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LOMA LINDA UNIVERSITY
School of Behavioral Health
in conjunction with the
Faculty of Graduate Studies

Predictors of Addiction Treatment Attrition

by

Suranee Abeyesinhe

A Thesis submitted in partial satisfaction of
the requirements for the degree
Doctor of Philosophy in Clinical Psychology

December 2013

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Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree Doctor of Philosophy.

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CONTENT

Approval Page	iii
Acknowledgements.....	iv
List of Figures.....	viii
List of Tables.....	x
Abstract	ix
Chapter	
1. Introduction.....	1
2. Background.....	3
Scope of the Problem	5
Current National Rates of Treatment Completion	6
Predictors of Treatment Attrition.....	7
Gender	8
Age	9
Ethnicity	10
Substance Abuse History	11
Mental Health	12
Program-Level Factors	13
Early Attrition.....	14
Clinical Implications.....	14
Aims and Hypotheses	15
3. Materials and Methods.....	16
Loma Linda Behavioral Medical Center.....	16
Pool of Participants	16
Procedure	18
Variables to be Examined.....	18
Gender	18
Age	18
Ethnicity.....	19
Substance Abuse History.....	19

Mental Health.....	19
Treatment Attrition.....	20
Planned Analyses.....	20
4. Results	22
Statistical Analyses	22
Patient Population	23
Predictors of Treatment Attrition.....	25
Predictors of Early Attrition.....	27
5. Discussion.....	29
Limitations.....	31
Clinical Implications.....	32
Research Implications and Future Directions.....	32
Conclusion.....	33
References.....	35

FIGURES

Figures	Page
1. Treatment Length of Stay by Type of Drug Use	30

TABLES

Tables	Page
1. DSM Criteria of Substance Abuse	3
2. DSM Criteria of Substance Dependence	4
3. Descriptive Statistics for the LLUBMC Population	24
4. Hierarchical Logistic Regression Results Predicting Treatment Attrition.....	26
5. Hierarchical Cox Regression Survival Analysis	30

ABSTRACT OF THE THESIS

Predictors of Addiction Treatment Attrition

By

Suranee Abeyesinhe

Doctor of Philosophy Graduate Program in Clinical Psychology

Loma Linda University, December 2013

Dr. Jason E. Owen, Chairperson

According to the Substance Abuse and Mental Health Services Administration's (SAMHSA's) National Survey on Drug Use and Health, 23.5 million persons aged 12 or older needed treatment for an illicit drug or alcohol abuse problem in 2009 (9.3 percent of persons aged 12 or older). Unfortunately, addiction treatment completion rates remain relatively low, looming around 50%. In order for treatment programs to be more effective, it is imperative that risk factors for attrition are identified, and that programs strive to combat these risks through personalized engagement and individually tailored treatment programs. This study aims to identify specific risk factors for treatment attrition in the Intensive Outpatient Program (IOP) at the Loma Linda Behavioral Medical Center (LLUBMC). With this understanding, we may be able to target patients at risk for attrition, and tailor treatment programs in order to maximize completion of treatment, influencing higher efficacy and lower relapse rates.

CHAPTER ONE

INTRODUCTION

Over 17 million people in the United States are alcoholics or suffer from alcohol abuse problems (NIH). Alcoholism can lead to a variety of different problems, including social, psychological, cognitive, and medical ailments. In 2009 alone, alcohol abuse treatment made up 42% of the near 2 million substance abuse admissions into treatment programs. Further, relapse rates in this population remain relatively high; research findings vary depending on the definition of relapse. With the various implications alcohol addiction and abuse create on society, it is important for us to study the cycle of addiction, as well as the efficacy of treatment available.

Currently, there are a number of treatment modalities that have been shown to be effective. The Minnesota Model, Cognitive Behavioral Therapy, Motivational Enhancement Therapy, and Twelve-step Facilitation are some of the most commonly used addiction treatments (SAMHSA, 2009). Although these treatments have been shown to have positive results, completion of treatment remains a hurdle all treatment modalities face (Borkman et al., 2007; Bates et al., 2004).

Further, a study reviewing treatment approaches found that ninety percent of privately funded substance abuse treatment programs in the United States offer treatment programs based on cognitive behavioral therapy, but one-third of these do not provide their counselors with any formal training in the intervention. Even fewer employ individualized training methods that experts recommend to ensure counselors' proficiency and adherence to CBT. In addition, a survey of 340 directors

of a national treatment programs documented substantial training gaps for three less widely used evidence-based interventions: motivational interviewing, contingency management, and brief strategic family therapy (Olmstead et al., 2012). This lack of training could be contributing to current pitfalls of addiction treatment efficacy.

There are many factors that may contribute to attrition from substance abuse treatment, including factors related to demographics, history of substance abuse, past and present mental health, family history, treatment program factors, etc. A review of the literature examining client characteristics associated with attrition from inpatient or outpatient substance abuse treatment programs suggests that factors such as younger age, African-American or Hispanic race, unmarried status, poor family support, poor motivation, and fewer years of education contribute to higher rates of attrition (Ball et al., 2006; Joe et al., 1999; Sayre et al., 2002; White et al., 1998; Matthews et al., 2005).

This study aims to identify specific risk factors that contribute to attrition from the intensive outpatient treatment program at the LLUBMC. Novel to this study is a look at predictive factors of early attrition from treatment. If we can identify specific risk factors that contribute treatment attrition, it may be possible to implement more individually tailored treatment plans that are more effective for patients who are at a higher risk of dropping out of treatment.

CHAPTER TWO

BACKGROUND

The National Institute on Drug Abuse has defined addiction as a “chronic relapsing disease characterized by compulsive drug-seeking and abuse and by long-lasting chemical changes in the brain.” Generally, there are genetic, psychosocial, and environmental factors that contribute to the development of this disease. The following tables from the DSM-IV describes the criteria for substance abuse and substance dependence:

Table 1

DSM Criteria of Substance Abuse

A maladaptive pattern of substance use leading to clinically significant impairment or distress as manifested by one (or more) of the following, occurring within a 12-month period:

1. Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home
 2. Recurrent substance use in situations in which it is physically hazardous
 3. Recurrent substance-related legal problems
 4. Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance
-

Table 2

DSM Criteria of Substance Dependence

Substance dependence is defined as a maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring any time in the same 12-month period:

1. Tolerance, as defined by either of the following: (a) A need for markedly increased amounts of the substance to achieve intoxication or the desired effect or (b) Markedly diminished effect with continued use of the same amount of substance.
 2. Withdrawal, as manifested by either of the following: (a) The characteristic withdrawal syndrome for the substance or (b) the same (or closely related) substance is taken to relieve or avoid withdrawal symptoms.
 3. The substance is often taken in larger amounts or over a longer period than intended.
 4. There is a persistent desire or unsuccessful efforts to cut down or control substance use.
 5. A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects.
 6. Important social, occupational, or recreational activities are given up or reduced because of substance use.
 7. The substance use is continued despite knowledge of having a persistent physical or psychological problem that is likely to have been caused or exacerbated by the substance
-

Substance addiction can cause a number of medical, social, and psychological problems. According to the Center for Disease Control, immediate risks associated with excessive substance use include unintentional injuries such as overdose, car accidents, falls, drowning, and firearm injuries; alcohol poisoning; violence, such as domestic disputes and child maltreatment; risky sexual behaviors; miscarriages and

birth related defects. Long term risks associated with excessive alcohol use can lead to the development of chronic diseases, neurological problems, and social problems.

Scope of the Problem

The economic cost of drug abuse in 2002 was estimated at \$180.9 billion. This value represents both the use of resources to address health and crime consequences as well as the loss of potential productivity from disability, death and withdrawal from the workforce. Further, alcohol related arrests have significantly contributed to the doubling of the nation's incarceration rate since 1985. Risk for relapse is high and maybe even higher among sensitive subpopulations such as those presenting to treatment with complex comorbidities (Office of National Drug Control Policy).

According to the United States Substance Abuse and Mental Health Services Administration (SAMHSA) in 2009, almost 2,000,000 substance abuse treatment admissions for people aged 12 and older were reported in the United States. Five major substance groups accounted for 96 percent of these 2 million admissions: alcohol (42%), opiates (21%), marijuana (18%), cocaine (9%), and methamphetamines/amphetamines (6%). The average age at admission was 34 years, with non-Hispanic Whites making up 60 percent of all treatment admissions (followed by Blacks at 21%, Hispanics at 14%, and other racial groups at 5%). There was no significant difference in gender at admission; females made up 51 percent of admissions, males made up 49 percent.

Relapse rates for addictive diseases are usually in the range of 50% to 90%; however, these rates vary by definition of relapse, severity of addiction, which drug of addiction, length of treatment, and elapsed time from treatment discharge to assessment, as well as other factors (National Institute on Drug Abuse). A study by Dawson et al. (2007) found that 25% of alcohol dependent subjects had relapsed in a 3-year follow up from an abstinence based treatment program, as evidenced by a recurrence of any alcohol use disorder symptoms. Another study found that one-third of people who enter treatment trials are in full remission from alcohol dependence during the following year (Miller et al. 2001). These figures apply to those who actually enter and participate in treatment, and ignore the majority of alcohol dependent people who do not utilize a treatment program to gain sobriety. A study by Dawson et al. (2006) stated that about three-quarters of people with alcohol dependence reduce or stop drinking without any kind of professional treatment or interaction in support groups such as AA. This is an important consideration to make, as relapse rates among this population are not likely evaluated.

Current National Rates of Treatment Completion

Unfortunately, addiction treatment completion rates remain poor. In a study of 488 subjects in an intensive outpatient substance abuse program, Fishman (1999) found that 65.2% of patients completed treatment. Similarly, Rabinowitz and Marjefsky (1998) reported that 10-30% of individuals with substance use disorders drop out of treatment.

These findings are promising; however, many other studies have not been so encouraging. For example, McKay et al. (2009) stated that it is not uncommon for 50% or more of patients who begin a 4-week course of intensive outpatient treatment to drop out before completion and for another 50% to drop out before completion of a subsequent 12-week course of continuing care. Sellers et al. (1979) lamented that 70% of clients in behavioral programs (such as substance abuse or diet control) fail to complete the programs. Even less promising is the more recent finding by the Substance Abuse and Mental Health Services Administration (2008), which reported that only 36% of patients admitted to intensive outpatient treatment completed the program.

These findings are especially discouraging because it has been established that the time spent in treatment is one of the strongest factors associated with positive outcomes in the post-treatment period. Thus, patients who have early exit, failing to complete the steps in the proposed treatment, tend to have an increased risk of readmission (Moos et al., 1995). Although treatment retention is not an outcome measurement per se, the capacity to retain patients in active participation is a sensible measurement related to quality and efficacy of the health care (McLellan et al., 2007)

Predictors of Treatment Attrition

There are many factors that contribute to attrition from substance abuse treatment programs. Among these, factors that will be discussed further are gender, age, ethnicity, substance abuse history, mental health, and program-level factors.

Gender

Much research has looked at gender differences in substance abuse treatment. In general, this research yields mixed results.

One argument favoring treatment specialization for women is that current treatment programs are gender biased towards men. The argument is that many programs are based on the 12-steps principle laid out by Alcoholics Anonymous. This program, although a widely used method for recovery, was developed by two professional Caucasian alcoholic men in Akron, Ohio, and was based on their own experiences of addiction (Alcoholics Anonymous), and does not consider gender related nuances of society (Matthews et al., 2005).

A review of the literature on gender differences in substance abuse treatment by Tuchman et al. (2010) found that women who are addicted to substances seek treatment less often than their male counterparts. There are a host of reasons why this may happen. Some common barriers that women may face include pregnancy, fear of losing custody of their children, sexual harassment, lack of affordable childcare, and inadequate health insurance.

Wechsberg et al. (1998) found that women entering substance abuse treatment were younger, had lower education and employment levels, were more concerned about child-related issues, were less likely to be married, had more health and mental health problems, had greater exposure to physical and sexual abuse, and had greater concerns about issues related to children compared with men. Because of the characteristics of women with substance abuse problems and the obstacles to treatment they face, many researchers have suggested that women

would be less likely to seek, begin, or complete treatment, and would therefore have poorer long-term outcomes (Schmidt and Weisner 1995); however more studies are needed to confirm this hypothesis.

Once in treatment, Matthews and Lorah (2005) found no significant difference in treatment attrition based on gender, as did Greenfield et al. (2007), while McCaul (2001) did find that males remained in treatment longer than females. Further, Green et al. (2004) reports that men and women are equally likely to complete treatment, but women who complete are nine times more likely to be abstinent in the future than women who do not; men who complete treatment were only three times more likely to be abstinent than men who do not.

In regards to treatment outcomes, such as future abstinence, a study investigating longer-term outcomes of addictions treatment reported that at seven years, 76% of women reported current abstinence versus 54% of males. However, this study stressed that longer treatment stay was more predictive of future abstinence than was gender (Satre et al., 2007).

Age

A patient's age has been found to be a factor in addictions treatment attrition. Naturally, those who become addicted earlier in life have more chances to "kick the habit"; however, does one's age play a part in his or her success in treatment programs?

Generally, research has found that older age is related to lower rates of treatment attrition. Fishman et al. (1999) found that in an intensive outpatient

treatment program, patients aged 50 and older were more likely to complete treatment. Similarly, Elbreder (2010) found that older age was predictive of treatment retention. In residential treatment settings, McKellar (2006) found that younger age was a risk factor for treatment dropout.

On the other hand, a study examining data from 31 intensive outpatient programs at VA facilities conducted by Curran (2009) found that among 8,064 patients, older age was predictive of higher rates of treatment attrition (mean age of 46.2). This may be due to the average age being higher in the veteran treatment population (other studies report a mean age of early 30's), not taking into account the more common, younger substance abuse treatment population.

Ethnicity

There are many studies that have investigated the discrepancies in addictions treatment dependent upon one's ethnicity. As with many other social concerns, ethnicity plays a major part in the efficacy of substance abuse treatment.

In a study of 138 intensive outpatient treatment patients, White (1998) found that treatment attrition was more likely to occur among Hispanics than among Caucasians and Blacks. Treatment non-completers were over two and a half times more likely to be Hispanic (although they only made up 20% of the treatment population). Being African American was associated with higher dropout rates in a residential treatment study (Milligan, Nich, & Carroll, 2004), while Caucasians were found to remain in treatment longer (McCaul, 2001). Milligan et al. (2004) found few differences between African Americans and Whites in terms of demographic

characteristics, reasons for seeking treatment, or expectations of treatment; however, this study also found that African-American participants completed significantly fewer days of treatment than white participants. Conversely, Matthews and Lorah (2005) studied gender and ethnicity differences in a sample of 514 patients enrolled in intensive outpatient treatment. They found that although Caucasian clients spent more time in treatment than African American clients, there was no significant difference in treatment attrition rates.

Substance Abuse History

Much research has looked at substance abuse history as an indicator for treatment compliance. It has been argued that many patients relapse and return to treatment on multiple occasions; however, is it possible to predict treatment success based on substance of abuse or history of treatment episodes?

Fishman et. al (1999) found that of polydrug users (poly/cocaine, poly/opiates, poly/other), alcohol only users had a 75% completion rate, making them significantly more likely to complete treatment than other substance abuse treatment patients. White (1998) also found that while recent alcohol use was not related to treatment attrition, recent cocaine and/or cannabis use was. This is an important factor to consider, as polydrug use occurs in a number of abusers.

In terms of treatment readiness factors, clients entering treatment for the first time report less recognition of substance use problems, desire for treatment, and motivation to change than the treatment-experienced clients (Claus et al., 2002).

In a study of over 2,400 patients in substance abuse treatment programs,

Cacciola et al. (2009) found that Clients with the most prior treatment episodes had greater baseline substance use and had the greatest levels of treatment acceptance. Patients with no prior treatment reported the least acceptance. Treatment completion rates did not vary as a function of treatment experience; however, at admission, discharge and follow-up, clients with ≥ 2 treatments generally had greater problems than clients with fewer treatments, and may need to be treated with more intensive care (e.g., residential) and longer lengths of stay in treatment programs.

Mental Health

Co-occurring mental health diagnoses are common amongst the addiction treatment population. In regard to treatment of addictions, it is important to assess this factor's influence on completion of substance abuse treatment. Generally, it has been reported that presence of depression is predictive of lower rates of treatment attrition (Agosti et al., 1996; Sayre et al., 2002; Broome et al., 1999; Curran, 2009); however, there are reported differences dependent upon type of mental health diagnosis and gender. Curran (2002) reported that current severe depressive symptomatology, but not lifetime diagnosis of depression, was associated with higher attrition from substance abuse treatment programs. Siqueland et al. (2001) found that higher psychiatric severity was associated with staying in outpatient treatment longer for men, but predictive of early attrition for women. Also among female population, severe psychopathology resulted in higher likelihood of treatment attrition (Haller, 2002).

With such variable research findings and discrepancies based upon mental health type and gender, it will be important to identify what risk factors for treatment attrition can be found in patients with a co-occurring disorder.

Program-Level Factors

Seeing as how completion of addictions treatment remains a challenging undertaking, it may be beneficial to examine program related factors that may be contributing to this trend. Ball et al. (2006) conducted a retrospective assessment of reasons for early attrition and found lack of client motivation and conflicts with program staff were most frequently endorsed. These reasons were consistent with findings that impaired coping and social functioning, and low motivation or readiness to change are associated with higher rates of premature dropout from substance abuse treatment (Broome et al. 2002; Joe et al. 1998). Taken together, these findings suggest motivational interviewing and coping skills training might be meaningful components of an intervention for this high-risk group of clients. Claus and Kindleberger (2002) also suggested that program factors and staff behaviors might contribute to early dropout, while Palmer (2009) found that the most commonly reported reasons for dropout were individual or personal factors rather than program-related factors. Further examination of additional factors that would prove helpful in future research on treatment retention would include information on program content, extent of 12-step orientation, use of evidence-based practices such as CBT and motivational interviewing.

Early Attrition

Here we have discussed many variables that may lend themselves to poor treatment completion rates. Of interest as well, is an examination of factors that contribute to early attrition from treatment programs, or dropout within the first few days or first week of substance abuse treatment. Curran et al. (2002) found that presence of severe depressive symptomatology at treatment entry was predictive of early attrition from an intensive outpatient treatment program. A study on cocaine users found that early dropouts were more likely to be African-American or Hispanic-American, younger, and had an earlier onset of substance abuse than those who remained in treatment longer (Agosti et al., 1996).

This study will attempt to further identify specific risk factors that may be related to early attrition from intensive outpatient treatment. By identifying these factors, patients at risk for early attrition can be targeted for early intervention in order to keep them in treatment longer.

Clinical Implications

This study will serve as an examination of treatment attrition specific to the LLUBMC's Chemical Dependency IOP treatment program. By identifying factors that may be predictive of attrition, program staff can identify patients at risk. Early interventions geared towards these patients may help to retain them in treatment longer, improving their odds of positive outcomes. This study will also encourage the development of more individually tailored treatment programs for future patients.

Aims and Hypotheses

The first aim of this study will be to assess the patient population at the BMC. Age, gender, and ethnicity will be described.

Second, it will be determined whether these factors predict treatment attrition. Based on review of the literature, the hypothesis is that younger, male, minority patients will have higher rates of treatment attrition.

Next, while controlling for demographic factors, presence of co-occurring mental health diagnoses will be evaluated in relation to treatment attrition. The hypothesis for this aim is that patients exhibiting depressive symptomatology will remain in treatment longer. Due to the fact that substance use treatment also targets symptoms of depression and anxiety, a patient who experiences reduction in these symptoms may elect to continue treatment longer. However, the second hypothesis is that patients with more severe psychiatric disorders such as bipolar disorder, disorders of the schizophrenia spectrum, or those with borderline personality disorder will have higher rates of treatment attrition due to their severity of psychiatric symptoms. For these patients, it may be primarily important to stabilize their psychiatric disorder before attempting to treat their substance use issues.

Substance use type will also be investigated in its predictability of treatment attrition. It is hypothesized that those with alcohol primary diagnoses (vs. other illicit drug diagnoses) will have lower rates of attrition.

Finally, an analysis of factors that predict early attrition will be conducted. The hypothesis is that presence of a psychiatric disorder, younger, and illicit drug users will be more likely to drop out of treatment early on.

CHAPTER THREE

MATERIALS AND METHODS

Loma Linda University Behavioral Medical Center (LLUBMC)

The addiction service provided at the LLUBMC is the Chemical Dependency Intensive Outpatient Program (IOP). This program caters to adults (ages 18+), providing care consistent with the guidelines of the American Society of Addiction Medicine. The IOP utilizes a twelve-step approach, endorsing a self-help approach to recovery. Currently, there are few quality assurance measures in place at the LLUBMC aimed at addressing treatment efficacy. This study will provide administrators and staff members information on how to target patients that may be at risk for treatment attrition, thereby potentially increasing the IOP efficacy. With research suggesting that longer time in treatment directly yields better outcomes such as reduced relapse rates and longer periods of abstinence, this study can directly benefit the patients and staff at the LLUBMC.

Pool of Participants

The Development department at Loma Linda University Medical Center compiles an Environmental Scan article each year, tracking information regarding the admissions and discharges at the LLUBMC. According to this report, Caucasians make up about 75% of the LLUBMC patients, although in San Bernardino County, they only make up 56.7% of the population. Conversely, Hispanics only make up about 20% of LLUBMC patients, while representing 50% of the San Bernardino

County population. This discrepancy suggests that they are not receiving the care they need, or that they are utilizing other resources.

The top referral sources to the Chemical Dependency program at the LLUBMC come from self-referrals, family/friend referrals, military referrals, managed care referrals, and from medical center emergency departments. Patients who attend the IOP are required to be sober. Some patients have undergone a medical detoxification program before admission to the IOP, while others may have detoxified at home. The LLUBMC does have an inpatient medical detoxification program, which some patients take part in before starting the IOP. Patients are all given a drug screen at the beginning of treatment in order to ascertain they have no substances in their system at that time.

The patients in the Chemical Dependency program have substance dependence diagnoses such as alcohol dependence, opiate dependence, amphetamine dependence, cannabis dependence, cocaine dependence, or sedative/hypnotic/anxiolytic dependence. Regardless of the diagnoses, all patients admitted to the IOP go through the same course of intensive outpatient treatment.

In 2009, the patients from the following cities made up most of the patient population in the Chemical Dependency program at the LLUBMC: Redlands, Yucaipa, Twenty-nine Palms, Fort Irwin, Beaumont, Hesperia, San Bernardino, and Victorville.

Participants included in this study will be all adult patients enrolled in the Chemical Dependency IOP at the LLUBMC between the dates of January 1st, 2011 through December 31st, 2011.

Procedure

Data will be collected from retrospective chart review, and compiled into a de-identified database. The office of Decision Support at the LLUBMC will generate this de-identified database including the following variables: age, gender, ethnicity, substance use diagnosis, date of admission, date of discharge, and discharge status. This information is collected as part of a multidisciplinary assessment done at intake for each patient, and electronically entered into a Powerchart database. Decision Support will utilize these records in order to create the de-identified dataset.

Mark Testerman, CIP, a senior Institutional Review Board Analyst determined that the analysis of the anonymous data provided does not involve the use of human subjects as defined in the federal regulations 45 CFR 46.102(f), that is, “a living individual about whom an investigator conducting research obtains data through intervention or interaction with the individual, or *identifiable private information.*” Hence, this study does not require IRB review or approval.

Variables to be examined

Gender

Each patient’s gender will be recorded as a dichotomous variable.

Age

The age of each patient will be recorded as a continuous variable. This variable will be created from the original dataset variable of patient’s date of birth

subtracted from today's date (09/25/2012). This will produce a continuous variable, representing how old each patient is.

Ethnicity

Ethnicity of each patient will be recorded as a categorical variable, including: Caucasian (1), Hispanic(2), African-American (3), Asian(4), or Other(5).

Substance Abuse History

Information regarding each patient's type of substance abuse will be evaluated in relation to treatment attrition in this study. It will be of interest to determine if addicts using a specific drug remain in treatment for a longer or shorter period of time. This variable will be coded as a categorical value, representing either alcohol (1), opioid (2), cannabis(3), amphetamine(4), cocaine(5), or sedative/hypnotic/anxiolytic(6) drug of primary abuse.

Mental Health

The dataset will contain a variable denoting whether a patient received a comorbid mental health diagnosis. A categorical variable will be created depending on the level of mental health co-morbidity. No other mental health diagnosis will be coded as a "0", a mood disorder (depression or anxiety) will be coded as a "1", a psychotic disorder (Schizophrenia spectrum, bipolar disorder) will be coded as a "2", and any other diagnoses coded a "3". Other diagnoses will be evaluated case by case.

Treatment Attrition

Dates of admission and discharge will be recorded for each patient. A new variable will then be created, logging the number of days the patient attended treatment at the LLUBMC. Two variables will be created for this factor. One will be a continuous variable accounting the number of days in treatment (labeled “days_stay”). The second will be a dichotomous variable indicating whether the patient dropped out of treatment or completed treatment (labeled “treatment_attrition”), gathered from the discharge status variable denoting whether the patient completed treatment or left treatment against medical advice.

Planned Analyses

A descriptive analysis will be run first, in order to assess the patient characteristics in the LLUBMC population.

The primary outcome measures are attrition (defined as dropping out of treatment before 21 days) and length of treatment time (time from entry into the treatment program until discharge). Risk factors of primary interest are demographic factors (age, gender, race), presence of a comorbid diagnosis, and type of drug use. The chi-square test for independence will be used to analyze unadjusted hazard rates and to calculate relative risk (RR) and 95% confidence interval (CI). A p value of 0.05 will be considered significant. Cox regression survival analysis will be used to adjust for potential influence of confounding factors on survival time and included age, gender, and race. Results will be reported as adjusted hazard ratio (HR) with 95% CI. The computer statistical software package SPSS (version 16) will

be used for all analyses.

For the analyses, dummy codes will be created for race and drug type in order to run the hierarchical logistic regression and the survival analysis. In regards to race, the dummy variable will classify race into a dichotomous variable: White vs. all other racial groups, as all other racial groups would be considered minority status. In regard to drug type, the top two types of drugs used (alcohol and opioids) will be created into two dummy codes: Alcohol vs. all other drugs, and Opioids vs. all other drugs. Further, in order to distinguish presence of a comorbid mental health diagnosis from no other co-occurring diagnosis, dummy variables will be created as such: No dual diagnosis v. dual diagnosis.

In order to assess risk factors for attrition, a hierarchical logistic regression analysis will be conducted. The dependent variable will be the treatment attrition variable. The independent variables will be run in three steps: step 1 will include demographic factors (age, gender, and ethnicity); step 2 will include mental health co-morbidity; step 3 will include substance use type.

Finally, a Cox Regression survival analysis will be conducted to determine what factors predict treatment attrition along the continuous variable of days completed. The time variable will be the number of days the patient was in treatment (days_stay); the status variable/event will be whether the person dropped out of treatment, coded a "1" if they completed treatment, and a "0" if they dropped out. Covariates will include substance use type, mental health co-morbidity, and the demographic variables (age, gender, ethnicity).

CHAPTER FOUR

RESULTS

Statistical Analyses

The primary outcome measures were attrition (defined as dropping out of treatment before 21 days) and length of treatment time (time from entry into the treatment program until discharge). Risk factors of primary interest were demographic factors (age, gender, race) and type of drug use. The chi-square test for independence was used to analyze unadjusted hazard rates and to calculate relative risk (RR) and 95% confidence interval (CI). A *p* value of 0.05 was considered significant. Cox regression survival analysis was used to adjust for potential influence of confounding factors on survival time and included age, gender, and race. Results are reported as adjusted hazard ratio (HR) with 95% CI. The computer statistical software package SPSS (version 16) was used for all analyses.

For the analyses, dummy codes were created for race and drug type in order to run the hierarchical logistic regression and the survival analysis. In regards to race, the dummy variable created classified race into a dichotomous variable: White vs. all other racial groups, as all other racial groups would be considered minority status. In regard to drug type, the top two types of drugs used (alcohol and opioids) were created into two dummy codes: Alcohol vs. all other drugs, and Opioids vs. all other drugs. When trying to create a meaningful dual diagnosis variable, it was found that the original dataset only held data describing whether a patient had a dual diagnosis or no (yes vs. no), but held no meaningful information about what type of diagnosis each patient received. As such, this data was only analyzed as a

descriptive statistic regarding patient population, but not included in analyses which identified specific risk factors for dropout. Results regarding implications of a dual diagnosis in this study must therefore be reviewed with caution.

Patient Population

Of 758 patients enrolled in the Chemical Dependency Partial Hospitalization Program (PHP) at the LLUBMC during the years of 2009-2011, 708 were considered in the final analysis. 50 patients were excluded because of missing information.

The clinical characteristics of patients enrolled in the Chemical Dependency PHP are shown in Table 3. Of the total population, 263 of the 708 patients dropped out of the program (37%). Information on mean age and length of stay was recorded. Also recorded were gender, race, and type of drug abuse upon admission. Males made up the majority of the treatment population, constituting 63% of the patient pool. The ethnic majority of this population was Caucasian (77.5%), and the average age at admission was 36.08. A majority of patients also presented with a comorbid disorder (72.3%). Descriptive information regarding gender, race, drug abuse type, dual diagnosis, and age were recorded by treatment status: attriters and completers. According to a preliminary Pearson's Chi squared analysis, the only variable that was significantly different between these two groups was drug type ($p < .001$).

Table 3.

Descriptive Statistics for the LLUBMC patient population

Total N = 708	N (%)	Attriters = 263 N (%)	Completers = 445 N (%)
Gender			
Male	445 (62.9)	169 (64.3)	276 (62)
Female	263 (37.1)	94 (35.7)	169 (38)
Race			
White	548 (77.5)	198 (75.3)	350 (78.7)
Hispanic	111 (15.7)	46 (17.5)	65 (14.6)
Asian	5 (.7)	3 (1.1)	2 (0.4)
Black	23 (3.2)	7 (2.7)	16 (3.6)
Other	21 (2.9)	9 (3.4)	12 (2.7)
Drug Abuse Type			
Alcohol	396 (56)	113 (43)*	283 (63.6)
Opioid	247 (35.9)	128 (48.7)*	119 (26.7)
Amphetamine	28	10 (3.8)	18 (4.0)
Cannabis	12	5 (1.9)	7 (1.6)
Cocaine	7	3 (1.1)	4 (0.9)
Sedative/Hypnotic/Anxiolytic	18	4 (1.5)	14 (3.2)
Dual Diagnosis			
Yes	512 (72.3)	195 (74.1)	317 (71.2)
No	196 (27.7)	68 (25.9)	128 (28.8)
<hr/>			
	Mean (SD)	Mean (SD)	Mean (SD)
Age	37.1 (13.85)	36.02 (14.84)	37.73 (13.21)

Predictors of Treatment Attrition

A series of univariate logistic regressions were run in order to determine if any variables predicted treatment attrition independently. Age, gender, and race did not demonstrate any significance in predicting treatment attrition. However, drug use type did significantly predict treatment attrition ($\chi^2(2) = 35.326, p < .001$). Of the types of drugs, only opioid use was a significant predictor of attrition ($\chi^2(1) = 6.501, p = .011$).

A hierarchical logistic regression was then conducted in order to address predictors of treatment completion while controlling for demographic factors. In the first step, age, gender, and ethnicity were entered into the model in order to assess their ability to predict attrition. This step was not significant ($\chi^2(3) = 3.497, p = .321$). In the second step, type of drug use was entered. This overall model was significant ($\chi^2(5) = 36.535, p < .001$), as well as this step ($\chi^2(2) = 33.038, p < .001$). Logistic regression results for this step indicated that one predictor (opioid use vs. other drug use) was statistically reliable in distinguishing between attrition ($\chi^2(1) = 6.956, p = .008$). Regression coefficients are presented in Table 4. Wald statistics indicated that opioid use significantly predicted treatment attrition.

Table 4.

Hierarchical Logistic Regression Results Predicting Treatment Attrition

	B	SE	Wald	df	<i>p</i>	OR	95% C.I.	
Step 1							Lower	Upper
Age	.001	.006	.042	1	.837	1.001	.989	1.013
Gender	-.117	.168	.483	1	.487	.890	.640	1.237
White vs. Minority	.160	.190	.708	1	.400	1.173	.809	1.702
Step 2								
Alcohol vs. Other	.224	.289	.604	1	.437	.799	.454	1.407
Drugs								
Opioid vs. Other Drugs	-.774	.293	6.956	1	.008	2.167	1.220	3.851

Predictors of Early Attrition

In order to identify variables that predicted early attrition, a series of univariate ANOVAs were run on the length of time (LOS) a patient remained in treatment. Age, gender, and race once again did not significantly predict the length of time a patient was in treatment. However, type of drug use was again a significant predictor (Model: $F(2,705) = 19.568, p < .001$).

As an exploratory analysis, an ANOVA was run on LOS with each original drug type entered as a variable. To specifically identify which type of drug use was significant, Bonferroni post hoc analyses were conducted. According to these analyses, there were significant differences between the following types of drug use on attrition: opioid vs. alcohol ($p < .001$) and opioid vs. amphetamine ($p = .015$).

A hierarchical Cox Regression Survival analysis was then conducted to test predictive factors on length of stay while controlling for demographic factors. Also, in order to identify if alcohol or opioid use was more predictive of attrition, the dummy variables of alcohol vs. all other drugs, and opioid vs. all other drugs were used in the analysis. The event evaluated in this analysis is whether the patient dropped out or completed treatment. In the first step of this hierarchical analysis, age, gender, and white vs. minority ethnicity were entered. This first step was not significant in predicting length of stay ($\chi^2(3) = 3.230, p = .357$). The drug type variables were entered in the second step, which did significantly predict length of stay ($\chi^2(2) = 38.072, p < .001$). In this step, opioid use vs. all other types of drug use was a predictive factor of length of treatment stay (Wald (1) = 6.920, $p = .009$, Hazard ratio = .543).

Table 5.

Hierarchical Cox Regression Survival Analysis

	B	SE	Wald	df	p	HR	95% C.I.	
Step 1							Lower	Upper
Age	.002	.005	.265	1	.607	1.002	.993	1.012
Gender	-.043	.130	.108	1	.743	.958	.742	1.237
White vs. Minority	.164	.144	1.298	1	.255	1.178	.889	1.562
Step 2								
Alcohol vs. Other Drugs	.227	.235	.929	1	.335	1.254	.791	1.989
Opioid vs. Other Drugs	-.611	.232	6.920	1	.009	.543	.344	.856

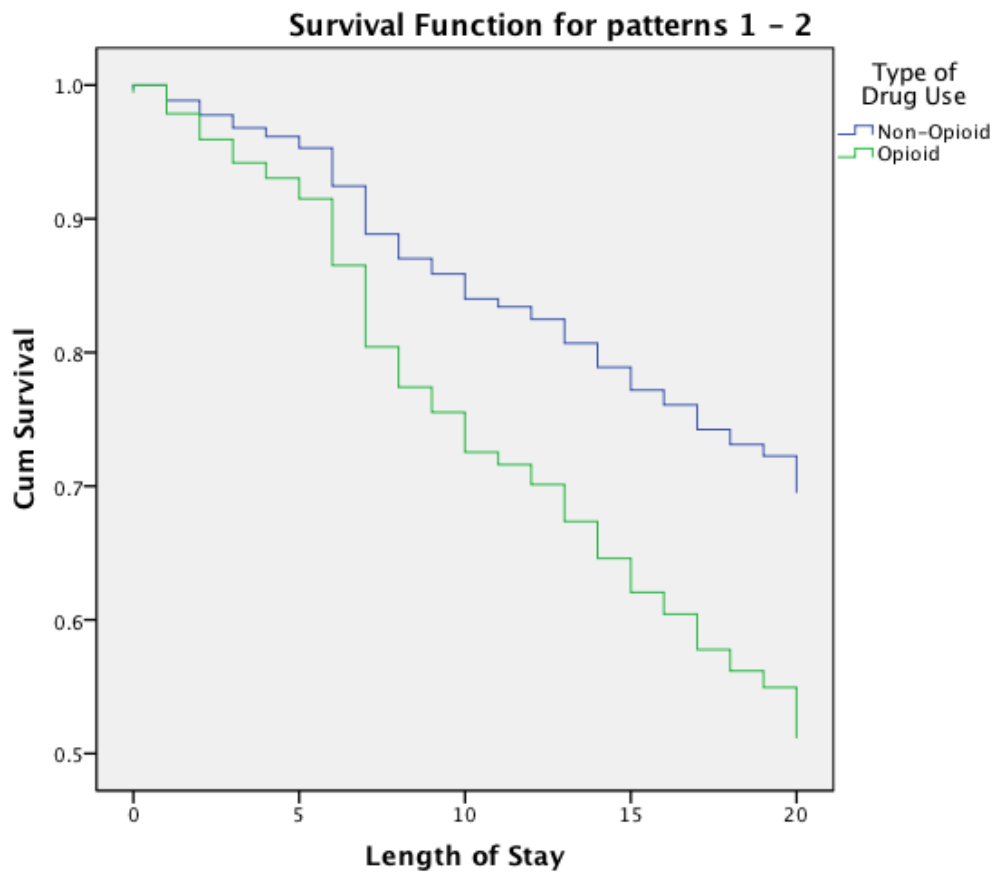


Figure 1. Treatment length of stay by type of drug use.

CHAPTER FIVE

DISCUSSION

This retrospective study examined attrition rates in the Chemical Dependency Intensive Outpatient Program at the Loma Linda University Behavioral Medical Center. There were a total of 708 patients enrolled in this program during the 2009-2011 years. In this 21-day treatment cycle, 263 (37%) patients dropped out before completing treatment. This is consistent with previous studies, which report completion rates of 65.2% (Fishman et al., 1999), and attrition rates of 10-30% (Rabinowitz and Marjefsky, 1998).

The purpose of this investigation was to identify factors that may predict treatment attrition. Previous studies suggest that factors such as younger age, being male, African-American, or Hispanic, unmarried status, poor family support, poor motivation, and fewer years of education contribute to higher rates of attrition (Ball et al., 2006; Joe et al., 1999; Sayre et al., 2002; White et al., 1998; Matthews et al., 2005). In this study, none of these findings were confirmed. Race, age, and gender were evaluated; none of these proved to be significant predictors of attrition. While age (mean = 37.1) and gender (63% male, 37% female) of this population were comparable to previous studies (White et al., 1998), these findings were not replicated. In this study, the White race made up almost 80% of the study population, which may be why we did not find a significant result based on racial variability. Marital status, family support, educational level, and motivation were not evaluated due to lack of information from available clinic data. This suggests an area in which this clinic, specifically, may benefit from more thorough data

collection during intakes, as well as a more comprehensive system of recording this data into an electronic dataset.

This study did find opioid use as a significant predictor of treatment attrition. According to the analyses run, half of the opioid using patients admitted to the IOP program at the BMC dropped out of treatment. This represents a very large segment of this specific population, as opioid users made up 35% of the total treatment population. This could signify a great portion of patients that need additional attention during the treatment process. Further, our survival analysis specified that although drug users show the same profile of attrition status during the first few days of treatment, by the end of the first week of treatment, opioid users show a more significant rate of attrition than other types of drug users. After the first week of treatment, this discrepancy in attrition rate grows over the rest of treatment as well. This data gives the BMC a specific time marker in which attrition rates amongst opioid users increases, allowing them to identify a certain period of time that may be crucial to motivating opioid users to remain in treatment. Seeing as how these results are not typical of treatment dropout from the literature, it may speak directly to the program at the LLUBMC. Upon further investigation, study personnel discussed this issue with LLUBMC staff and found that amongst the treatment population, there seems to be a bias disfavoring patients admitted for opioid use. It is also likely that the treatment program at the LLUBMC may be more tailored towards patients with an alcohol primary diagnosis, as seen by the regular Alcoholics Anonymous meetings available, but no Narcotics Anonymous meetings

offered. Further, there may be a financial consideration at play such as courses of treatment that insurance companies will support.

Overall, although opioid use presents a significant finding, all other variables did not tell us much about why people drop out of treatment. This may suggest that demographic variables are not necessarily predictive of treatment attrition. Instead, there may be more relevant variables that compel further exploration. Some of these variables may include financial and economic considerations, knowledge about consequences of drug and alcohol use, and clinical factors such as distress level at the start of treatment.

Limitations

The present study has a number of limitations. First off, due to the nature of retrospective chart review, the quality of the data was reduced. This study relied on the accuracy of entered records of patients by many different sources. This dataset was compiled by the research director at the BMC from data gathered from the decision support and health information management teams. The original entry of these variables may have been biased by differing needs in each department.

Important data was also not available for this study. There were a number of variables (education level, mental health diagnoses, family history, and previous treatment history) that were initially of interest; however, as this information was not available, these analyses could not be conducted. Due to the limited analyses, it is difficult to establish cause and effect.

This limitation creates an opportunity for the LLUBMC to amend their data entry process. There is a very rich dataset to be created, tracking historical,

demographic, and treatment factors independent to each patient, which may in turn provide answers to why certain patients present with more difficulty during treatment. This amended data collection could serve as a very rich pool of information for many future studies investigating addiction treatment.

Clinical Implications

With these limitations established, it is important to note that this study is still innovative and fully applicable to the clinical setting at hand. This is the first study conducted at the Loma Linda BMC that has evaluated why patients drop out of treatment. Further, considering that the opioid users make up over a third of the addiction treatment population, the findings of this study are directly relevant to this setting. Utilizing this data, the staff and counselors can immediately start to apply this knowledge to the treatment program. Opioid users may be identified early on as having a greater risk of attrition, especially after the first week of treatment. If the treatment staff can target and engage these patients, they may be able to keep them in treatment longer. With studies showing that longer time in treatment directly impacts future abstinence (Moos et al., 1995), this can be a very important clinical factor.

Research Implications and Future Directions

In regards to research implications, this study shows that there may be factors that affect attrition that have not yet been investigated. It will be important to identify what these factors are in order to improve treatment, and its direct

influence on future abstinence. This study may also generate a need to evaluate site-specific treatment programs, in order to identify risks for attrition based on drug use type. Further, it may suggest that individually tailored treatment plans are even more important to treatment, as patients with different types of drug use and associated symptoms may benefit from different types of interventions.

In regard to future directions, a follow up to this study will collect original data as part of a dissertation project. In this follow up, the variables examined in this study, as well variables concerning financial resources, addiction severity, and psychological distress will be gathered. Further, cognitive function will be examined in order to identify what specific cognitive deficits may be present at the beginning of treatment, as well as evaluate whether these deficits improve over the course of treatment. The hope for this follow up study is to target patients that have cognitive deficits, and tailor a treatment program aimed at strengthening these domains, in turn improving treatment retention and efficacy.

Conclusion

In summary, this study aimed to identify predictive variables of attrition in the addiction treatment population at the Loma Linda Behavioral Medical Center. According to previous literature examining client characteristics associated with attrition from inpatient or outpatient substance abuse treatment programs, factors such as younger age, African-American or Hispanic race, unmarried status, poor family support, poor motivation, and fewer years of education contributed to higher rates of attrition (Ball et al., 2006; Joe et al., 1999; Sayre et al., 2002; White et al.,

1998; Matthews et al., 2005). Although these findings were not replicated in this population, a very important finding regarding type of drug use was established. In this specific population, opioid use was a significant predictor of treatment attrition, specifically after about 5-6 days of treatment. This discovery can be immediately utilized in this treatment population, as opioid users make up a third of the patient pool. By identifying opioid users as having a higher risk of treatment attrition, staff and counselors can target these patients in order to deepen their engagement in treatment. By retaining these patients in treatment longer, not only could the LLUBMC's chemical dependency treatment program have higher rates of completion, these patients may show benefits of longer rates of abstinence after finishing treatment. Again, while the findings of this study did not replicate those in the literature, this may be due to population/region specific factors of each facility. This suggests a need for individual treatment programs to evaluate their own facilities and patient population, looking at demographic and background information for each of their patients. By identifying these factors, and analyzing them in conjunction with treatment dropout and completion rates, individual facilities may be able to target patients who are at risk for treatment attrition. By targeting at risk patients, treatment programs may be able to increase treatment retention rates, improve treatment completion, and in turn, aim to reduce national rates of addiction relapse in the future.

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