. Patients with high psychiatric severity had poor outcomes regardless of which type of treatment they underwent. And patients with mid-level psychiatric severity showed wide ranging outcomes depending on which treatment program they entered. This helped to clarify what had previously been a troubling question about why benefit from substance abuse treatments varied so widely among patients.

Early reviews of the services that dual diagnosis patients received revealed two major problems. First, these patients typically received no substance abuse treatment apparently due to difficulty in accessing services. Second, when they did receive substance abuse treatment it was not tailored to the special needs of dual diagnosis patients. Much of these difficulties were attributed to a historical split between mental health services and substance abuse services. For years this has been the case, with separate providers, financing arrangements, and treatment facilities for the two areas. As a result patients often got care for only one of their problems or separate, fragmented treatments for both.

Recognition of these problems in the late 80s and early 90s led to calls for integrated treatment programs for these patients. New programs rapidly evolved and many have been assessed through prospective studies. Drake et al. published a comprehensive review of the literature on integrated treatment programs in 1998, reporting on 36 completed studies in the literature.

Through recognition of the specific problems encountered by patients with a psychiatric disorder and a substance abuse disorder, newer and more effective treatments have been designed. In the study presented here, dual diagnosis patients
will similarly be analyzed, through description of demographics, outcomes, and lengths of stay. In addition, this study will examine patients with other combinations of two diagnoses such as two co-existing psychiatric disorders. Through doing this, further knowledge can be gained regarding patients with multiple psychiatric disorders and their needs.
Methods

Study Design

This study is a retrospective descriptive analysis of primary diagnoses and dual diagnosis pairs. The question to be addressed is whether there are significant differences in treatment outcomes and lengths of stay in patients with dual diagnoses compared to those with a single diagnosis. Specifically, the analysis will examine which combinations of dual diagnoses have significant effects on outcome and length of stay.

Data Source

Data for this project were collected via the PsychSentinel outcome measurement program, which has been run by Dr. Hal Mark of the University of Connecticut Department of Community Medicine for the past 7 years. Through this program 11 psychiatric treatment centers in the Connecticut area and 45 in the U.S. assess the clinical outcomes of their behavioral health care treatments. These inpatient and outpatient psychiatric units complete data collection forms on each patient at admission to their program and again at discharge. Using the information on the forms, the patients are classified into clinically distinct populations based on diagnosis, level of care, and age. Then an outcome measure is determined, risk adjusted, and compared to reference norms (see below). As the psychiatric programs submit more forms, aggregate information is compiled for each program regarding the patient population, outcomes, and lengths of stay. The analyzed data
are reported to the treatment programs when 150 cases or more are available for analysis. For some programs the data are used to maintain their JCAHO accreditation.

For the purpose of this study, PsychSentinel data collection and analysis methods will be generally described. Complete details on PsychSentinel including information on reliability and validity of data have been published elsewhere. 29 Data collection on each patient begins with treatment programs completing a data collection form at admission (see appendix 1). Three major categories of information are collected about the patients: descriptive and demographic data, clinical difficulty data, and symptom data. The descriptive and demographic data variables are listed in Table 1. Table 2 lists items collected as clinical difficulty data. In general, the descriptive and demographic data is used to define the patient’s background and clinical difficulty data is used to risk adjust the outcomes, as will be discussed below. Occasional overlap, however, occurs since items such as age may be used as descriptive data and also to determine clinical difficulty.

**Table 1 – Descriptive and Demographic Variables**

<table>
<thead>
<tr>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Type</td>
</tr>
<tr>
<td>Readmission status</td>
</tr>
<tr>
<td>Critical Pathway Used</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>Marital Status</td>
</tr>
<tr>
<td>Pay Source</td>
</tr>
</tbody>
</table>

1 Program Type refers to classifying patients as inpatient or outpatient.
2 Readmission status refers to classifying patients as either readmissions or new admissions to a particular institution.
3 The critical pathway item is a yes or no answer regarding whether the treatment program used a critical pathway.
### Table 2 – Clinical Difficulty Items

<table>
<thead>
<tr>
<th>Reason for Entering Treatment</th>
<th>History of Substance Abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suicide Potential</td>
<td></td>
</tr>
<tr>
<td>History of Assault</td>
<td></td>
</tr>
<tr>
<td>Concurrent Physical Illness</td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
</tr>
<tr>
<td>Residential Status</td>
<td></td>
</tr>
</tbody>
</table>

Inpt. Psychiatric or Substance Abuse Admission in past 12 Months

History of Inpatient Psychiatric or Substance Abuse Admissions

1 Refers to classifying patients as “told to enter by a professional” or “self motivated”.
2 These clinical difficulty items are answered either “yes” or “no”.
3 Refers to classifying patients as living alone, not living alone, or without a stable residence.

The third type of information collected on each patient is symptom data. Psychiatric treatment programs using PsychSentinel complete a symptom checklist that notes the presence or absence of symptoms specific to the patient’s diagnosis. There are 17 different symptom checklists, each corresponding to a particular patient category (most of the categories correspond to the patient’s diagnosis with the exception of substance abuse, which is split into two categories based on the programmatic treatment goals for that patient). The checklists contain symptoms taken from Diagnostic and Statistical Manual, 4th edition, a publication of the American Psychiatric Association.30 For a patient with a particular diagnosis, each symptom is checked as either “present” or “not present.” Based on the patient’s symptoms at initiation of treatment, a raw symptom intensity score, $T_{1_{raw}}$, is calculated using numerical values assigned to each symptom that is present. Some symptoms are more severe, and therefore carry a higher numerical value when present. Thus $T_{1_{raw}}$ is a function of the number of symptoms present and the relative weight given to each symptom. For example, a depressed patient may have
significant suicide risk, which carries a score of 4, and poor concentration, which
carries a score of 2. If no other symptoms were present, these would be the only
components of the $T_{1_{\text{raw}}}$ score. This hypothetical patient’s symptom intensity score
would be 6. The numerical value assigned to each symptom was determined at the
creation of PsychSentinel via consultation with psychiatric professionals.\textsuperscript{31}

For each diagnosis, the maximum value for $T_{1_{\text{raw}}}$ is different. For example,
a schizophrenic patient with every symptom on the checklist present could have a
$T_{1_{\text{raw}}}$ score of 24 while a depressed patient with every symptom present may have a
$T_{1_{\text{raw}}}$ score of 32. This makes comparison of symptom intensity scores across
different diagnostic categories problematic. To rectify this, the $T_{1_{\text{raw}}}$ scores are
multiplied by a conversion factor to generate a standardized symptom intensity
score, $T_1$, which ranges from 0 to 100 for every diagnosis. Thus a schizophrenic
patient with all symptoms present will have a score of 100 and a depressed patient
with all symptoms present will also have a score of 100. In this way, patients with
different diagnoses may be compared to one another in terms of their $T_1$ score.

At discharge, the data collection form is completed for each patient.
Information is added on length of stay and a reassessment of the patient’s
symptoms. All symptoms that were present at admission are reassessed as “not
improved”, “improved”, or “totally improved”. The patient is given a standardized
symptom intensity score at discharge, $T_2$ (calculated using the same conversion
methodology as for $T_1$). Using the initial and discharge standardized symptom
intensity scores, a change in symptom intensity, $\Delta T$, can be calculated by
subtracting $T_2$ from $T_1$ as shown in equation 1.
AT = T1 - T2 \hspace{1cm} (1)

\( \Delta T \) is divided by \( T1 \) to generate an outcome measure, the percent attainable improvement, \( \%A \), as shown in equation 2.

\[
\%A = \frac{T1 - T2}{T1}
\] \hspace{1cm} (2)

This value represents the percentage improvement in a patient’s symptom intensity from admission to discharge, ranging from 0 to 100\%, regardless of diagnosis (100\% being complete resolution of admission symptoms at discharge). Thus for each patient treated an outcome measure, \( \%A \), and a length of stay (LOS) value is determined.

Risk Adjustment of Data

To risk adjust the data, patients are first classified according to their level of clinical difficulty by assigning them into either low or high clinical difficulty categories. Their outcomes are then compared to those calculated from a reference data set; a collection of cases that provide norms (i.e., a benchmark). The reference norms allow the determination of a risk-adjusted average or “expected” outcome that is compared to the observed values for patients in this study. For example, a study patient may have a relatively low \( \%A \) of 50. However, for patients with the same diagnosis and clinical difficulty level in the reference database, the average \( \%A \) is 35. This \( \%A \) of 50 is actually quite good when viewed in light of the patient’s clinical difficulty level and associated reference norm.
When PsychSentinel was originally launched, a baseline of approximately 36,000 reference cases was compiled (these cases were separate from those analyzed for this study). Linear regression was performed using clinical difficulty items relative to %A and LOS for all cases with a particular diagnosis. In doing this, clinical difficulty items strongly predictive of poor outcomes, expressed as a low %A or a long length of stay, were determined. For each single diagnosis (dual diagnosis cases were not used in this analysis) items from Tables 1 and 2 that were strong predictors of low %A and long LOS were identified. These characteristics became the clinical difficulty items specific to each diagnosis. These items were used to divide the reference cases into two groups: low clinical difficulty or high clinical difficulty. The average or "expected" %A and LOS were determined for each diagnosis for the low clinical difficulty and high clinical difficulty patients using the data from the reference cases.

The clinical difficulty items used for each diagnosis in PsychSentinel are proprietary and will not be mentioned here but the following example will serve to illustrate the use of the reference cases in risk adjusting the data. For example, suppose it had been determined that for patients with a diagnosis of depression in the reference case set, the best predictors of a low %A were age>65 and a positive history of assault. Patients with both of these elements in their history would be considered high clinical difficulty cases. Cases with anything other than both of these elements would be classified as low clinical difficulty. For this example, assume those with a high clinical difficulty had an average %A of 50 and those with a low clinical difficulty had an average %A of 70. These values of 50 and 70 would
be used as "expected" %A for cases of similar clinical difficulty in the study data set. By doing this data are risk adjusted since cases of high clinical difficulty are compared to the reference average of 50 whereas those of low clinical difficulty are compared to the %A of 70.

The study data were split into cases of low or high clinical difficulty using the same diagnosis-specific clinical difficulty items as for the reference norms. For dual diagnosis cases, the primary diagnosis of the pair was used to select the appropriate reference norm for use as expected %A and LOS. The clinical difficulty of the study patients had to be known so the correct "expected" %A and LOS from the reference norms could be used. The actual %A and LOS for the study cases was compared to the "expected" %A and LOS from the reference norm data set. A ratio of observed to expected %A, O/E %A, was calculated using equation 3.

\[
O/E\%A = \frac{\%A_{\text{observed}}}{\%A_{\text{expected}}} \tag{3}
\]

In this equation the observed %A came from our data set and the expected %A came from the reference cases that were of the same clinical difficulty. The same was done for length of stay using equation 4.

\[
O/E\text{LOS} = \frac{\text{LOS}_{\text{observed}}}{\text{LOS}_{\text{expected}}} \tag{4}
\]

For %A the ratio of observed divided by expected is used so that higher values for this ratio represent better than expected outcomes. For LOS the ratio of observed divided expected is also used; however, lower values for \(\text{LOS}_{\text{observed}}\) represent a better length of stay. This means that the O/E LOS value is less than one when observed LOS is better than expected. When considering O/E %A and O/E
LOS values, it must be kept in mind that O/E %A values greater than 1 indicated better than expected outcomes and O/E LOS values less than one indicated better than expected length of stay. These opposite ratios of observed to expected occur for %A and LOS because a higher %A represents a better outcome for the %A variable while a lower LOS represents better result for the LOS variable. Use of equations 3 and 4 to calculate observed to expected ratios provides risk adjusted measures for %A and LOS. %A values which may be low (poor outcome) may have a high O/E %A if the %A achieved was actually higher relative to the risk-adjusted expected %A.

*Patient Diagnoses*

Part of the data collection form completed on each patient includes the patient’s diagnosis. The various diagnoses assigned to patients in the study are listed in Table 3. The PsychSentinel data collection form allows for listing of either 1 or 2 psychiatric disorders for a patient. If a patient has two diagnoses (so called “dual diagnosis” patients), one disorder is listed as primary and one as secondary. The primary diagnosis should be the disorder responsible for the majority of the patient’s symptoms at the time of admission.

The patients’ diagnoses correspond to their descriptions in DSM-IV with exception of patients being treated for substance abuse. These patients were split into two groups: brief substance abuse and extended substance abuse. Brief substance abuse patients were those admitted for stabilization and detoxification.
Extended substance abuse patients were those treated in a long-term rehabilitation program.

Table 3. Diagnoses of Patients in Study

<table>
<thead>
<tr>
<th>Depression</th>
<th>Brief Substance Abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar Disorder</td>
<td>Extended Substance Abuse</td>
</tr>
<tr>
<td>Post Traumatic Stress Disorder</td>
<td>Borderline Personality Disorder</td>
</tr>
<tr>
<td>Dysthymia</td>
<td></td>
</tr>
</tbody>
</table>

Inclusion Criteria

A total of 19,414 cases collected as part of the PsychSentinel program from 1995 to 1999 were used for this study. Of these, 16,561 carried a single diagnosis and 2,853 carried a dual diagnosis. In order to achieve greater consistency in the data set, only patients from inpatient treatment facilities who were over 17 years of age were used.

Initial analysis of the data set revealed that several dual diagnosis "pairs" occurred infrequently. Since a minimum of 50 cases was deemed necessary for analysis, pairs with less than this number of cases were eliminated from the data set. For example, if the dual diagnosis of bipolar disorder with posttraumatic stress disorder (PTSD) occurred only 40 times in the data set, these 40 cases were eliminated. This refining of the data set left 10 dual diagnosis pairs and a total of 1527 dual diagnosis cases for the study.

Since the purpose of our study was to compare single to dual diagnosis cases (i.e., look at outcomes when a diagnosis is single verses when it is within a pair), all disorders present in the single diagnosis data set but not in the dual diagnosis data
set were eliminated. Thus, for example, if there were 100 cases of brief psychotic disorder in the single diagnosis data set but brief psychotic disorder did not occur in any of the dual diagnosis pairs, then these 100 cases were eliminated. This left 7 single diagnoses and a total of 11,296 cases in the single diagnosis data set. Table 4 lists the single and dual diagnoses along with their frequencies that make up the final data set.

**Table 4. Diagnoses and Frequencies of Study Patients**

<table>
<thead>
<tr>
<th>Single Diagnoses</th>
<th>No. Cases</th>
<th>Dual Diagnoses (primary/secondary)</th>
<th>No. Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>7399</td>
<td>Depression/Brief Substance Abuse</td>
<td>480</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>1688</td>
<td>Depression/Borderline</td>
<td>277</td>
</tr>
<tr>
<td>Brief Substance Abuse</td>
<td>1539</td>
<td>Depression/Extended Substance Abuse</td>
<td>174</td>
</tr>
<tr>
<td>Extended Substance Abuse</td>
<td>306</td>
<td>Depression/PTSD</td>
<td>129</td>
</tr>
<tr>
<td>PTSD</td>
<td>162</td>
<td>Brief Substance Abuse/Depression</td>
<td>117</td>
</tr>
<tr>
<td>Borderline</td>
<td>148</td>
<td>Bipolar/Brief Substance Abuse</td>
<td>108</td>
</tr>
<tr>
<td>Dysthymia</td>
<td>54</td>
<td>Bipolar/Depression</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression/Bipolar</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extended Substance Abuse/Depression</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Borderline/Depression</td>
<td>51</td>
</tr>
</tbody>
</table>

**Statistical Analysis**

Statistical analysis was performed using SPSS for Windows version 10.1. Means were compared with a one-way ANOVA or two-tailed t test for parametric data. Where indicated the Kruskal-Wallis test non-parametric one-way ANOVA was performed.
Results

Table 5 shows the outcomes and lengths of stay for all single and dual diagnoses in the study. The %A and LOS columns represent the non risk-adjusted outcomes and lengths of stay. The columns O/E %A and O/E LOS represent the observed to expected ratios of %A and LOS (i.e. risk adjusted %A and LOS outcome measures).

Table 5. Average Outcomes and Lengths of Stay

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>%A</th>
<th>LOS</th>
<th>O/E %A</th>
<th>O/E LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>63.9</td>
<td>8.0</td>
<td>1.0090</td>
<td>0.8521</td>
</tr>
<tr>
<td>Bipolar</td>
<td>62.1</td>
<td>10.0</td>
<td>0.9886</td>
<td>1.0357</td>
</tr>
<tr>
<td>Brief SA</td>
<td>77.4</td>
<td>3.8</td>
<td>1.0573</td>
<td>0.8003</td>
</tr>
<tr>
<td>Extended SA</td>
<td>56.4</td>
<td>11.5</td>
<td>0.7830</td>
<td>2.3359</td>
</tr>
<tr>
<td>PTSD</td>
<td>54.5</td>
<td>7.1</td>
<td>0.9076</td>
<td>1.0698</td>
</tr>
<tr>
<td>Borderline</td>
<td>57.7</td>
<td>6.6</td>
<td>0.9757</td>
<td>0.8884</td>
</tr>
<tr>
<td>Dysthymia</td>
<td>57.5</td>
<td>8.0</td>
<td>0.9084</td>
<td>0.7223</td>
</tr>
<tr>
<td>Depression/Brief SA</td>
<td>71.1</td>
<td>6.3</td>
<td>1.1243</td>
<td>0.6875</td>
</tr>
<tr>
<td>Depression/Borderline</td>
<td>56.8</td>
<td>8.1</td>
<td>0.9062</td>
<td>0.8247</td>
</tr>
<tr>
<td>Depression/Extended SA</td>
<td>60.8</td>
<td>8.7</td>
<td>0.9861</td>
<td>0.9133</td>
</tr>
<tr>
<td>Depression/PTSD</td>
<td>62.2</td>
<td>8.9</td>
<td>0.9882</td>
<td>0.9739</td>
</tr>
<tr>
<td>Brief SA/Depression</td>
<td>68.0</td>
<td>4.9</td>
<td>0.9354</td>
<td>0.9981</td>
</tr>
<tr>
<td>Bipolar/Brief SA</td>
<td>69.0</td>
<td>8.1</td>
<td>1.1016</td>
<td>0.8642</td>
</tr>
<tr>
<td>Bipolar/Depression</td>
<td>58.9</td>
<td>10.1</td>
<td>0.9037</td>
<td>1.0836</td>
</tr>
<tr>
<td>Depression/Bipolar</td>
<td>58.4</td>
<td>9.5</td>
<td>0.9286</td>
<td>0.9459</td>
</tr>
<tr>
<td>Extended SA/Depression</td>
<td>63.4</td>
<td>7.3</td>
<td>0.8948</td>
<td>1.4035</td>
</tr>
<tr>
<td>Borderline/Depression</td>
<td>68.6</td>
<td>6.9</td>
<td>1.1678</td>
<td>0.8604</td>
</tr>
</tbody>
</table>

Table 6 lists results of the statistical comparison of the dual diagnosis pairs to the stand-alone diagnoses. For each dual diagnosis pair in Table 6, the p value listed is the result of a comparison of the pair's mean O/E %A or mean O/E LOS to that of the primary diagnosis as a stand-alone. For example, the p value of 0.550 for depression/borderline O/E LOS in Table 6 indicates the significance of a
comparison of the mean O/E LOS for the pair (0.6875 in Table 5) to mean O/E LOS for depression as a stand-alone diagnosis (0.8521 in Table 5).

Table 6. P values for Dual Diagnosis Pairs Relative to Primary Diagnosis as Stand-Alone

<table>
<thead>
<tr>
<th></th>
<th>O/E %A</th>
<th>O/E LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression/Brief SA</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
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<td>0.550</td>
</tr>
<tr>
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<tr>
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<td>0.012*</td>
</tr>
<tr>
<td>Extended SA/Depression</td>
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<td>&lt;0.001*</td>
</tr>
<tr>
<td>Borderline/Depression</td>
<td>0.005*</td>
<td>0.156</td>
</tr>
</tbody>
</table>

* Denotes significant (p<0.05) difference between pair and primary diagnosis as stand-alone

Depression was the most common single diagnosis in the study. It also occurred with significant frequency as a primary and secondary diagnosis in a pair. Table 5 shows the changes in average O/E %A and O/E LOS when depression was a stand-alone diagnosis and when it was part of a dual diagnosis pair. Figure 1 shows the variation in average O/E %A when depression was a single diagnosis and when it was the primary diagnosis in a dual diagnosis pair. Significant variation (p<0.05) in depression as a stand-alone diagnosis compared to depression as primary in a pair occurred only in the depression/brief substance abuse and depression:borderline pairs. Figure 2 shows the variation in average O/E LOS when depression was a stand-alone diagnosis and when it was primary in a dual diagnosis pair. Only the depression/brief substance abuse pair had a significant change in average O/E LOS compared to depression as a stand-alone diagnosis.
Bipolar disorder occurred second in frequency only to depression as a stand-alone diagnosis. Figures 3 and 4 show the variation in average risk-adjusted %A and LOS when bipolar was a stand-alone and when it was a primary diagnosis in a dual diagnosis pair. The two dual diagnosis pairs that contained bipolar as a
primary were bipolar/brief substance abuse and bipolar/depression. The former showed a significantly different average O/E %A and O/E LOS compared to bipolar alone while the latter did not change significantly for these variables.

**Figure 3. Average O/E %A for Bipolar as a Stand Alone and Primary in a Dual Diagnosis Pair**
* Denotes significant (p<0.05) difference between pair & primary diagnosis as stand-alone

**Figure 4. Average O/E LOS for Bipolar as a Stand Alone and Primary in a Dual Diagnosis Pair**
* Denotes significant (p<0.05) difference between pair & primary diagnosis as stand-alone
Brief substance abuse ranked 3rd in frequency as a stand-alone diagnosis. Its variation in average O/E %A and O/E LOS is shown in Figures 5 and 6. The only dual diagnosis pair in which this diagnosis was primary was brief substance abuse/depression. The addition of depression as a secondary diagnosis resulted in a significantly different average risk-adjusted %A and risk adjusted LOS.

![Figure 5. Average O/E %A for Brief Substance Abuse as a Stand-Alone and Primary in a Dual Diagnosis Pair](image)

* Denotes significant (p<0.05) difference between pair and primary diagnosis as stand-alone
Figure 6. Average O/E LOS for Brief Substance Abuse as a Stand-Alone and Primary in a Dual Diagnosis Pair
* Denotes significant (p<0.05) difference between pair and primary diagnosis as stand-alone

The variation in extended substance abuse average outcomes and lengths of stay as a stand-alone and as primary in a dual diagnosis pair is illustrated in Tables 7 and 8. The only pair that contained extended substance abuse was extended substance abuse/depression. This pair resulted in a significantly different average O/E %A and O/E LOS compared to extended substance abuse alone.
The variation in average outcomes and lengths of stay for borderline as a single diagnosis and primary in a dual diagnosis pair is shown in Tables 9 and 10.
The only dual diagnosis with borderline as a primary was borderline/depression. In this pair, the average O/E %A and O/E LOS changed significantly.

Figure 9. O/E %A for Borderline as a Stand-Alone and Primary in a Dual Diagnosis Pair
* Denotes significant (p<0.05) difference between pair & primary diagnosis as stand-alone

Figure 10. O/E LOS for Borderline as a Stand-Alone and Primary in a Dual Diagnosis Pair
* Denotes significant (p<0.05) difference between pair and primary diagnosis as stand-alone
PTSD and Dysthymia never occurred in a dual diagnosis pair as a primary. They did, however, occur in several pairs as a secondary diagnosis. For this reason they were considered in the study and their outcomes and length of stay data as single diagnoses are included in Table 5.
Discussion

Frequencies

Depression was the most common single diagnosis among the study patients. This is not surprising considering the high prevalence of depression in American society recently estimated at 21 to 24% of the population in women and 12 to 15% in men. Brief substance abuse occurred 3rd as a single diagnosis and extended substance abuse occurred 4th. The combination of these two, however, represents substance abuse of any type and was the 2nd most common single diagnosis with 1,845 cases (determined by adding together the frequencies of brief and extended substance abuse in Table 4). This is also an expected finding in light of the high prevalence of substance abuse in American society (it is estimated that 7 to 10 percent of adults are alcohol abusers). Considering the significant frequencies of depression and substance abuse as single diagnoses, it is not surprising that combinations of substance abuse and depression were common dual diagnosis pairs. Adding together all the pairs in Table 4 that combine depression and substance abuse (depression/brief substance abuse, depression/extended substance abuse, brief substance abuse/depression, and extended substance abuse/depression) gives a total of 823 cases or 53% of all the dual diagnosis cases in this study. Adding bipolar/brief substance abuse to these 823 cases gives a total of 931 cases that represent all the dual diagnosis pairs that include substance abuse plus any psychiatric disorder. This is the traditional definition of “dual diagnosis” patients in the literature and represents 61 percent of the dual diagnosis cases in this study.
This finding is consistent with literature regarding the high prevalence of traditional
dual diagnosis patients.

One interesting item in Table 4 is that certain single diagnoses and dual
diagnosis pairs did not occur at significant frequencies. Brief substance abuse
occurred in a pair with depression and bipolar. It did not, however, appear at
significant rates with other psychiatric disorders such as schizophrenia. Many other
psychiatric disorders, such as the anxiety disorders and personality disorders,
occurred at low frequencies as stand-alone diagnoses and thus it is not surprising
that they were not present in many dual diagnosis pairs. Schizophrenia, however, is
relatively common (lifetime prevalence of 1.4%\textsuperscript{11}) and did have a significant rate as
a single diagnosis (1,454 cases), but was not included in the final data set because it
was not present at significant rates in any dual diagnosis pairs. With this relatively
high number of patients with schizophrenia alone, it is surprising that no dual
diagnosis pairs occurred which included this diagnosis. Furthermore, the data from
the Epidemiological Catchment Area Study\textsuperscript{11} show 48% of schizophrenics have co-
occurring substance abuse. It must be considered that a difficulty may exist in
recognizing or in coding patients with schizophrenia and co-occurring substance
abuse. Additionally, schizophrenia is a thought disorder while bipolar disorder and
depression are mood disorders. Perhaps some feature of thought disorders makes
recognition or coding of co-existing substance abuse more difficult.

Also notable from Table 4 is the lower frequency of extended substance
abuse compared to brief substance abuse. As a single diagnosis, brief substance
abuse occurred 1539 times while extended substance abuse occurred only 306 times.
This indicates that patients were far more likely to be treated for brief substance abuse (i.e. stabilization) than for long-term therapy. This pattern was also present in the dual diagnosis pairs. For depressed patients with a secondary diagnosis of substance abuse, they were more often treated for brief substance abuse than for extended substance abuse (480 verses 174 cases). In the case of bipolar, the dual diagnosis pair of bipolar/brief substance abuse occurred 108 times while bipolar/extended substance abuse did not occur with enough frequency to be included in the study (<50 cases).

**Outcomes**

The method for risk adjusting outcomes must be considered when comparing single to dual diagnoses. For single diagnoses, clinical difficulty items were available specific to each diagnosis and were used to risk adjust the data. For dual diagnosis pairs, clinical difficulty items for the primary diagnosis were used to risk adjust data for each pair. It is possible that if clinical difficulty items for each dual diagnosis pair were known, the risk-adjusted outcomes would be different. Development of new clinical difficulty items for dual diagnosis pairs would require collection of a new database of reference cases and was not done as part of this study.

*Psychiatric Disorders and Brief Substance Abuse*

Depression showed significantly improved mean O/E %A and mean O/E LOS when paired with a secondary diagnosis of brief substance abuse in a dual
diagnosis pair (Figures 1 and 2). This finding is of interest since one might expect the addition of a secondary diagnosis of brief substance abuse to worsen outcomes and increase lengths of stay relative to depression alone. Improved outcomes and lengths of stay also occurred when bipolar disorder was paired with brief substance abuse as a secondary diagnosis (Figures 3 and 4). This indicates that patients with a primary psychiatric disorder of depression or bipolar and a secondary diagnosis of brief substance abuse do better than patients that carry only a single diagnosis of the corresponding psychiatric disorder. The explanation for this finding may lie in the significant experience that treatment centers have in dealing with dual diagnosis patients such as these. As mentioned in the introduction, there is ample literature on treatments for patients with substance abuse plus a psychiatric disorder. Since depression and bipolar disorder are common psychiatric disorders, it is likely that treatment centers have developed experience and strategies for these dual diagnosis patients. Targeted treatment programs may be so effective that the dual diagnosis patients respond better than single diagnosis psychiatric patients.

The situation is confused, however, with the finding that patients with a primary diagnosis of brief substance abuse and a secondary diagnosis of depression (Figures 5 and 6) did worse compared to brief substance abuse alone in terms of mean O/E %A and O/E LOS. This indicates that while treatment centers were more effective at treating dual diagnosis patients when substance abuse was secondary, the same was not true when substance abuse was primary. Furthermore, a direct comparison of cases with depression/brief substance abuse to brief substance abuse/depression showed that depression/brief substance abuse had better
outcomes and lengths of stay. This implies that patients with diagnoses of depression and brief substance abuse responded differently in terms of outcomes and lengths of stay depending on which diagnoses was primary (i.e., responsible for most of the symptoms at admission). There may be an interaction between these two diagnoses such that when substance abuse is primary, the patient’s depression adds to the clinical difficulty of treatment. Another possibility is that targeted programs for these dual diagnosis patients are successful when depressive symptoms dominate but less effective when substance abuse symptoms dominate.

**Depression and Extended Substance Abuse**

When depression was paired with extended substance abuse, there were no significant changes in either mean O/E %A or mean O/E LOS. This is surprising since one might expect that the additional diagnosis of extended substance abuse would result in poorer outcomes and longer lengths of stay. As with brief substance abuse treatment, this finding may be due to the extensive literature on recognition and treatment of patients with a psychiatric disorder plus substance abuse. Experience with these patients may allow treatment centers to achieve similar outcomes and lengths of stay compared to patients with only depression.

Looking at the reverse situation of extended substance abuse as a primary and depression as a secondary diagnosis is complicated (Figures 7 and 8). The extended substance abuse/depression pair had worse mean O/E %A values but improved mean O/E LOS values. A partial explanation for the improved mean O/E LOS may lie in the exceptionally high mean O/E LOS for extended substance abuse
alone of 2.33. This value may be inflated due to a need for better reference norms since it seems unlikely that our study cases performed 2.33 times better than the reference norms.

**Brief Substance Abuse and Extended Substance Abuse**

In the stand-alone diagnoses (Table 5), brief substance abuse showed significantly improved risk-adjusted outcomes and lengths of stay compared to extended substance abuse (p values <0.001 for O/E%A and <0.001 for O/E LOS). A similar trend was present in the dual diagnosis data where depression/brief substance abuse showed improved risk adjusted outcomes and lengths of stay relative to depression/extended substance abuse (p values <0.001 for O/E%A and 0.001 for O/E LOS). Also in the dual diagnosis cases, brief substance abuse/depression had better outcomes and lengths of stay compared to extended substance abuse/depression. This indicates that treatment centers were more successful in treating patients with brief substance abuse issues than those with extended substance abuse issues regardless of whether the patient carried one diagnosis or two. A possible explanation is that brief substance abuse needs (i.e. stabilization) may be easier to meet than long term substance abuse needs. Additionally there may be substance abusers that frequently present for brief treatment and are successfully treated, but have a more difficult time meeting long-term treatment goals.
Depression and Bipolar Disorder

When depression was paired with bipolar as a secondary diagnosis there were no significant changes in mean risk adjusted outcome or length of stay (Figures 1 and 2). The same occurred in the reverse pair of bipolar as primary and depression as a secondary diagnosis where mean risk adjusted outcomes were not significantly different compared to bipolar alone (Figures 3 and 4). By definition, patients with bipolar disorder suffer from symptoms of mania and depression, usually oscillating between a manic phase, where mania symptoms occur, and a depressive phase, where depressive symptoms occur. It is therefore unclear why some patients are coded as only having bipolar disorder (which by definition includes depression) while others are coded as having bipolar disorder and depression. It is unlikely that patients would have symptoms of both mania and depression at the same time since bipolar patients usually oscillate between symptoms of one or the other but not both. However, it does stand to reason that patients with bipolar disorder who are coded with a primary diagnosis of depression (i.e., depressive symptoms comprise the majority of there symptoms at admission) should have similar outcomes and lengths of stay compared to depression alone since both depressed patients and bipolar patients in a depressive phase suffer from the same symptoms. By the same logic, it is also understandable that patients with a primary diagnosis of bipolar and a secondary diagnosis of depression have similar outcomes and lengths of stay compared to bipolar disorder alone. Most likely these patients coded as having depression and bipolar are actually no different from the patients coded as having only bipolar.
Depression and Borderline

When depression was paired with borderline (Figures 1 and 2), risk adjusted outcomes were significantly worse compared to depression alone. Risk adjusted lengths of stay, however, was not significantly altered compared to depression alone. This implies that these dual diagnosis patients were treated for relatively the same amount of time as patients with only depression but had worse outcomes. The reverse situation of borderline as a primary and depression as a secondary diagnosis (Figures 9 and 10) showed that these patients had worse outcomes and lengths of stay compared to borderline alone. Therefore, it appears that patients with borderline personality disorder and depression have the same or worse length of stay compared to the stand-alone diagnoses and have consistently worse outcomes. The explanation for this is unclear but may lie in the extreme difficulty of resolving depressive symptoms in patients with borderline personality disorder.

Depression and PTSD

Depression paired with PTSD showed no significant changes in mean risk adjusted outcomes or lengths of stay compared to depression alone. This implies that although these patients suffer from the additional diagnosis of PTSD, this does not significantly alter the effectiveness and duration of treatment.
Conclusions and Future Work

This study determined the frequencies, outcomes, and lengths of stay for single diagnoses and dual diagnosis pairs. The diagnoses of brief substance abuse, extended substance abuse, depression, bipolar disorder, borderline personality disorder, PTSD, and dysthymia occurred at significant rates in dual diagnosis pairs and therefore were included in the analysis. For unclear reasons, schizophrenia did not occur at significant rates in any dual diagnosis pairs and thus it was excluded from the study.

This study found that brief substance abuse treatment occurs far more often than extended substance abuse treatment both as a single diagnosis and in a pair. Furthermore, the outcomes and lengths of stay were better for patients treated for brief substance abuse than for extended substance abuse.

The logical expectation that adding a secondary diagnosis to a single diagnosis would result in worse outcomes or longer lengths of stay did not occur in several cases. The addition of brief substance abuse to depression or bipolar disorder resulted in better outcomes and shorter lengths of stay. When depression was paired with bipolar disorder or PTSD, outcomes were no different compared to depression alone. Also, when depression was paired with borderline, although outcomes worsened, lengths of stay did not significantly change. This implies that there may be interactions between these diagnoses such that the pairs perform the same or better than the single diagnosis. Alternatively, there may be a selection process occurring when providers code these patients such that those coded with dual diagnoses are able to achieve the same or better outcomes than those with
stand-alone diagnoses. A discussion with providers at the sites included in the study may further elucidate the reasoning behind these relationships.

Brief substance abuse, extended substance abuse, and depression have a complex interrelationship. In general, brief substance abuse had better outcomes and lengths of stay than extended substance abuse, whether it was a single diagnosis or part of a pair with depression. The brief substance abuse/depression pair showed improved outcomes and lengths of stay when depression was primary compared to the reverse situation when brief substance abuse was primary. Since the number of cases (stand-alones and pairs) with these three diagnoses is large, it would be beneficial to develop reference norms for each dual diagnosis pair to be used for risk adjustment. This would answer several interesting questions. First, which clinical difficulty items would be good risk adjusters for the pairs and would they be the same as for the stand-alone diagnoses? This alone may shed some light on features that are predictive of poor outcomes and how they vary within the dual diagnosis pairs. Second, do the same relationships between single and dual diagnosis pairs exist when the new risk adjusters are used? If the same relationships exist, it can be more confidently stated that certain pairs do better than the stand-alone diagnoses and that further investigation into the reasons behind these phenomena should be done.
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