THE ANALYSIS OF PATIENT STATUS FOLLOWING SUBSTANCE ABUSE TREATMENT AND UTILIZATION OF MEDICAL CARE

DISSERTATION

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements For the Degree of

DOCTOR OF PHILOSOPHY

By

French Allan Jones, B.S., Th.M.
Denton, Texas
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Subjects were 2,950 patients who had previously received inpatient treatment for substance abuse at 40 treatment centers in 13 states and were followed up by the Chemical Abuse/Addiction Treatment Outcome Registry (CATOR) via telephone during the 2 years immediately following their treatment. All subjects were contacted every 6 months and asked a series of questions regarding their relapse status, medical utilization, illnesses, injuries, and arrests. Patient status was based on 3 categories: (1) abstinence from any abuse of a chemical, (2) brief relapse of less than 3 months abuse of any chemical, or (3) total relapse of longer than 3 months of any chemical. Findings showed that abstainers had fewer days in the hospital for emotional problems and detoxification. Abstainers also had fewer visits to the hospital for emergency reasons. Males in the brief relapse category had a greater number of injuries than abstainers or total relapsers. Regarding arrests and automobile accidents, no difference was discovered. However, regarding Drunk While Driving (DWI) arrests, abstainers had fewer arrests.
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Introduction

Substance abuse problems have escalated tremendously over the past two decades (Hoffman & Harrison, 1987). The staggering effect of substance abuse negatively influences marriages, children of substance abusers, lost job productivity, driving on the highway, and medical costs related to treatment and subsequent health care. Alcohol related problems alone have impacted over 60 million Americans (Bradshaw, 1987) and alcohol abuse has been reported to be the number one health problem in the United States (Lane, 1981). Alcoholism is a severe, debilitating and life-threatening illness affecting at least 10% of American men and 3% to 5% of American women (Schuckit, Schweil, & Gold, 1986).

Employment productivity and absenteeism are two issues related to substance abuse that are critical to employers. For example, Lewis (1986) demonstrated that work performance among 493 inpatients admitted for chemical dependency did improve when employees successfully completed substance abuse treatment. And Forcier (1984) found that employment absenteeism declined markedly among 670 alcoholics (Forcier, 1984) when treatment was offered by employee assistance
programs. By combating substance abuse at the business level, increased effectiveness on the job would appear to justify the treatment cost to the company.

Although it has been demonstrated that employers can receive a financial return for the cost of employee treatment in terms of increased effectiveness on the job, there remains employer concern regarding the long-term effectiveness of substance abuse treatment. Long-term effect, in fact, is one of the major concerns related to chemical abuse treatment. Frenkel (1977) has described a vicious cycle observed among a large cross-section of alcoholic patients of relapse and hospitalizations. An ongoing debate in substance abuse treatment is whether abstinence or moderation should be the goal of successful treatment.

The relationship between effectiveness of substance abuse treatment and medical care utilization is another major issue in substance abuse treatment and was addressed by two Alcohol, Drug Abuse, and Mental Health Administration (ADA MHA) conferences. A summary consensus of these two ADA MHA conferences (ADA MHA, 1981) was that past studies have had serious methodological problems and have had too narrow a focus, and, therefore, more research is needed on the relationship between substance abuse and physical disorders. They also concluded that broader research studies and more longitudinal studies are needed for follow-up of alcohol,
drug, and mental health (ADM) treatment and to develop a stronger referral base for specific aspects of medical care related to substance abuse. While it may seem reasonable that abstainers following substance abuse treatment would have better evidence of wellness than those who relapse, this concept has not received adequate attention in the research literature.

Statement of the Problem

Although the literature is inconclusive in its overall findings, there is evidence that a correlation does exist between effective substance abuse treatment and a resulting reduced level of medical care usage. However, no definite studies were found related to medical care usage following substance abuse treatment. Therefore, the problem of this study was to determine whether there is a relationship between substance abuse treatment and abuse recover/relapse and medical care. The purpose of this study was to determine the impact of recidivism following successful substance abuse therapy on selected wellness indicators.

Review of the Literature

Much has been written on substance abuse and follow-up, but there has been a lack of attention given to recidivism and its effect on patient health. The length of this review reflects the paucity of empirical studies in the areas of concern to the present study.
Several studies have sought to evaluate treatment effectiveness through follow-up of patients. In a four year follow-up study of 225 patients who received treatment for alcoholism, Pettinati, Sugerman, DiDonato, and Mauer (1982) found a minimum of two years of consistent abstinence status was necessary before any relationship could be seen between the first and fourth year status. They explained that a halo effect appeared to discount the immediate positive effects of treatment during the first year after treatment. Obitz, Brechner, and Shippee (1975) in an evaluation of a Veterans Administration Hospital alcoholic treatment program, discovered that 46% of the 43 patients who completed an inpatient alcoholism treatment program indicated total abstinence following discharge from the program. Of those who did drink, over 50% got drunk most of the time when they did drink.

Dole (1980) reported that traditional treatment such as psychotherapy and punishment of addictive behaviors, and heroin addiction in particular have had little permanent effect. The relapse rates have been as high as 90% of those patients who completed a substance abuse treatment program. It would seem, then, that one criterion of success for treatment for substance abuse must be the recidivism rate of those who successfully complete the treatment.

The issue of abstinence versus moderation as treatment goals and the effect of each on relapse continue to be
debated. Connor (1980) reported that recidivism is one of the major problems encountered in the treatment of alcoholics. Taylor, Helzer, and Robins (1986) in examining several recent studies of moderate drinking in ex-alcoholics found "the longer the interval required for alcoholics to sustain moderate, problem-free drinking, the less likely is such an outcome" (p. 115). Their findings support the notion that total abstinence is a realistic treatment goal for the ex-alcoholic.

In an examination of effective treatment and recidivism, Hoffmann and Harrison (1983) followed up 900 inpatients 6 months after treatment. They found a high correlation between total abstinence 6 months after discharge and weekly attendance at Alcoholics Anonymous (AA) during this period.

The research literature indicates there are several areas of patient life that are impacted by effective substance abuse treatment. Ottenberg (1977) found that successful substance abuse treatment, defined by abstinence following treatment, had a favorable effect on the patient's employment status. Davidson's (1976) findings concurred with those of Ottenberg, but from the opposite perspective. She found a higher recidivism rate for 82 former alcohol inpatients after treatment that resulted in a higher rate of unemployment.
Smith (1983) demonstrated that Employee Assistance Programs (EAP) can be personally helpful to employees who participate in them and also enhance job performance and productivity. She used a nationwide survey of 95 randomly chosen employed subjects who had completed substance abuse treatment and were involved in an EAP. The results of Smith's study have extremely positive implications for business productivity.

Alcohol related motor vehicle accidents have been reported to cost an estimated six billion dollars each year including 25,000 deaths and 500,000 disabling injuries (Lane, 1981). Obolensky (1984) sought to identify the High Risk drunk driver and to implement a treatment program which would make an impact on the recidivism rate. He found that a Relapse Prevention Model, which included participation of significant others, was effective in slowing the relapse rate of patients and increasing their social skills as measured by the Situational Competency Test.

Procedures

Definition of Terms

The following terms have restricted meaning for this study.

**Abstinence** - No use of any mood altering substance for the duration of the two years following treatment.
**Brief relapse** - Three months or less of abstinence during any six month period up to two years following treatment. This means, for example, that taking one drink during any six month time period is defined as brief relapse.

**Currently Employed** - Patients who entered treatment, still employed and having been employed for the previous twelve months.

**Medical care utilization/Hospitalization** - Spending at least one day an in-patient care unit for any health care problem during the two years following substance abuse treatment.

**Substance Abuse** - The misuse of any mood altering substance alcoholic beverages or drugs of any kind.

**Substance abuse treatment** - Treatment programs which are licensed or accredited (average length of in-patient care: 25 days) and who have become an affiliate with The Chemical Abuse/Addiction Treatment Outcome Registry (CATOR), located in St. Paul, MN.

**Total Relapse** - Three months or more use of any mood altering substance during the two years after treatment.

**Hypotheses**

1. Among male and female substance abusers who successfully completed a licensed treatment program, relapse patients will have spent more days in a hospital for (a) a
medical problem, (b) an emotional problem, or (c) detoxification, than recovery patients two years following completion of treatment.

2. Male and female substance abusers who abstained during the two years following treatment will have had fewer visits to hospital emergency rooms than those who had a brief or total relapse for the same time period.

3. Male and female substance abusers who abstained during the two years following treatment will have had significantly fewer injuries or illnesses than those who had a brief relapse or total relapse for the same time period.

4. Male and female substance abusers who abstained during the two years following treatment will have had significantly fewer misdemeanor or felony arrests than those who had a brief relapse or total relapse for the same time period.

5. Male and female substance abusers who have a valid driver's license and who abstained during the two years following treatment will have significantly fewer accidents while driving an automobile compared to those who had a brief relapse or total relapse for the same time period.

Subjects

Subjects for this study were 2,950 individuals from 13 states who successfully completed a substance abuse treatment program (i.e. alcohol, drugs) and consented to 4
follow-up interviews by telephone, at 6-month intervals for 2 years. The subjects' cases and 6-month follow-up interviews over 2 years were reported to the Chemical Abuse/Addiction Treatment Outcome Registry (CATOR) in St. Paul, Minnesota between 1980 and 1988. Forty treatment centers from 13 states (see appendix A) were used in this study. All treatment centers were Alcoholics Anonymous Certified with licensed therapists and drug counselors.

Hoffmann and Harrison (1986) reported that the typical patient entering treatment as CATOR affiliates is a white (98.4%), married (54.9%), male (67.8%) over 35 years of age with at least a high school education. More than two-thirds of the patients are men and over 98 percent are white. The mean age of patients is 40.0 years and the median age is 37.2 years. These descriptive statistics represent the demographic characteristics of the current study as well, with the exception that the sample for the current study was composed of 71.2% males.

Collection of Data

All of the data for this study were collected by CATOR and their affiliated treatment centers. Patients who had completed substance abuse treatment were interviewed at 6-month intervals for 2 years. In each follow-up interview the patients' responses were recorded on a CATOR 6-month follow-up form (see appendix B). The research staff at
CATOR maintain a computerized data base of the data from the patient follow-up interviews.

The researcher gained permission from CATOR to carry out this study and received assistance from CATOR’s research staff in accessing the data base. The dependent and independent variables used for this study were gleaned directly from the CATOR six month follow-up form. The following list enumerates the variables used and their location on the follow-up form.

1. Sex: Item 3
2. Patient status: Item 14
3. Days in hospital for detoxification: Item 34
4. Days in hospital for medical problem: Item 36
5. Days in hospital for emotional problem: Item 42
6. Visits to hospital emergency room: Item 37
7. Visits to doctor's office for injury: Item 38
8. Visits to doctor's office for illness: Item 39
9. Number of misdemeanor arrests: Item 56
10. Number of felony arrests: Item 57
11. Incidence of arrest for DWI: Item 62
12. Incidence of automobile accident: Item 63

Results and Discussion

Data Analysis

Hypotheses one through four were tested by two-way analysis of variance (ANOVA). In each of the four
hypotheses, the two independent variables were sex and patient status (abstinence, brief relapse, total relapse). Of primary interest were the main effect for patient status, and if a significant interaction was present, the simple effect for patient status within sex. Significant effects for patient status were followed up with Tukey's multiple comparison procedure to indicate which pairs of groups differed.

Hypothesis five was evaluated using the Chi-square procedure. This hypothesis utilized data that were categorical in nature and thus were not appropriate for the ANOVA procedure used in the previous hypotheses.

Hypothesis 1 stated that among male and female substance abusers who successfully completed a licensed treatment program, relapse patients will have spent more days in a hospital (a) for a medical problem, (b) for an emotional problem, or (c) for detoxification, than recovery patients two years following completion of treatment.

Hypothesis 1 was tested by examining six variables:
(1) number of days spent in the hospital during the first year of treatment for medical problems, (2) number of days spent in the hospital during the second year of treatment for medical problems, (3) number of days spent in the hospital during the first year of treatment for detoxification, (4) number of days spent in the hospital during the second year of treatment for detoxification, (5)
number of days spent in the hospital during the first year of treatment for an emotional problem, and (6) number of days spent in the hospital during the second year of treatment for an emotional problem. All six variables were measured in terms of number of days spent in the hospital. Table 1 presents the cell means and frequencies for the first dependent variable.

Table 1

Cell Means and Frequencies for Number of Days Spent in the Hospital for Medical Problems during the First Year following Treatment

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>N</th>
<th>Females Mean</th>
<th>N</th>
<th>Both Sexes Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.85</td>
<td>1168</td>
<td>1.54</td>
<td>526</td>
<td>1.07</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>1.41</td>
<td>794</td>
<td>1.35</td>
<td>284</td>
<td>1.39</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.73</td>
<td>137</td>
<td>.29</td>
<td>41</td>
<td>.63</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>1.05</td>
<td>2099</td>
<td>1.41</td>
<td>851</td>
<td>1.16</td>
<td>2950</td>
</tr>
</tbody>
</table>

The effect of patient status and sex on days in the hospital for medical problems was tested using two-way ANOVA. The results are presented in Table 2.

As data in Table 2 show, neither patient status nor sex had a significant impact on days in the hospital for medical problems during the first year after treatment. In addition, Table 2 data show that there was not a significant interaction between the two independent variables, patient status and sex.
Table 2

Two-way ANOVA Summary Table for First Year Days Spent in a Hospital for Medical Problems

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>125.42</td>
<td>2</td>
<td>62.71</td>
<td>1.16</td>
<td>.31</td>
</tr>
<tr>
<td>Sex</td>
<td>81.01</td>
<td>1</td>
<td>81.01</td>
<td>1.50</td>
<td>.22</td>
</tr>
<tr>
<td>Interaction</td>
<td>94.74</td>
<td>2</td>
<td>47.37</td>
<td>.88</td>
<td>.42</td>
</tr>
<tr>
<td>Residual</td>
<td>158927.87</td>
<td>2944</td>
<td>53.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>159225.70</td>
<td>2949</td>
<td>53.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents the means and frequencies for number of days spent in the hospital during the second year following treatment for medical problems.

Table 3

Cell Means and Frequencies for Number of Days Spent in the Hospital for Medical Problems during the Second Year following Treatment

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>1.28</td>
<td>1168</td>
<td>1.24</td>
<td>526</td>
<td>1.27</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>1.86</td>
<td>794</td>
<td>1.77</td>
<td>284</td>
<td>1.84</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>1.55</td>
<td>137</td>
<td>.95</td>
<td>411</td>
<td>.42</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>1.52</td>
<td>2099</td>
<td>1.40</td>
<td>851</td>
<td>1.48</td>
<td>2950</td>
</tr>
</tbody>
</table>

The effect of patient status and sex on days in the hospital for medical problems was tested using two-way ANOVA. Table 4 data show that patient status, sex, and
their interaction had no significant impact on days in the hospital for medical problems during the second year after treatment.

Table 4

Two-way ANOVA Summary Table for Second Year Days Spent in a Hospital for Medical Problems

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>213.52</td>
<td>2</td>
<td>106.76</td>
<td>1.43</td>
<td>.24</td>
</tr>
<tr>
<td>Sex</td>
<td>4.37</td>
<td>1</td>
<td>4.37</td>
<td>.06</td>
<td>.81</td>
</tr>
<tr>
<td>Interaction</td>
<td>9.23</td>
<td>2</td>
<td>4.61</td>
<td>.06</td>
<td>.94</td>
</tr>
<tr>
<td>Residual</td>
<td>220368.22</td>
<td>2944</td>
<td>74.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>220618.69</td>
<td>2949</td>
<td>74.81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5 presents the cell means and frequencies for number of days spent in the hospital for an emotional problem during the first year following treatment.

Table 5

Cell Means and Frequencies for Number of Days Spent in the Hospital for an Emotional Problem during the First Year following Treatment

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.22</td>
<td>1168</td>
<td>.39</td>
<td>526</td>
<td>.27</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.40</td>
<td>794</td>
<td>.72</td>
<td>284</td>
<td>.74</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.46</td>
<td>137</td>
<td>.83</td>
<td>41</td>
<td>.54</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>.30</td>
<td>2099</td>
<td>.86</td>
<td>851</td>
<td>.46</td>
<td>2950</td>
</tr>
</tbody>
</table>
Table 6 presents the results of the two-way ANOVA procedure. These results indicate a significant difference in number of days spent in a hospital for emotional problems during the first year following treatment based on patient status and sex, with males spending fewer days in the hospital for emotional problems than did females.

Tukey's multiple comparison procedure showed that abstainers had significantly fewer days in the hospital than did those in brief relapse. The other two pairs of groups (abstainers vs. total relapse and total relapse vs. brief relapse) were not significantly different. The significant interaction between sex and patient status also was explored using Tukey's procedure. For males, none of the groups differed significantly, but for females, all of the groups differed significantly from each other.

Table 6

Two-way ANOVA Summary Table for First Year Days Spent in a Hospital for Emotional Problems

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>165.25</td>
<td>2</td>
<td>82.63</td>
<td>3.48</td>
<td>.031</td>
</tr>
<tr>
<td>Sex</td>
<td>202.69</td>
<td>1</td>
<td>202.69</td>
<td>8.54</td>
<td>.004</td>
</tr>
<tr>
<td>Interaction</td>
<td>179.75</td>
<td>2</td>
<td>89.87</td>
<td>3.79</td>
<td>.023</td>
</tr>
<tr>
<td>Residual</td>
<td>69863.91</td>
<td>2944</td>
<td>23.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>70393.40</td>
<td>2949</td>
<td>23.87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7 presents the cell means and frequencies for number of days spent in the hospital for emotional problems during the second year following treatment.

Table 7

Cell Means and Frequencies for Number of Days Spent in the Hospital for an Emotional Problem during the Second Year following Treatment

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.11</td>
<td>1168</td>
<td>.45</td>
<td>526</td>
<td>.22</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.80</td>
<td>794</td>
<td>1.93</td>
<td>284</td>
<td>1.10</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>1.40</td>
<td>137</td>
<td>.15</td>
<td>411</td>
<td>.11</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>.46</td>
<td>2099</td>
<td>.93</td>
<td>851</td>
<td>.59</td>
<td>2950</td>
</tr>
</tbody>
</table>

Table 8 presents the results of the two-way ANOVA with second year days in the hospital for emotional problems as the dependent variable.

Table 8

Two-way ANOVA Summary Table for Second Year Days Spent in a Hospital for Emotional Problems

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>592.16</td>
<td>2</td>
<td>296.08</td>
<td>7.12</td>
<td>.001</td>
</tr>
<tr>
<td>Sex</td>
<td>168.31</td>
<td>1</td>
<td>168.31</td>
<td>4.05</td>
<td>.044</td>
</tr>
<tr>
<td>Interaction</td>
<td>190.27</td>
<td>2</td>
<td>95.14</td>
<td>2.29</td>
<td>.102</td>
</tr>
<tr>
<td>Residual</td>
<td>122.350.96</td>
<td>2944</td>
<td>41.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>123,268.24</td>
<td>2949</td>
<td>41.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results of Table 8 show a significant difference in number of days spent in a hospital during the second year for emotional problems based on patient status and sex, with males having fewer days in the hospital for emotional problems than females.

Tukey's multiple comparison procedure showed that abstainers and those in total relapse had significantly fewer days in the hospital than did those in brief relapse.

Table 9 presents the means and frequencies for days in the hospital for detoxification during the first year following treatment.

Table 9  
Cell Means and Frequencies for Number of Days Spent in the Hospital during the First Year of Treatment for Detoxification

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.00</td>
<td>1168</td>
<td>.00</td>
<td>526</td>
<td>.00</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.13</td>
<td>794</td>
<td>.14</td>
<td>284</td>
<td>.13</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.08</td>
<td>137</td>
<td>.05</td>
<td>41</td>
<td>.07</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>.05</td>
<td>2099</td>
<td>.05</td>
<td>851</td>
<td>.05</td>
<td>2950</td>
</tr>
</tbody>
</table>

Table 10 presents the results of the ANOVA procedure for days spent in a hospital for detoxification during the first year following treatment.
The results of Table 10 show a significant difference in number of days spent in a hospital for detoxification during the first year based on patient status but not based on sex.

Table 10

Two-way ANOVA Summary Table for First Year Days Spent in a Hospital for Detoxification

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>10.89</td>
<td>2</td>
<td>3.63</td>
<td>31.54</td>
<td>.001</td>
</tr>
<tr>
<td>Sex</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.02</td>
<td>.886</td>
</tr>
<tr>
<td>Interaction</td>
<td>.05</td>
<td>2</td>
<td>.03</td>
<td>.22</td>
<td>.803</td>
</tr>
<tr>
<td>Residual</td>
<td>338.81</td>
<td>2944</td>
<td>.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>349.75</td>
<td>2949</td>
<td>.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tukey's multiple comparison procedure showed that abstainers had significantly fewer days in the hospital than did those in brief relapse or those in total relapse. These comparisons also showed that the days in the hospital for detoxification was less for those in total relapse than it was for those in brief relapse.

Table 11 presents the means and frequencies for days spent in the hospital for detoxification during the second year following treatment.

Table 12 presents the results of the ANOVA procedure with days spent in the hospital for detoxification during the second year following treatment as the dependent variable.
Table 11

Cell Means and Frequencies for Number of Days Spent in the Hospital during the Second Year of Treatment for Detoxification

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males</th>
<th>Females</th>
<th>Both Sexes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean N</td>
<td>Mean N</td>
<td>Mean N</td>
</tr>
<tr>
<td>Abstainers</td>
<td>.00 1168</td>
<td>.00 526</td>
<td>.00 1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.12 794</td>
<td>.12 284</td>
<td>.12 1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.33 137</td>
<td>.02 41</td>
<td>.26 178</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td><strong>.07 2099</strong></td>
<td><strong>.04 851</strong></td>
<td><strong>.06 2950</strong></td>
</tr>
</tbody>
</table>

Table 12

Two-way ANOVA Summary Table for Second Year Days Spent in a Hospital for Detoxification

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>16.56</td>
<td>2</td>
<td>8.28</td>
<td>26.91</td>
<td>.001</td>
</tr>
<tr>
<td>Sex</td>
<td>.20</td>
<td>1</td>
<td>.20</td>
<td>.64</td>
<td>.424</td>
</tr>
<tr>
<td>Interaction</td>
<td>2.73</td>
<td>2</td>
<td>1.36</td>
<td>4.43</td>
<td>.012</td>
</tr>
<tr>
<td>Residual</td>
<td>905.75</td>
<td>2944</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>925.50</td>
<td>2949</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of Table 12 show a significant difference in number of days spent in a hospital for detoxification during the second year based on patient status but not on sex. Tukey's multiple comparison procedure showed that abstainers had significantly fewer days in the hospital than
did those in brief relapse or those in total relapse. These comparisons also showed that the days in the hospital for detoxification was less for those in brief relapse than it was for those in total relapse.

Table 12 data also show a significant interaction between sex and patient status. Inspection of Table 11 shows the nature of the interaction. Whereas there was not a significant main effect for sex, there was a significant difference between males and females when only those in total relapse were considered. Males in total relapse had significantly more days in the hospital for detoxification during the second year than did females.

In summary, Hypothesis 1 was supported for days in the hospital for emotional problems and for detoxification but not for general medical problems.

Hypothesis 2 stated male and female substance abusers who abstained during the two years following treatment will have had fewer visits to hospital emergency rooms than those who had a brief relapse or total relapse for the same time period.

Hypothesis 2 was tested by examining two variables: (1) visits to hospital emergency rooms during the first year following treatment and (2) visits to hospital emergency rooms during the second year following treatment.

Tables 13 and 14 present the means and cell frequencies for visits to the hospital emergency room during the first
and second year following treatment. These data are presented by patient status and sex.

Table 13

**Cell Means and Frequencies for Number of Visits to Hospital Emergency Rooms during the First Year following Treatment**

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.17</td>
<td>1168</td>
<td>.21</td>
<td>526</td>
<td>.18</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.30</td>
<td>794</td>
<td>.36</td>
<td>284</td>
<td>.31</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.22</td>
<td>137</td>
<td>.17</td>
<td>41</td>
<td>.21</td>
<td>178</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>.22</td>
<td>2099</td>
<td>.26</td>
<td>851</td>
<td>.23</td>
<td>2950</td>
</tr>
</tbody>
</table>

Table 14

**Cell Means and Frequencies for Number of Visits to Hospital Emergency Rooms during the Second Year following Treatment**

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.21</td>
<td>1168</td>
<td>.25</td>
<td>526</td>
<td>.22</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.30</td>
<td>794</td>
<td>.37</td>
<td>284</td>
<td>.32</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.45</td>
<td>137</td>
<td>.34</td>
<td>41</td>
<td>.43</td>
<td>178</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>.26</td>
<td>2099</td>
<td>.29</td>
<td>851</td>
<td>.27</td>
<td>2950</td>
</tr>
</tbody>
</table>

Both parts of Hypothesis 2 were tested using 2-way ANOVA with sex and patient status as the independent variables. Tables 15 and 16 present the results of the ANOVA procedures.
Table 15

Two-way ANOVA Summary Table for First Year Number of Visits to Hospital Emergency Rooms

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>12.04</td>
<td>2</td>
<td>6.02</td>
<td>15.62</td>
<td>.001</td>
</tr>
<tr>
<td>Sex</td>
<td>1.07</td>
<td>1</td>
<td>1.07</td>
<td>2.78</td>
<td>.096</td>
</tr>
<tr>
<td>Interaction</td>
<td>0.31</td>
<td>2</td>
<td>0.15</td>
<td>0.40</td>
<td>0.673</td>
</tr>
<tr>
<td>Residual</td>
<td>1,134.68</td>
<td>2944</td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,147.79</td>
<td>2949</td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of Table 15 show a significant difference in number of visits to the hospital emergency room during the first year based on status but not based on sex. Tukey's multiple comparison procedure showed that abstainers and those in total relapse had significantly fewer visits to the hospital emergency room than did those in brief relapse. There was not a significant difference in the number of visits to the emergency room between abstainers and those in total relapse.

The results of Table 16 show that there was a significant difference in number of days spent in a hospital for emotional problems based on patient status but not based on sex. Tukey's multiple comparison procedure showed that abstainers had significantly fewer visits to the hospital emergency room than did those in brief relapse and those in total relapse. Also those in brief relapse had
significantly fewer days in the hospital than did those in total relapse.

Table 16

Two-way ANOVA Summary Table Second Year Number of Visits to Hospital Emergency Rooms

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>11.87</td>
<td>2</td>
<td>5.94</td>
<td>11.9</td>
<td>.001</td>
</tr>
<tr>
<td>Sex</td>
<td>1.16</td>
<td>1</td>
<td>1.16</td>
<td>2.32</td>
<td>.128</td>
</tr>
<tr>
<td>Interaction</td>
<td>.87</td>
<td>2</td>
<td>.44</td>
<td>.88</td>
<td>.417</td>
</tr>
<tr>
<td>Residual</td>
<td>1,467.86</td>
<td>2944</td>
<td>.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,481.37</td>
<td>2949</td>
<td>.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 3 stated male and female substance abusers who abstained during the two years following treatment will have had significantly fewer injuries or illnesses than those who had a brief relapse or total relapse for the same period.

Hypothesis 3 was tested by examining four dependent variables: (1) injuries for the first year following treatment, (2) injuries for the second year following treatment, (3) illnesses for the first year following treatment, and (4) illness for the second year following treatment. All 4 of these variables are measured in terms of number of office visits to a doctor. Tables 17 through 20 present the cell means and frequencies for the four dependent variables broken down by sex and patient status.
Table 17

**Cell Means and Frequencies for Office Visits to a Doctor due to Injuries during the First Year following Treatment**

| Patient Status | Males | | | Females | | | Both Sexes | | |
|----------------|-------|---------|---------|---------|---------|---------|---------|---------|
|                | Mean  | N       | Mean    | N       | Mean    | N       | Mean    | N       |
| Abstainers     | .49   | 1,168   | .35     | 526     | .44     | 1,694   |         |         |
| Brief Relapse  | .84   | 794     | .52     | 284     | .75     | 1,078   |         |         |
| Total Relapse  | .46   | 137     | .17     | 41      | .39     | 178     |         |         |
| **All**        | .62   | 2,099   | .40     | 851     | .55     | 2,950   |         |         |

Table 18

**Cell Means and Frequencies for Office Visits to a Doctor due to Injuries during the Second Year following Treatment**

| Patient Status | Males | | | Females | | | Both Sexes | | |
|----------------|-------|---------|---------|---------|---------|---------|---------|---------|
|                | Mean  | N       | Mean    | N       | Mean    | N       | Mean    | N       |
| Abstainers     | .61   | 1,168   | .37     | 526     | .53     | 1,694   |         |         |
| Brief Relapse  | .71   | 794     | .57     | 284     | .67     | 1,078   |         |         |
| Total Relapse  | .97   | 137     | .61     | 41      | .89     | 178     |         |         |
| **All**        | .67   | 2,099   | .45     | 851     | .61     | 2,950   |         |         |

Table 19

**Cell Means and Frequencies for Office Visits to a Doctor due to Illnesses during the First Year following Treatment**

| Patient Status | Males | | | Females | | | Both Sexes | | |
|----------------|-------|---------|---------|---------|---------|---------|---------|---------|
|                | Mean  | N       | Mean    | N       | Mean    | N       | Mean    | N       |
| Abstainers     | 1.01  | 1,168   | 1.95    | 526     | 1.30    | 1,694   |         |         |
| Brief Relapse  | .92   | 794     | 1.87    | 284     | 1.17    | 1,078   |         |         |
| Total Relapse  | .88   | 137     | 1.66    | 41      | 1.06    | 178     |         |         |
| **All**        | .97   | 2,099   | 1.91    | 851     | 1.24    | 2,950   |         |         |
Table 20

Cell Means and Frequencies for Office Visits to a Doctor due to Illnesses during the Second Year following Treatment

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>N</th>
<th>Females Mean</th>
<th>N</th>
<th>Both Sexes Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>1.26</td>
<td>1,168</td>
<td>2.02</td>
<td>526</td>
<td>1.50</td>
<td>1,694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>1.35</td>
<td>794</td>
<td>2.13</td>
<td>284</td>
<td>1.55</td>
<td>1,078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>1.11</td>
<td>137</td>
<td>2.27</td>
<td>41</td>
<td>1.38</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>1.28</td>
<td>2,099</td>
<td>2.07</td>
<td>851</td>
<td>1.51</td>
<td>2,950</td>
</tr>
</tbody>
</table>

All four parts of Hypothesis 3 were tested using two-way analysis of variance (ANOVA) with sex and patient status as the independent variables.

Table 21 presents the ANOVA results when the dependent variable was office visits for injuries in the first year.

Table 21

Two-way ANOVA Summary Table for First Year Injuries

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>64.53</td>
<td>2</td>
<td>32.27</td>
<td>6.54</td>
<td>.002</td>
</tr>
<tr>
<td>Sex</td>
<td>25.47</td>
<td>1</td>
<td>25.47</td>
<td>5.16</td>
<td>.023</td>
</tr>
<tr>
<td>Interaction</td>
<td>4.45</td>
<td>2</td>
<td>2.22</td>
<td>.45</td>
<td>.637</td>
</tr>
<tr>
<td>Residual</td>
<td>14,521.48</td>
<td>2944</td>
<td>4.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14,619.14</td>
<td>2949</td>
<td>4.96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of Table 21 show a significant difference in number of office visits for injuries during the first year based on patient status and sex. Males had more office
visits than females. Tukey's multiple comparison procedure indicated subjects who experienced brief relapse had more visits to doctors for injuries during the first year following treatment than either those in total relapse or abstainers.

Table 22 presents the ANOVA results when the dependent variable was office visits for injuries during the second year.

Table 22

Two-way ANOVA Summary Table for Second Year Injuries

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>24.96</td>
<td>2</td>
<td>12.48</td>
<td>2.68</td>
<td>.069</td>
</tr>
<tr>
<td>Sex</td>
<td>26.09</td>
<td>1</td>
<td>26.09</td>
<td>5.60</td>
<td>.018</td>
</tr>
<tr>
<td>Interaction</td>
<td>2.20</td>
<td>2</td>
<td>1.10</td>
<td>.24</td>
<td>.790</td>
</tr>
<tr>
<td>Residual</td>
<td>13,716.58</td>
<td>2944</td>
<td>4.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13,772.92</td>
<td>2949</td>
<td>4.67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of Table 22 show that there was not a significant difference in number of office visits for injuries during the second year based on patient status. However, there was a significant effect due to sex. Males had more office visits than females.

Table 23 presents the ANOVA results when the dependent variable was office visits for illnesses during the first year. The results of Table 23 show no a significant difference in number of office visits for illnesses during
the first year based on patient status. However, there was
a significant effect due to sex. Males had fewer office
visits than females.

Table 23

Two-way ANOVA Summary Table for First Year Illnesses

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>8.48</td>
<td>2</td>
<td>4.24</td>
<td>.48</td>
<td>.618</td>
</tr>
<tr>
<td>Sex</td>
<td>531.99</td>
<td>1</td>
<td>531.99</td>
<td>60.43</td>
<td>.001</td>
</tr>
<tr>
<td>Interaction</td>
<td>.83</td>
<td>2</td>
<td>.42</td>
<td>.05</td>
<td>.954</td>
</tr>
<tr>
<td>Residual</td>
<td>25,916.99</td>
<td>2944</td>
<td>8.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26,468.08</td>
<td>2949</td>
<td>8.98</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 24 presents the ANOVA results when the dependent
variable was office visits for illnesses during the second
year.

Table 24

Two-way ANOVA Summary Table for Second Year Illnesses

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>7.34</td>
<td>2</td>
<td>3.67</td>
<td>.22</td>
<td>.802</td>
</tr>
<tr>
<td>Sex</td>
<td>377.13</td>
<td>1</td>
<td>377.13</td>
<td>22.64</td>
<td>.001</td>
</tr>
<tr>
<td>Interaction</td>
<td>4.54</td>
<td>2</td>
<td>2.27</td>
<td>.14</td>
<td>.873</td>
</tr>
<tr>
<td>Residual</td>
<td>49,044.06</td>
<td>2944</td>
<td>16.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49,431.25</td>
<td>2949</td>
<td>16.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of Table 24 show no significant difference
in number of office visits for illnesses during the second
year based on patient status. However, there was a
significant effect due to sex. Males had fewer office visits than females.

In summary, only in the first year and in regard to injuries did a difference exist due to patient status. Those whose status was considered a brief relapse had more office visits to a doctor for injuries than did those in total relapse or abstainers. For both years males had more visits due to injury and females had more visits due to illness.

Hypothesis 4 stated male and female substance abusers who abstained during the two years following treatment will have had significantly fewer misdemeanor or felony arrests than those had a brief relapse or total relapse for the same time period. Only arrests not related to substance abuse were used in evaluating Hypothesis 4.

Hypothesis 4 was tested by examining four variables: (1) misdemeanor arrests during the first year following treatment, (2) misdemeanor arrests during the second year following treatment, (3) felony arrests during the first year following treatment, and (4) felony arrests during the second year following treatment.

Tables 25 through 28 present the cell means and frequencies for the four analyses delineated.
Table 25

**Cell Means and Frequencies for Number of Misdemeanor Arrests during the First Year following Treatment**

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>N</th>
<th>Females Mean</th>
<th>N</th>
<th>Both Sexes Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.09</td>
<td>1168</td>
<td>.05</td>
<td>526</td>
<td>.08</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.13</td>
<td>794</td>
<td>.07</td>
<td>284</td>
<td>.12</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.12</td>
<td>137</td>
<td>.02</td>
<td>41</td>
<td>.10</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>.11</td>
<td>2099</td>
<td>.06</td>
<td>851</td>
<td>.09</td>
<td>2950</td>
</tr>
</tbody>
</table>

Table 26

**Cell Means and Frequencies for Number of Misdemeanor Arrests during the Second Year following Treatment**

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>N</th>
<th>Females Mean</th>
<th>N</th>
<th>Both Sexes Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.11</td>
<td>1168</td>
<td>.07</td>
<td>526</td>
<td>.10</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.11</td>
<td>794</td>
<td>.08</td>
<td>284</td>
<td>.10</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.13</td>
<td>137</td>
<td>.07</td>
<td>41</td>
<td>.12</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>.11</td>
<td>2099</td>
<td>.07</td>
<td>851</td>
<td>.10</td>
<td>2950</td>
</tr>
</tbody>
</table>

Table 27

**Cell Means and Frequencies for Number of Felony Arrests during the First Year following Treatment**

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>N</th>
<th>Females Mean</th>
<th>N</th>
<th>Both Sexes Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.00</td>
<td>1168</td>
<td>.01</td>
<td>526</td>
<td>.00</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.01</td>
<td>794</td>
<td>.00</td>
<td>284</td>
<td>.00</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.00</td>
<td>137</td>
<td>.00</td>
<td>41</td>
<td>.00</td>
<td>178</td>
</tr>
<tr>
<td>All</td>
<td>.00</td>
<td>2099</td>
<td>.00</td>
<td>851</td>
<td>.00</td>
<td>2950</td>
</tr>
</tbody>
</table>
Table 28

Cell Means and Frequencies for Number of Felony Arrests during the Second Year following Treatment

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Males Mean</th>
<th>Males N</th>
<th>Females Mean</th>
<th>Females N</th>
<th>Both Sexes Mean</th>
<th>Both Sexes N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>.00</td>
<td>1168</td>
<td>.00</td>
<td>526</td>
<td>.00</td>
<td>1694</td>
</tr>
<tr>
<td>Brief Relapse</td>
<td>.00</td>
<td>794</td>
<td>.00</td>
<td>284</td>
<td>.00</td>
<td>1078</td>
</tr>
<tr>
<td>Total Relapse</td>
<td>.01</td>
<td>137</td>
<td>.00</td>
<td>41</td>
<td>.00</td>
<td>178</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>.00</td>
<td>2099</td>
<td>.00</td>
<td>851</td>
<td>.00</td>
<td>2950</td>
</tr>
</tbody>
</table>

Table 29 presents the results of the analysis concerning number of misdemeanor arrests other than for substance abuse during the first year following treatment. The table shows a significant effect for sex but not for patient status. Males had more arrests than did females.

Table 29

Two-way ANOVA Summary Table for Number of Misdemeanor Arrests during the First Year following Treatment

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>.76</td>
<td>2</td>
<td>.38</td>
<td>2.51</td>
<td>.082</td>
</tr>
<tr>
<td>Sex</td>
<td>1.73</td>
<td>1</td>
<td>1.73</td>
<td>11.39</td>
<td>.001</td>
</tr>
<tr>
<td>Interaction</td>
<td>.10</td>
<td>2</td>
<td>.05</td>
<td>.31</td>
<td>.733</td>
</tr>
<tr>
<td>Residual</td>
<td>447.90</td>
<td>2294</td>
<td>.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>450.61</td>
<td>2949</td>
<td>.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 30 presents the results of the analysis concerning number of misdemeanor arrests other than for substance abuse during the first year following treatment.
Table 32 presents the results of the analysis concerning number of felony arrests other than for substance abuse during the second year following treatment. The Table shows no significant effect for sex or for patient status.

Table 32
Two-way ANOVA Summary Table for Number of Felony Arrests during the Second Year following Treatment

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient status</td>
<td>.01</td>
<td>2</td>
<td>.00</td>
<td>1.17</td>
<td>.311</td>
</tr>
<tr>
<td>Sex</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>1.13</td>
<td>.289</td>
</tr>
<tr>
<td>Interaction</td>
<td>.00</td>
<td>2</td>
<td>.00</td>
<td>.19</td>
<td>.829</td>
</tr>
<tr>
<td>Residual</td>
<td>7.97</td>
<td>2944</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7.98</td>
<td>2949</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In summary, Hypothesis 4 was not supported. In none of the four analyses was patient status found to be significantly related to the dependent variables.

Hypothesis 5 stated that male and female substance abusers who have a valid driver's license and who abstained during the two years following treatment will have significantly fewer accidents while driving an automobile compared to those who had a brief relapse or total relapse for the same time period. Two measures were used in assessing hypothesis 5. Since both of these were categorical data, chi-square was used in the analyses. The two measures were (1) incidence of auto accident in the last six months in the two year period following treatment, and
(2) incidence of arrest for DWI during the same time period. Table 33 presents the crosstabulation of incidence of auto accident and patient status.

Table 33
Crosstabulation of incidence of auto accident and patient status

<table>
<thead>
<tr>
<th>Had Auto Accident?</th>
<th>Patient Status</th>
<th>Abstainers</th>
<th>Brief Relapse</th>
<th>Total Relapse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>No</td>
<td>Abstainers</td>
<td>1421</td>
<td>96.7</td>
<td>871</td>
</tr>
<tr>
<td>Yes</td>
<td>Brief Relapse</td>
<td>48</td>
<td>3.3</td>
<td>34</td>
</tr>
<tr>
<td>Total</td>
<td>Total Relapse</td>
<td>1469</td>
<td>100.0</td>
<td>905</td>
</tr>
</tbody>
</table>

Chi-square test of independence between patient status and incidence of auto accident yielded a value of $X^2 = 1.18$, $p = .5539$, indicating the two variables are independent. In other words, there is no difference in the incidence of auto accidents among the three groups of patients.

Table 34 presents the crosstabulation of incidence of DWI and patient status. Chi-square test of independence between patient status and incidence of auto accident yielded a value of $X^2 = 32.57$, $p < .0001$, indicating the two variables are not independent. In other words, there is a statistically significant difference in the incidence of DWI among the three groups of patients. Inspection of the
The crosstabulation table shows that the proportion of patients who experienced arrest for DWI increased from 0.0% for abstainers to 1.2% for those in brief relapse to a high of 3.5% for those in total relapse.

Table 34

Crosstabulation of incidence of auto accident and patient status

<table>
<thead>
<tr>
<th>Arrested for DWI?</th>
<th>Patient Status</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abstainers</td>
<td>Brief Relapse</td>
<td>Total Relapse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>No</td>
<td>1469</td>
<td>100.0</td>
<td>894</td>
<td>98.8</td>
</tr>
<tr>
<td>Yes</td>
<td>0</td>
<td>0.0</td>
<td>11</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>1469</td>
<td>100.0</td>
<td>905</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In summary, patient status was not related to incidence of auto accidents but it was found to be related to incidence of arrest for DWI. The proportion of subjects arrested for DWI was smallest for abstainers, a little larger for those in brief relapse, and even larger for those in total relapse.

Discussion

During the two years after treatment, there was no difference based on patient status or sex in regard to the number of days spent in a hospital for medical problems. This finding seems to raise the question about treatment
effectiveness. The two Alcohol, Drug Abuse, and Mental Health Administration conferences (1979 & 1981) indicated a need exists to further understand the relationship between substance abuse and physical disorders. Thus, it would appear that treatment should make a difference in the quality of a person's life physically. However, the findings in this study show there is not a significant difference between patient status and hospitalization.

Regarding the number of days spent in a hospital for emotional reasons, a significant difference was found to exist based on patient status and sex. Males had fewer days in the hospital for emotional problems than did females. Abstainers had significantly fewer days in the hospital than did those in relapse. These findings support Mechanic's (1981) view that substance abuse treatment does cause a reduction in medical care. Furthermore, Frenkel (1977) observed this same pattern of relapse and hospitalization. One would conclude that abstinence should be the treatment goal for substance abuse centers based on the benefit of fewer days spent in the hospital due to recidivism.

During both the first and second years after treatment, considering the number of days spent in a hospital for detoxification, there was a significant difference based on patient status but not based on sex. As would be suspected, abstainers had significantly fewer days in the hospital for detoxification than did those in brief relapse or total
relapse. This finding seems to support the study done by Obitz, Brechner, and Shippee (1975). Their study of alcoholics drinking after treatment showed that for over 50% of the time they drank, they got drunk.

During both the first and second year the number of hospital emergency room visits was a significantly lower for those who abstained. Thus, those who complete treatment and continue in recovery, have a greater chance of fewer visits to the hospital for emergency reasons. This finding supports the Alcohol, Drug Abuse, and Mental Health Administration (1981) view that drug abuse leads to greater medical care utilization. Hallan's findings related to drug abuse and this study's finding includes both alcohol and drug abuse. Together, these two studies show that substance abuse is related to medical utilization.

Those males in recovery who had brief relapses had a significantly greater number of injuries during the first year than males who abstained or who totally relapsed. During the second year, males, without regard to status, had significantly more injuries than females.

The findings only partially support Frenkel's (1977) observation of the cycle of relapse and hospitalization found in alcoholic patients in that only brief relapsers in this study had a greater number of injuries.

Regarding the number of illnesses, there was not a significant difference based on patient status for either
the first or second year. It would appear that illnesses requiring medical attention are not a significant factor related to substance abuse follow-up.

During both years of follow-up, regarding the number of misdemeanor or felony arrests, there was no difference based on patient status or sex. Thus, it would appear that relapse is not related to arrests.

Regarding the incidence of auto accidents in the last six months in the two year period following treatment, there was no significant difference between the three groups of patients. This finding does contradict Lane's finding (1981) of a strong relationship between alcohol abuse and automobile accidents. With 25,000 deaths and 500,000 disabling injuries per year on the average in the United States (Lane, 1981), one would conclude that a relationship should be evident. However, that relationship was not evident in this study.

Regarding the incidence of arrests for DWI during the last six months in the two year period following treatment, there was a significant difference among the three groups of patients. Abstainers had the lowest number of arrests for DWI while total relapsers had the highest number. Generally speaking, one would expect such a finding. Abstainers in recovery, by definition, would not be using any chemical which could impair their driving. Thus, this finding is not surprising and supports Lane's (1981) observations.
The lack of a significant difference based on patient status or sex for the number of days spent in a hospital for medical problems in general was not anticipated. However, there was a significant difference for days spent in a hospital based on emotional reasons. To understand more specifically why emotional problems but not physical illnesses would lead to a hospital stay, more study will be needed. By isolating specific emotional issues and their relationship to relapse and hospitalization, greater understanding of the relationship between these variables may be possible.

In summary, substance abusers in recovery who abstained had fewer days in the hospital for emotional problems, detoxification, and visits to hospital emergency rooms than did non-abstainers. They also had fewer arrests for drunk driving. Therefore, it seems reasonable to conclude that abstinence should be the goal for substance abuse treatment.

Counselors should be aware that emotional problems of relapsers require significantly more days of hospitalization than do physical problems. It would appear that employers also could assist the chemical abuser by allowing for time off to get regular follow-up sessions with the counselor. By being granted such freedom, the person who is in recovery will have some encouragement to continue in the program. Lack of employer encouragement could lead the recovering
addict not to continue in recovery due to the added stress and pressure of a job.

The cost for medical attention directly affects the family of the recovering patient. Thus, injuries and illnesses requiring immediate hospital care present an increasing risk for the brief relapser and even greater for the total relapser. Work performance also is affected. Companies which have Employee Assistance Programs should consider substance abuse follow-up as a part of their benefits. Insurance companies could reduce their hospital costs by encouraging the patient to get the needed counseling for follow-up and thus seek to reduce the risks of relapse which could lead to hospitalization. However, further study which seeks to understand the relationship between emergency room care and relapse would add significantly to this field as it relates to employment productivity and insurance costs.

In summary, recidivism following substance abuse treatment is a major problem. This study found a significant relationship between relapse/abstinence and several indicators of medical care utilization. Wherever a significant relationship was found, relapsers were seen to have greater medical care utilization than abstainers. More in-depth studies which seek to isolate other factors related to abstinence could help recovering addicts in beneficial ways such as improving family relations, enhancing
employment opportunities, and reducing medical and insurance costs.
AGENCIES REPORTING TO CATOR

Abbott-Northwestern Hospital
Chemical Dependency Program
Minneapolis, MN

Golden Valley Health Center
Golden Valley, MN

Mercy Medical Center
Coon Rapids, MN

St. Paul-Ramsey Medical Center
Dual Disorder Services
St. Paul, MN

Mounds Park Hospital
Chemical Dependency Program
St. Paul, MN

St. John's Lutheran Hospital
Chemical Dependency Program
St. Paul, MN

Fairview-Southdale Hospital
Edina, MN

Buffalo Memorial Hospital
Buffalo, MN

St. Mary's Hospital
Chemical Dependency Program
Minneapolis, MN

Waseca Area Memorial Hospital
Chemical Dependency Program
Waseca, MN

Fountain Lake Treatment Center
Albert Lea, MN

Abbott NW Lynville
Jordan Family Treatment Center
Jordan, MN
Faribault family Focus
Waseca Memorial
Faribault, MN

Counseling Associates of Bemidji
Bemidji, MN

District Memorial Hospital
St. John's Hospital
Chemical Dependency Program
Forest Lake, MN

Chemical Depend. Unit of South Texas
Corpus Christi, TX

Baton Rouge Chemical Depend. Units
Baton Rouge, LA

Charter Ridge Hospital
Chemical Dependency Program
Lexington, KY

Baton Rouge CDU of Acadiania
Lafayette, LA

Hopedale Medical Center
Hopedale, IL

Glenbeigh East Hospital of Rock Creek
Rock Creek, OH

Glenbeigh West Hospital Cleveland
Cleveland, OH

Martha Washington Hospital
Treatment Center
Chicago, IL

Glenbeigh of Tampa
Tampa, FL

No. Colorado Family Recovery Center
Greeley, CO

Shick Shadel Hospital
Seattle, WA

St. Croix Valley Memorial Hospital
Chemical Dependency Program
St. Croix Falls, WI
Waukesha Memorial Hospital
Waukesha, WI

Elmbrook Memorial Hospital
Chemical Dependency Program
Brookfield, WI

Theda Clark Hospital
Neenah, WI

Midelfort Clinic, Ltd.
Eau Claire, WI

Lutheran Memorial Hospital
Family Recovery Center
Grand Island, NE

Trinity Regional Hospital
Fort Dodge, IA

Forest City Treatment Center
Forest City, IA

Powell III C.D.C.
Iowa Methodist Medical Center
Des Moines, IA

Riverview Rehabilitation
Burlington Medical Center
Burlington, IA

Women's Recovery Center
Des Moines General Hospital
Des Moines, IA

Harold Hughes Center, Inc.
Mt. Ayr, IA

Hughes Treatment Center, Inc.
John McDonald Hospital
Monticello, IA

Frances Mahon Deaconess Hospital
Chemical Dependency Center
Glasgow, MT
APPENDIX B
PLEASE NOTE:

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These consist of pages:

46-47, 6 Month Follow-Up

UMI
6 MONTH FOLLOW-UP

DATE OF FOLLOW-UP: ______ / ______ / ______

1. SS#: ________

2. BIRTH DATE: ________ / ________ / ________

SEX: (1) Male (2) Female

FACILITY:

CHEMICAL USAGE
PLACE A CHECK IN THE BOX FOR EACH SUBSTANCE TO INDICATE AVERAGE USAGE IN THE LAST SIX MONTHS:

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>1-3 TIMES PER MONTH</th>
<th>3-5 TIMES WEEKLY</th>
<th>DAILY</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Alcohol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Opiates (Morphine, Heroin, Codeine, Dilaudid)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Cocaine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Marijuana/Hashish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Opioids (Morphine, Heroin, Codeine, Dilaudid)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Synthetic amphetamines (e.g., meclozine, dextroamphetamine)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Other substances (e.g., THC)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. IN THE LAST SIX MONTHS, WHAT WAS YOUR LONGEST PERIOD OF ABSTINENCE FROM ALL CHEMICALS? (Answer 0 if less than one week and 1 if a week or more.)

( ) No ( ) Yes

15. HOW LONG SINCE LAST USE OF CHEMICALS?

( ) Completed

16. HAVE YOU SEEN IN EXTENDED CARE OR A HALFWAY HOUSE IN THE PAST SIX MONTHS?

(0) No (1) Yes

17. HOW OFTEN DO YOU ATTEND AA MEETINGS?

(1) I do not attend (2) Once or twice a week (3) Several times a month (4) Once a month or less

18. HAVE YOU ATTENDED ANY OTHER GROUPS? (SUCH AS "AFTERTAEX", FAMILY GROUP, SUPPORT GROUP, ASSOCIATION, TRAINING, ETC.)

(0) No (1) Yes (2) Completed

19. HAVE YOU BEEN IN TREATMENT IN THE PAST SIX MONTHS?

(0) No (1) Yes, Completed (2) Yes, but did not complete (3) Yes, still in treatment

TYPE: INPATIENT OUTPATIENT RESIDENT OTHER

EMPLOYMENT

20. FOR HOW MANY OF THE PAST SIX MONTHS DID YOU RECEIVE WELFARE?

( ) ( )

21. ARE YOU RECEIVING WELFARE NOW?

(0) No ( ) Yes

22. FOR HOW MANY OF THE PAST SIX MONTHS DID YOU GET DISABILITY?

( ) ( )

23. ARE YOU RECEIVING DISABILITY COMPENSATION NOW?

(0) No ( ) Yes

24. ARE YOU CURRENTLY WORKING?

(1) No (2) Yes 

(3) Retired (4) Housewife (5) Student

25. DURING THE PAST SIX MONTHS HOW MANY MONTHS HAVE YOU WORKED FULL-TIME?

( ) ( )

26. DURING THE PAST SIX MONTHS HOW MANY MONTHS HAVE YOU WORKED PART-TIME?

( ) ( )

27. DURING THE PAST SIX MONTHS HOW MANY MONTHS HAVE YOU NOT WORKED?

( ) ( )

28. JOB OR TYPE OF EMPLOYMENT: (specify)

29. DURING THE PAST SIX MONTHS WERE THERE ANY CHEMICALLY RELATED PROBLEMS WITH:

(1) Work performance (2) Missed work (3) Loss of a job

(0) No (1) Yes (2) Completed

( ) ( ) ( )

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05/08/81
32. During the past six months, how many times have you been admitted to a detox center? 

33. During the past six months, how many times have you been admitted to a hospital for detoxification? 

34. During the past six months, how many times were you in a hospital for a medical problem? 

35. During the past six months, how many times were you hospitalized for a detoxification? 

36. During the past six months, how many times were you hospitalized for a medical problem? 

37. During the past six months, how many times were you treated in an emergency room? 

38. During the past six months, how many office visits have you made to a doctor for: 

- An injury? 
- An illness? 

40. During the past six months, how many times were you treated by any other health professionals (e.g., chiropractor)? 

42. During the past six months, how many times were you treated by a professional for an emotional, nervous, or psychiatric problem? 

44. Are you now taking prescribed medications for an emotional or psychiatric problem? 

- Yes
- No 

45. During the past six months, how many visits have you made to an attorney or legal professional? 

46. Are you now taking prescribed medications for any medical problem? 

- Yes
- No 

47. During the past six months, how many times have you been arrested for charges not related to chemical use: 

- Misdemeanor arrest: 
- Felony arrest: 

48. During the past six months, how many times were you in jail for charges related to chemical use: 

- Misdemeanor arrest: 
- Felony arrest: 

50. Have you been arrested for driving while under the influence in the past six months? 

- Yes
- No 

52. Have you had an automobile accident in the past six months? 

- Yes
- No 

54. Does anyone else in your household abuse alcohol? 

- Yes
- No 

55. Does anyone else in your household abuse other substances? 

- Yes
- No 

56. Are you now taking prescribed medications for any substance abuse? 

- Yes
- No 

57. Are you now taking prescribed medications for any medical problem? 

- Yes
- No 

58. Are you now taking prescribed medications for any emotional, nervous, or psychiatric problem? 

- Yes
- No 

59. Are you now taking prescribed medications for any medical problem? 

- Yes
- No 

60. Do you now have a valid driver's license? 

- Yes
- No 

61. Have you been arrested for driving while under the influence in the past six months? 

- Yes
- No 

62. Have you had an automobile accident in the past six months? 

- Yes
- No 

63. Type of follow-up: 

- Telephone
- Personal
- Mail

64. Information source: 

- Patient contacted
- Significant other contacted
- Significant other refused information
- Significant other refused information

65. Permits for further follow-up: 

- Yes
- No 

66. Current marital status: 

- Married
- Divorced
- Separate
- Widowed
- Living with a mate
- Other 

67. Present family and/or conjugal relationship: 

- Single
- Married
- Divorced
- Separated
- Unmarried
- Living with a mate
- Other 

68. Type of follow-up: 

- Telephone
- Personal
- Mail

69. Information source: 

- Patient contacted
- Significant other contacted
- Significant other refused information
- Significant other refused information

70. Permits for further follow-up: 

- Yes
- No 

71. Current marital status: 

- Married
- Divorced
- Separated
- Widowed
- Living with a mate
- Other 

72. Present family and/or conjugal relationship: 

- Single
- Married
- Divorced
- Separated
- Unmarried
- Living with a mate
- Other 

73. Type of follow-up: 

- Telephone
- Personal
- Mail

74. Information source: 

- Patient contacted
- Significant other contacted
- Significant other refused information
- Significant other refused information

75. Permits for further follow-up: 

- Yes
- No 

76. Current marital status: 

- Married
- Divorced
- Separated
- Widowed
- Living with a mate
- Other 

77. Present family and/or conjugal relationship: 

- Single
- Married
- Divorced
- Separated
- Unmarried
- Living with a mate
- Other 

78. Type of follow-up: 

- Telephone
- Personal
- Mail

79. Information source: 

- Patient contacted
- Significant other contacted
- Significant other refused information
- Significant other refused information

80. Permits for further follow-up: 

- Yes
- No 

81. Current marital status: 

- Married
- Divorced
- Separated
- Widowed
- Living with a mate
- Other 

82. Present family and/or conjugal relationship: 

- Single
- Married
- Divorced
- Separated
- Unmarried
- Living with a mate
- Other 

83. Type of follow-up: 

- Telephone
- Personal
- Mail
REFERENCES


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