

**Profiles and Predictors of Length of Treatment,
Transitions to the Next Level of Care, and
Clinical Outcomes of Chemical Dependency Treatment**

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Executive Summary

Study Purpose

The purpose of the current study was to examine three questions related to the step-down chemical dependency treatment program run by NorthSTAR, specifically:

1. How long are patients staying in treatment and how does this vary by (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?
2. Following transfer from one level of care to another, how long are patients staying in treatment? How do the odds of transfer vary by (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?
3. What is the relationship between overall length of treatment, number of successful transitions, and outcomes measured at 60 days following final discharge from treatment? How do outcomes vary after controlling for (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?

Study Clients and Methods

Clients included in the study are adults (18 years of age and older) who had admissions to NorthSTAR services between May 2002 and March 2003. Two sources provide the data for this study. First, the Data Warehouse contains enrollment and claims data for Medicaid and non-Medicaid enrollees during the study period. These data are used to analyze overall length of treatment and length of treatment following step-down. Second, data from admissions, discharges and follow-ups are abstracted from the *Behavioral Health Integrated Provider System (BHIPS)*. BHIPS data are used to evaluate length of treatment and treatment outcomes based on sociodemographic characteristics, comorbid conditions, legal involvement, substance use history, and client strengths and limitations. Data from the two sources – i.e., from the Data Warehouse and from BHIPS – are analyzed separately. Treatment cycles are defined as beginning with the initial admission during the study period and ending with the final discharge, with no more than a 14-day break between levels of care. If there was a break of more than 2 weeks, a new treatment cycle was assumed to begin.

Overall Length of Treatment

Analyses indicated that the overall length of treatment is about 38 days, with approximately half of admissions in treatment for 14 days or less. Length of treatment varies by characteristics such as sociodemographics and health, legal status and substance abuse history, and client strengths and problems. The overall treatment completion rate is low, but it is unclear to what extent potential problems in data coding or entry, or the short time frame of study, contribute to this. Analyses related to reasons for discharge suggest that about 65% stop treatment either because there are no further services available or, in the majority of cases, because they transfer to non-TCADA services. The majority of non-TCADA referrals are to community-based drug and alcohol services, including outpatient day treatment, other residential services, and peer support groups such as Alcoholics Anonymous.

Step-Down Transfers

The analysis of transfer to step-down levels of care indicated that the majority of admissions to any level do not transfer on. Likewise, the completion rate calculated at each level of care was low, but varied, with Level III evincing the highest rate. However, those patients who do transfer to a step-down level of care remain in treatment for a significant amount of time. Analyses using BHIPS data to predict who is likely to make a step-down transfer were problematic due to sample size constraints and the low frequency of transfer. In a preliminary manner, however, the analyses revealed that as compared to blacks, whites were less likely to make a step-down transfer; as compared to all others, individuals with a primary substance abuse of heroin were less likely to make a step-down transfer; and the greater the number of close persons involved in treatment, the more likely the client will make a step-down transfer.

Outcomes of Treatment

Last, selected treatment outcomes were examined. The sample available for these analyses was relatively small, and it was thus inadvisable to run multivariate analyses. These preliminary analyses, however, showed that clients who remained abstinent in the 30 days prior to follow-up had been in treatment longer than those who had not remained abstinent. Further, when compared from admission to follow-up, more clients were employed, fewer clients were involved in the legal system, and the number

of days abstinent was higher at follow-up than at admission. In addition, clients reported fewer problems at follow-up than admission in terms of problems with sickness, drugs, employment, family, peers and social contacts, emotional and psychological issues, and drugs and alcohol. And, clients reported fewer hospital and ER visits at follow-up than admission.

Limitations

Four factors limit the generalizability of these results. First, because BHIPS is relatively new, the length of time for the study is short. This impacts the analysis of ongoing treatment trends, as well as the ability to accurately estimate follow-up data. Second, owing to the short time frame, the number of admissions, discharges, and especially follow-ups available for analysis is limited, and precluded the analysis of data for youth. Third, there are problems with missing data for many of the BHIPS variables. Fourth, this study used a simple pre-post design to examine change from admission to discharge. However, this design can not rule out competing explanations for any observed changes, such as time, or other unmeasured processes.

Recommendations

The NorthSTAR Program provides unique and innovative services to its chemical dependency patients. Analyses of follow-up data point to some positive and exciting long-term effects of the NorthSTAR treatment program. The Program is also a leader in the effort it makes to collect quality treatment-related data. Even so, because of the limitations of this study, the recommendations for the Program must be regarded as preliminary. Four recommendations are suggested:

- The first recommendation is to replicate this study, as well as address the study questions with youth data, once further data that span a longer period of time are available.
- Second, although BHIPS is a rich data source, its complete utility is not maximized because of problems with missing data. Thus, further training, support, and encouragement of providers may be necessary so that the data is as detailed and accurate as possible. In addition, ValueOptions may want to consider broadening the number of fields providers are required to fill in, in order to fully maximize the system.
- Third, it is important to recall that this study paints a broad picture of treatment and treatment outcomes. While it is critical to analyze length of treatment, as well as transitions to step-down levels, and to link this to client outcomes, such an analysis does not answer important process

questions. Thus, an important next step would be to study the aspects of the treatment itself that impact length of stay, transitions, and outcomes.

- Fourth, chemical dependency treatment occurs in the larger system of health-care delivery. Further work should examine linkages between NorthSTAR and STAR services, particularly following discharge from chemical dependency treatment. An additional question or two could be added to the follow-up interview to begin addressing this question.

Introduction

The purpose of this focus study is to provide evaluative feedback on length of program stay and clinical outcomes of NorthSTAR's step-down outpatient treatment program for individuals with chemical dependency. Specifically, the goals are: (a) to examine profiles of overall length of treatment; (b) to examine length of stay post transfer to the next level of care; and (c) to use this information to evaluate clinical outcomes for clients completing chemical dependency treatment through NorthSTAR.

NorthSTAR is an innovative, integrated behavioral health service delivery system that combines federal, state, and local funding to provide mental health and chemical dependency services to clients in the seven-county Dallas service area (Collin, Dallas, Ellis, Hunt, Kaufman, Navarro, and Rockwall counties). This unique service model combines traditional Medicaid behavioral health services with a wide array of chemical dependency services and additional wrap-around mental health services for individuals who need increased levels of specialized services and supports. This report focuses on individuals receiving chemical dependency treatment.

Chemical dependency treatment is generally delivered in two basic settings: inpatient and outpatient. Whereas earlier treatment models emphasized 28-30 day inpatient stays followed by extensive community-based care, more recent models have shortened inpatient stays considerably and substituted intensive outpatient treatment followed by less intensive continuing care (Institute of Medicine, 1990; Gerstein & Harwood, 1990; Landry, 1996; SAMHSA, 1997). The initial goal is to place patients in the least restrictive environment that is still safe and effective and then move them along a continuum of care as they demonstrate the capacity and motivation to cooperate with treatment (American Psychiatric Association, 1995; Landry, 1996).

The step-down levels of treatment provided by NorthSTAR parallel this continuum, and are defined as follows. Level I includes detoxification treatment services. At this level, care includes around-the-clock treatment supervision that emphasizes medical management of detoxification or other medical crises, usually for a short period of time. While often conducted in inpatient settings,

detoxification is also conducted in many outpatient residential facilities, especially for individuals who need that level of care, but do not need management of other medical or psychiatric problems (SAMHSA, 1997).

Level II is residential treatment. This level of care takes place in a live-in facility with 24-hour supervision. Generally, this level is appropriate for individuals with overwhelming substance use problems who lack sufficient motivation or social supports to stay abstinent on their own but do not meet clinical criteria for hospitalization. These facilities range in intensity and duration of care from long-term and self-contained therapeutic communities to less-supervised halfway and quarterway houses from which the residents are transitioning back into the community (American Psychiatric Association, 1995; Landry, 1996).

Level III includes intensive outpatient services. It is often recommended for patients transitioning from residential or hospital settings. The treatment encompasses day care programs and evening or weekend programs that may offer a full range of services. The frequency and length of sessions is usually tapered as patients demonstrate progress, less risk of relapse, and a stronger reliance on drug-free community supports (American Psychiatric Association, 1995).

Level IV outpatient treatment has two tracts: Level IV-nonpharmacotherapy refers to supportive outpatient services that do not include drugs, whereas Level IV-pharmacotherapy is a methadone maintenance or opioid substitution program. The Level IV-nonpharmacotherapy approach is appropriate for patients who have some appropriate support systems in place, adequate living arrangements, transportation to the services, and considerable motivation to attend consistently and benefit from these least intensive approaches (Institute of Medicine, 1990). The Level IV-pharmacotherapy approach specifically targets chronic heroin or opioid addicts who have not benefited from other approaches (Gerstein & Harwood, 1998; Landry, 1996; NIDA, 1996).

Three issues relevant to evaluating the success of chemical dependency treatment in NorthSTAR form the foundation of this focus study. First, it is important to monitor the length of stay in the program and how various demographic, substance use history, and client characteristics can impact the length of

stay. Second, effective program completion requires successful transitions to the next step-down level of care. Thus, of equal importance to analyzing overall treatment length is an analysis of transition, including the number and percentage of clients transitioning appropriately, but also an analysis of how various demographic, substance-use history, and client characteristics can moderate the odds of a successful transition. Finally, the effectiveness of treatment participation is evidenced, in part, by the outcomes of care. That is, following treatment, what is the quality of life for clients, measured by indicators such as employment status, abstinence, and so on?

In addition to an innovative service delivery program, NorthSTAR is also a leader in collecting data that can address these questions. This data capture system, the *Behavioral Health Integrated Provider System* (BHIPS), developed by the Texas Commission on Alcohol and Drug Abuse (TCADA), mandates detailed information collected from providers at admission, discharge, and at follow-up. The information collected includes admission profiles, treatment plans, discharge plans, and detailed information about clients' strengths, weaknesses, living situations, substance use history, and various other indicators relevant to treatment outcomes, such as employment, family and social relationships, and so on. This rich data resource provides an excellent opportunity to address the study questions.

Study Questions

The specific questions addressed by this study are the following:

1. How long are patients staying in treatment and how does this vary by (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?
2. Following transfer from one level of care to another, how long are patients staying in treatment? How do the odds of transfer vary by (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?
3. What is the relationship between overall length of treatment, number of successful transitions, and outcomes measured at 60 days following final discharge from treatment? How do outcomes vary after controlling for (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?

Study Methodology

Data Sources

Two data sources are used for this study. The first is the Data Warehouse. This source contains claims and enrollment files for each NorthSTAR client and visit. These data are used to calculate overall length of treatment, admissions to various treatment levels, and differences in length of treatment. Records were selected to be included in the study if they contained any of the BH services codes that are listed in Appendix A; no 90000-level service codes or inpatient codes were included.

The second data source is the *Behavioral Health Integrated Provider System* (BHIPS), developed by the Texas Commission on Alcohol and Drug Abuse (TCADA). In this rich data system, NorthSTAR providers enter information about client profiles, admissions, discharges, and follow-ups. These data are used to supplement the Data Warehouse analyses, by providing information about client differences during treatment as well as follow-up outcomes of treatment.

It should be noted that data from the two sources – i.e., from the Data Warehouse and from BHIPS – were analyzed separately.

Study Variables

Multiple variables from the Data Warehouse and BHIPS are incorporated into the analyses for this project, and they are described in Appendix A. The primary outcome variables are overall length of treatment, completion of treatment, transition to the next level of care, and follow-up indicators of employment status, living conditions, substance use, legal problems, and problems with family, work, school or social conditions. The primary groups of predictor variables include sociodemographic indicators, history of substance abuse, legal issues, and patient strengths and weaknesses.

Analysis Plan

Multiple statistical techniques are used to address the study questions. Descriptive information is provided in terms of numbers and percentages of categorical indicators, and means and standard deviations for continuous variables. Tests of differences between group means are conducted using t-tests and analyses of variance (ANOVA). Chi-square analyses are used to test group differences in categorical

variables. Multivariate regression analyses are used to predict outcome variables. Logistic regression is used to test the odds of categorical outcomes (e.g., the odds of a step-down transition from Level I to the next level of care); ordinary least squares (OLS) regression is used to predict continuous outcomes (e.g., total length of treatment).

Study Population and Eligibility

Clients included in the study were adults (18 years of age and older) who had admissions to NorthSTAR services between May 2002 and March 2003. Originally, the study was designed to examine a 24-month period. However, data are not available in the *Behavioral Health Integrated Provider System* (BHIPS) prior to May 2002. Thus, to match the time span for both data sources, the time frame for the study was limited to the period May 2002 to March 2003.

This has several consequences for the study. First, the time frame is restricted to only 11 months of data. Obviously this restricts the number of individuals that can be profiled. While the window may be acceptable for examining admissions, analyses of discharges, completes, re-admissions, and follow-ups are more limited. Second, the time frame also drastically limited the number of substance abuse admissions for youth, and because the number of observations was so low (n=54), we were unable to analyze the data for youth.

Sample Characteristics

Because the number of admissions in the Data Warehouse and the BHIPS sources is not identical, and because the available demographic information is more detailed in BHIPS than in the Data Warehouse, sample characteristics are provided separately for the BHIPS sample and the Data Warehouse sample. Both descriptions are detailed below; the BHIPS sample is further detailed in Table 1. On the whole, while not identical, the distribution of sociodemographic characteristics, at least in terms of gender and ethnicity, in the two data sources is fairly similar.

Data Warehouse

During this study period, there were 10,476 admissions, representing 6,028 clients. This pool of clients was about 35.70 years of age (standard deviation = 9.84 years). In terms of gender, 58.58% of the

clients were male and 41.42% were female. With respect to race and ethnicity, about 26.09% were black, 54.32% were white, 10.43% were Hispanic, and 9.16% were “other.”

Behavioral Health Integrated Provider System (BHIPS)

There are 4,584 admissions to NorthSTAR recorded in BHIPS during the study period, representing 3,784 clients. These included 255 admissions to “Drug Free” treatment. These admissions were deleted from the pool because, according to TCADA, this is a treatment designation no longer in use. The overall pool of admissions also included 254 admissions for “Dual Diagnosis” admissions, or those that indicate the simultaneous presence of a mental health disorder (e.g., schizophrenia) and a chemical dependency problem. Because these admissions do not have an accompanying Level I, II, III, or IV admission code, it is difficult to place these individuals on the care continuum in the same way that the non-dual diagnosis clients are placed. Therefore, for the purposes of BHIPS analyses, these clients are deleted from the analyses; these clients are, however, included in the Data Warehouse analyses (see below). Thus, the final BHIPS sample includes 2,674 admissions for adults aged 18 and over (average age = 36.07 years; standard deviation = 9.46), enrolled in NorthSTAR for chemical dependency services from May 2002 to March 2003.

As recorded in BHIPS, the income for this pool of clients is very low, with average income reported at \$3,620 (standard deviation = \$6,652) per year. As seen in Table 1, this pool is about 56% male. In terms of ethnicity, the majority were white (60%), about 29% were black, and about 10% were Hispanic; < 1% were “other,” and these are dropped from further analysis. Less than 20% were married, with about 45% single, and 37% divorced. The majority (88%) were unemployed, and only 19% had education past high school. About 22% were homeless at the time of admission, and the remainder was either in institutional (2%) or a variety of non-institutional (76%) settings.

About a third was involved in the legal system. In terms of arrests at admission, 6% had DWI arrests, 8% had public intoxication arrest, and 10% had other drug or alcohol related arrests. Slightly less than half had prior IV drug use (45%), and about 48% had at least one hospital or ER visit in the last 12 months. About 52% had prior detox or substance abuse admissions.

With respect to the primary substance problem at admission, heroin use accounted for 21% of admissions, alcohol for 34%, crack for 23%, and all others (marijuana, barbiturates, amphetamines, hallucinogens, inhalants, tranquilizers, etc.) accounted for 22% of admissions. About 44% had used this primary substance daily for the 30 days preceding admission (mean = 22.30 days, standard deviation = 10.38 days), and 65% reported using it daily for the prior 60 months. The majority (88%) did not have a comorbid behavioral or physical disability. Finally, slightly more than half (53%) had some sort of health insurance at admission.

Table 1. Demographic Characteristics at Admission.

Demographic Characteristic	Percent of Clients in BHIPS
GENDER	
Male	56.13%
Female	43.87%
ETHNICITY	
Black	29.29%
White	59.94%
Hispanic	10.05%
Other	< 1%
RELATIONSHIP STATUS	
Single	44.79%
Married	18.45%
Divorced	36.76%
EMPLOYMENT STATUS	
Unemployed	87.63%
Employed	12.37%
HIGHEST GRADE IN SCHOOL	
Less than High School	31.11%
High School	49.85%
More than High School	19.05%
LIVING ARRANGEMENT PRIOR TO ADMISSION	
Non-Institutional	75.69%
Homeless	21.97%
Institutional/Other	2.34%
LEGAL STATUS AT ADMISSION	
Involved in Legal System	32.28%
None	67.72%
DWI ARRESTS AT ADMISSION	
Yes	5.77%
No	94.23%
OTHER ARRESTS AT ADMISSION	
Yes	9.71%

Demographic Characteristic	Percent of Clients in BHIPS
	No 90.29%
PUBLIC INTOXICATION ARRESTS	
	Yes 8.82%
	No 91.18%
PRIOR IV DRUG USE	
	Yes 45.16%
	No 54.84%
HOSPITAL/ER VISITS IN LAST 12 MONTHS	
	Yes 47.79%
	No 52.21%
PRIOR DETOX/SUBSTANCE ABUSE ADMISSIONS	
	Yes 51.82%
	No 48.18%
PRIMARY SUBSTANCE TYPES	
	Heroin 21.39%
	Alcohol 33.84%
	Crack 22.89%
	All Others 21.88%
USE LAST 30 DAYS – Primary Substance	
	None 8.12%
	Some 47.66%
	Every Day 44.22%
USE LAST 6 MONTHS – Primary Substance	
	None 2.10%
	Monthly 4.85%
	Weekly 27.91%
	Daily 65.14%
NUMBER OF SUBSTANCES	
	Primary Only 30.64%
	Primary and Secondary 36.51%
	All Three 32.85%
DSM-IV SUBSTANCE ABUSE DIAGNOSIS	
	Chronic Alcoholism 23.73%
	Opioid Type Dependency 14.69%
	Cocaine Dependence 18.23%
	Combination of Drugs, Excluding Opioids 33.26%
	All Others 10.09%
DISABILITIES	
	Behavioral Disability 7.22%
	Physical Disability 4.78%
	None 87.99%
HEALTH INSURANCE	
	Yes 53.23%
	No 46.77%

Study Question 1: Profiles and Predictors of Overall Length of Treatment

Study Question 1: How long are patients staying in treatment and how does this vary by (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?

Treatment cycles are defined as beginning with the initial admission during the study period and ending with the final discharge, with no more than a 14-day break between levels of care. If there is a break of more than 2 weeks, a new treatment cycle is assumed to begin. Analyses related to overall length of treatment (Table 2) are calculated with data from the Data Warehouse. Analyses considering sociodemographic and health related differences (Table 3), legal and substance abuse history differences (Table 4), and client strength and weakness differences (Table 5) in overall length of treatment are calculated with data from BHIPS. In addition, the multivariate regression analyses in Table 6, and the rates of completion in Table 7, are estimated using BHIPS data.

Overall Length of Treatment

The overall length of treatment is presented in Table 2. During the study period, there are 10,674 initial admissions represented in the Data Warehouse which, when subjected to the 14-day transition criterion, result in 8,330 admissions used to calculate treatment stay.

As seen in Table 2, roughly one-half were in treatment for 2 weeks or less; another 19.35% were in treatment for 30 days or less. On average, initial admissions resulted in an overall treatment stay of 38.14 days, allowing for no more than a 14-day break between levels of care.

Table 2. Overall Length of Treatment (Number of Days).

	Overall	In treatment 1-14 days	In treatment 15-30 days	In treatment 31-45 days	In treatment 46-60 days	In treatment 61+ days
Number of Admissions (%)	8,330 (100%)	4,125 (49.52%)	1,612 (19.35%)	608 (7.30%)	427 (5.13%)	1,558 (18.70%)
Mean (Std. Dev.) Length of Treatment	38.14 (60.09)	5.61 (4.61)	21.12 (4.81)	37.94 (4.16)	52.95 (4.29)	137.93 (78.07)

Socio-Demographic and Health-Related Differences in Overall Length of Treatment

In terms of demographic characteristics, age, yearly income, and educational status (less than high school, high school, more than high school) were unrelated to overall length of treatment. However, as seen in Table 3, analyses revealed that females stayed in treatment longer than males. Race and ethnicity was related to length of treatment such that Black clients stayed in treatment longer than Whites, Hispanics, or others. Clients who were divorced were in treatment for shorter periods of time than those who were single or married. In addition, with respect to employment and living status, those who were unemployed prior to admission as well as those who were homeless prior to admission had shorter treatment stays than their counterparts. Thus, those with potentially more troubled lives prior to admission – i.e., those who were divorced, or unemployed, or homeless – stayed in treatment for shorter periods of time than those who did not have these characteristics. Finally, those with either a physical or behavioral disability, as well as those with no prior health insurance, were in treatment longer than those who had no disability and those who did have health insurance.

Regression analysis was used to examine the predictive power of the sociodemographic and health-related patient characteristics. This is an important addition to the previous descriptive analyses for the following reason. The previous descriptive analyses are based on single variable associations, e.g., the relationship between age and length of treatment or between gender and length of treatment. Multivariate regression analysis allows for the examination of each variable *after* controlling for other variables. Thus, greater confidence can be expressed in the relationship between a predictor and an outcome, after controlling for other potentially confounding variables. As well, in a multivariate analysis, the predictive power of the collective block can be examined.

When collectively entered into a regression equation to predict overall length of treatment, the sociodemographic and health-related variables significantly account for 13% of the variance in overall treatment length ($p < .0001$). Variables that remained significant predictors of overall treatment length, after controlling for other variables in this block, include ethnicity, relationship status, living situation at admission, health insurance, and the presence of a disability.

Table 3. Sociodemographic and Health Differences in Overall Length of Treatment.

	Mean (Std. Dev.) Overall Length of Treatment	Significance
GENDER		
Male	17.27 (26.99)	$p < .01$
Female	20.06 (26.47)	
RACE/ETHNICITY		
Black	24.50 (30.67)	$p < .0001$
Hispanic	18.04 (27.83)	
White	15.67 (24.02)	
Other	10.26 (7.53)	
RELATIONSHIP STATUS		
Single	19.31 (27.08)	$p < .05$
Married	19.24 (29.11)	
Divorced	16.65 (24.51)	
EMPLOYMENT STATUS		
Unemployed	17.20 (24.35)	$p < .0001$
Employed	27.00 (38.62)	
LIVING ARRANGEMENT PRIOR TO ADMISSION		
Non-Institutional	20.16 (28.19)	$p < .0001$
Institutional/Other	35.67 (43.23)	
Homeless	10.90 (14.89)	
DISABILITIES		
None	13.50 (19.94)	$p < .0001$
Physical Disability	21.57 (29.48)	
Behavioral Disability	24.56 (28.25)	
HEALTH INSURANCE		
Yes	12.13 (18.76)	$p < .0001$
No	25.53 (30.60)	

Legal and Substance Abuse History Differences in Overall Length of Treatment

Differences in overall length of treatment based on legal issues and substance abuse history are in Table 4. As presented in the table, clients who were involved in the legal system had significantly longer overall treatment stays than those who were not. Similarly, although there were no differences based on DWI or public intoxication arrests, those who had been arrested for other drug or alcohol related crimes had longer treatment stays than those with no other arrest record.

In terms of clients' substance abuse history, correlational analyses revealed a significant inverse association such that those with a longer overall length of treatment had fewer prior detox or substance

abuse admissions and fewer prior hospital and ER visits ($r = -.05, p < .01$, and $r = -.11, p < .0001$, respectively). In addition, as seen in Table 4, those with a greater history of substance abuse (i.e., prior IV drug use, use of multiple substances, and more frequent use) had shorter treatment stays than those without such a history. Finally, those with heroin or alcohol addiction had shorter treatment stays when compared to those using crack and other substances.

When collectively entered into a regression equation to predict overall length of treatment, these variables significantly account for 26% of the variance in overall treatment length ($p < .0001$). Variables that remained significant predictors of overall treatment length, after controlling for other variables in this block, include involvement in the legal system, prior IV drug use, primary substance type, use during the last 30 days and use during the last 6 months, and the number of prior ER and hospital visits.

Table 4. Differences in Overall Length of Treatment Based on Clients' Involvement in the Legal System and Substance Abuse History.

	Mean (Std. Dev.)	Significance
Overall Length of Treatment		
Involvement in the Legal System		
LEGAL STATUS AT ADMISSION		
None	15.83 (23.90)	$p < .0001$
Any Involvement	23.58 (30.98)	
DWI ARRESTS AT ADMISSION		
Yes	19.69 (30.08)	Non-significant
No	18.28 (26.31)	
OTHER ARRESTS AT ADMISSION		
Yes	22.88 (31.40)	$p < .01$
No	17.83 (25.89)	
PUBLIC INTOXICATION ARRESTS		
Yes	16.90 (27.03)	Non-significant
No	18.50 (26.48)	
Substance Abuse History		
PRIOR IV DRUG USE		
Yes	15.12 (24.67)	$p < .0001$
No	21.35 (28.20)	
PRIMARY SUBSTANCE TYPES		
Heroin	13.04 (24.11)	$p < .0001$
Alcohol	14.94 (24.20)	
Crack	24.55 (27.96)	
All Others	22.84 (29.60)	
USE LAST 30 DAYS – Primary Substance		

	Mean (Std. Dev.)	Significance
	Overall Length of Treatment	
None	59.67 (46.56)	$p < .0001$
Some	19.42 (23.68)	
Daily	9.87 (15.19)	
USE LAST 6 MONTHS – Primary Substance		
None	47.96 (44.86)	$p < .0001$
Monthly	33.85 (32.20)	
Weekly	19.81 (26.80)	
Daily	15.65 (24.32)	
NUMBER OF SUBSTANCES		
Primary Only	20.13 (28.56)	$p < .001$
Primary and Secondary	19.55 (28.36)	
All Three	15.69 (22.64)	
DSM-IV SUBSTANCE ABUSE DIAGNOSIS		
Chronic Alcoholism	18.18 (28.07)	$p < .0001$
Opioid Type Dependency	15.80 (26.27)	
Cocaine Dependence	28.26 (31.60)	
Combination of Drugs, Excluding Opioids	10.55 (15.75)	
All Others	30.66 (32.74)	

Differences in Overall Length of Treatment Based on Clients' Strengths and Problems

BHIPS also contains information relating to assessments of client strengths and problems. Correlational analyses revealed a significant relationship between treatment support and length of treatment such that patients with a greater number of close persons actively involved in treatment had shorter lengths of treatment compared to those with less support ($r = -.16, p < .0001$). In addition, those involved with support groups during treatment had longer stays ($r = .34, p < .0001$). As seen in Table 5, overall length of stay was systematically and statistically significantly shorter for those who had higher levels of problems during the 30 days preceding admission, in terms of sickness, employment, family, peer and social, emotional and psychological, and drug and alcohol problems. Finally, although 88% of clients had no provider-reported impediment to treatment, 12% had problems related to language, illiteracy, medical issues, transportation, employment, or lack of family support, which resulted in longer treatment stays ($p < .0001$) for these individuals (mean = 23.82, standard deviation = 30.81) versus clients with no impediments to treatment (mean = 14.95, standard deviation = 21.71).

When collectively entered into a regression equation to predict overall length of treatment, these variables significantly account for 36% of the variance in overall treatment length ($p < .0001$). All of these variables remained significant predictors of overall treatment length, after controlling for all other variables in this block.

Table 5. Differences in Overall Length of Treatment by Number of Days with Problems During the Month Preceding Admission.

	Mean (Std. Dev.) Overall Length of Treatment	Significance
SICKNESS		
None	21.64 (30.36)	$p < .0001$
Some	15.88 (22.46)	
Daily	14.62 (20.81)	
EMPLOYMENT		
None	42.41 (38.20)	$p < .0001$
Some	18.01 (23.47)	
Daily	14.51 (22.10)	
FAMILY		
None	42.23 (39.16)	$p < .0001$
Some	17.83 (21.79)	
Daily	13.07 (19.65)	
PEER		
None	41.93 (39.23)	$p < .0001$
Some	18.05 (23.37)	
Daily	12.72 (18.83)	
EMOTIONAL/PSYCHOLOGICAL		
None	20.52 (31.78)	$p < .001$
Some	15.10 (20.66)	
Daily	17.16 (22.08)	
DRUG/ALCOHOL		
None	49.93 (40.21)	$p < .0001$
Some	25.27 (27.90)	
Daily	13.64 (20.53)	

Multivariate Prediction of Overall Length of Treatment

The previous analyses demonstrate both individual and collective prediction of length of stay, but within the confines of specific conceptual blocks of variables. The next set of regression analyses examines the multivariate prediction of overall length of treatment based on multiple blocks of predictors, that is, the sociodemographic, legal, substance abuse history, and client strengths and problems variables

identified as significant in the analyses presented previously. The purpose of this analysis is to examine the contribution of each block of predictors to predicting overall length of treatment.

Table 6 presents the results of this analysis. Each block contains the variables that remained significant in the previous within-block regression analyses. Overall, the full equation accounted for 49% of the variance. Sociodemographic and health characteristics accounted for 14% of the variance in overall length of treatment; legal status and substance abuse history accounted for 23% of the variance; and client reported strengths and problems accounted for an additional 12%. The specific variables that contributed over all others were ethnicity, legal involvement, substance use during the 30 days preceding admission, number of hospital/ER visits, the number of close persons involved in treatment, the number of days attending support groups prior to discharge, and client reported problems with peers and social contacts, and drugs or alcohol.

Table 6. Final Regression to Predict Overall Length of Treatment.

Predictor	Parameter Estimate	Significance	Block R ²
Block 1: Sociodemographic and Health Characteristics			
Ethnicity (Black)			
Hispanic	-1.22	Non-significant	
White	-2.87	$p < .01$	
Relationship Status (Married)			
Single	0.17	Non-significant	
Divorced	0.95	Non-significant	
Living Situation (Institutional/Other)			
Non-institution	-8.87	$p < .01$	
Homeless	-10.09	$p < .01$	
Health Insurance (No)			
Yes	-0.56	Non-significant	
Disability (None)			
Physical	0.48	Non-significant	
Behavioral	-0.03	Non-significant	
Block R²			R² = 14%, $p < .0001$
Block 2: Legal Status and Substance Abuse History			
Legal Involvement (No)			
Yes	2.20	$p < .05$	
Prior IV Use (No)			
Yes	-0.45	Non-significant	

Predictor	Parameter Estimate	Significance	Block R ²
Substance Type (all others)			
Heroin	-1.88	Non-significant	
Crack	0.77	Non-significant	
Alcohol	-0.85	Non-significant	
Use during past 30 days (0-30 days)	-0.75	$p < .0001$	
Use last 6 months (none)			
Monthly	-4.03	Non-significant	
Weekly	-6.34	Non-significant	
Daily	-1.85	Non-significant	
Hospital/ER Visits	-0.45	$p < .05$	
Block R²			R² = 23%, $p < .0001$
Block 3: Client Strengths and Problems			
Number of Close Persons Involved in Treatment	-0.13	$p < .05$	
Number days attending support groups in month preceding discharge	0.97	$p < .0001$	
Impediments to Treatment	3.46	$p < .05$	
Number of days in month preceding admission with problems concerning:			
Sickness	-0.05	Non-significant	
Employment	0.06	Non-significant	
Family	-0.11	Non-significant	
Peers and social contacts	-0.23	$p < .01$	
Emotional/Psychological	-0.03	Non-significant	
Drugs/alcohol	-0.23	$p < .05$	
Block R²			R² = 12%, $p < .0001$

Overall Completion Rate and Reasons for Discharge

The final set of analyses relevant to overall length of treatment concerns the overall completion rate and reasons for discharge. The treatment completion rate, calculated using TCADA methodology (see Appendix A) for overall treatment is very low: 2.72%. There are several potential explanations for this. First, as seen earlier, the majority of clients (approximately 50%) are only in treatment for periods of less than 2 weeks. This raises questions about transition. Thus, for example, completion rates for Level I treatment may be considerably higher, but clients are leaving treatment after the first transition. This will be explored with Study Question 2. Second, it must also be recalled that this study encompasses a narrow time frame. Accordingly, there are a number of clients who potentially have not completed treatment because their admission was close to the end of the study period. Third, there may be coding issues as to

definitions of what constitutes “complete.” Providers are required to enter a code of "complete" or "not complete" at discharge. However, because of numerous cases of missing data on this variable, as well as potential misunderstandings about what criteria are to be met to be coded "complete," some further discussion of this between NorthSTAR and providers may be appropriate.

Finally, given these issues, it may be worthwhile to consider the concept of completion from a different perspective. Therefore, final discharge reasons are listed in Table 7. As seen here, roughly 31% left against medical advice, were re-assessed as inappropriate, were discharged for non-compliance, were incarcerated or died. On the other hand, 65% stopped treatment because there were no further services available, or they transferred to TCADA or non-TCADA services. While not “completion” in the strict sense of the word, these rates do indicate that the majority of clients are at least continuing treatment that was begun in NorthSTAR and, for approximately 21%, are leaving because they have used all that was available to them.

As just discussed, a significant percentage of admissions ultimately end up in referrals to non-TCADA services. Table 8 displays the nature of these referrals. The vast majority, 84%, are referrals to community based drug and alcohol services, including outpatient day treatment, other residential services and peer support groups such as Alcoholics Anonymous.

Table 7. Reason for Final Discharge.

	Number and (Percent) of 2,674 Overall Admissions
Discharge Reason:	
Client Re-Assessed as Inappropriate	72 (2.69%)
No More Services Available	550 (20.57%)
Program Decision for Non-Compliance	196 (7.33%)
Left Against Medical Advice	554 (20.72%)
Incarcerated	10 (0.37%)
Died	1 (0.04%)
Transfer to TCADA service	7 (0.26%)
Referral to non-TCADA service	1,181 (44.17%)
Missing Data	103 (3.85%)

Table 8. Referrals to non-TCADA Services.

	Number and (Percent) of 1,181 Referrals to non-TCADA Services
Primary Referral at Discharge:	
Sickness/Physical health related referral	20 (1.69%)
Employment/school related referral	0
Family/marital related referral	0
Emotional/psychological problem related referral	78 (6.60%)
Drug/alcohol problem related referral	993 (84.08%)
Legal system related referral	4 (0.34%)
Living arrangement related referral	66 (5.59%)
Other referrals	12 (1.02%)
Missing Data	8 (0.67%)

Summary: Overall Length of Treatment

In summary, the previous analyses demonstrate that overall length of treatment is about 38 days, with about half of admissions resulting in stays of 14 days or less. In addition, length of treatment varies by a number of characteristics such as sociodemographics and health, legal status and substance abuse history, and client strengths and problems. The overall treatment completion rate is low, but it is unclear to what extent potential problems in data coding or entry, or the short time frame of study, contribute to this. Reasons for discharge were examined and these analyses suggest that about 65% stop treatment either because there were no further services available or, in the majority of cases, because they transferred to non-TCADA services. The majority of non-TCADA referrals are to community-based drug and alcohol services, including outpatient day treatment, other residential services and peer support groups such as Alcoholics Anonymous.

Study Question 2: Transitions to Step-Down Levels of Treatment

Study Question 2: Following transfer from one level of care to another, how long are patients staying in treatment? How do the odds of transfer vary by (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?

Analogous to the previous analyses, transfer between levels of care is defined to occur when there is no more than a 2-week break between discharge from one level and admission to another level. If there is a break of more than 2 weeks, a new treatment cycle begins. With the exception of data presented in Table 12, the following analyses are based on the 10,476 admissions represented in the Data Warehouse. There are a greater number of admissions for these analyses, as compared to the previous section (n=8,330), because the unit of interest is transition to level. That is, each admission to each level is counted once, whereas for Study Question 1 there may have been multiple admissions to various levels but, as long as the transitions occurred within the 14-day window, the overall admission was counted only once.

Admissions to Levels of Treatment

Table 9 shows the distribution of admissions across levels of treatment as represented in the Data Warehouse. For example, there are 1,771 admissions to Level I; these account for 16.91% of all admissions during the study period. However, all Level I admissions are initial admissions, and thus account for 100% of the admissions to Level I. There are 2,678 admissions to Level II services, which account for 25.56% of all admissions. Of these 2,678 admissions to Level II services, 1,971 were initial admissions to Level II, and these initial admissions to Level II services accounted for 73.60% of all admissions to Level II during the study period. Total and initial admissions to Levels III, IV Non-Pharmacy, and IV Pharmacy are also presented in the table.

Table 9. Admissions to Each Level of Treatment.

Level of Admission	Total Number of Admissions to Level	Percent of the 10,476 Overall Admissions	Number of <i>Initial</i> Admissions to Level	Percent of Level Admissions
Level I	1,771	16.91%	1,771	100%
Level II	2,678	25.56%	1,971	73.60%
Level III	1,741	16.62%	1,027	58.99%
Level IV – Non-pharmacy	3,060	29.21%	2,606	85.16%
Level IV – Pharmacy	1,226	11.70%	1,218	99.35%

Transfers to Step-Down Levels of Treatment

The number and percent of transfers from each level to subsequent levels is in Table 10; again, these data are from the Data Warehouse. In general, there is significant patient loss from one level to the next. For example, of the 1,771 admissions to Level I, about 53% of them do not transfer to a subsequent level. Likewise, approximately 75% of the admissions to Levels II and III, respectively, do not transfer to a subsequent level. There were no transfers from Level IV non-Pharmacy and Level IV-Pharmacy.

The number and percent of transfers from *initial* admissions to subsequent levels of treatment represented in the Data Warehouse is in Table 11. Only transfers from Levels II and III are included because there were only initial admissions to Level I and there are no transfers from Level IV non-Pharmacy or Level IV-Pharmacy. For initial admissions to Levels II and III, the pattern is similar to that for total admissions to the level. In other words, the majority of clients do not transfer to step-down levels of care, either when examining all admissions to a level, or initial admissions to a level. It should also be recalled that a 14-day window is allowed in these analyses. Thus, even with such a grace period between levels, transfers are minimal.

Table 10. Number and Percent Transferring to a Step-Down Level of Treatment from Each Admission Level.

Admission Level	Number of Admissions to Level	Transferred to				
		Did not Transfer	Level II	Level III	Level IV-NP	Level IV-PM
Level I	1,771	946 (53.42%)	707 (39.92%)	107 (6.04%)	3 (0.17%)	8 (0.45%)
Level II	2,678	2,018 (75.35%)	--	619 (23.11%)	41 (1.53%)	0 (0.00%)
Level III	1,741	1,325 (76.11%)	--	--	416 (23.89%)	0 (0.00%)
Level IV – Non-pharmacy	3,060	3,060 (100%)	--	--	--	--
Level IV – Pharmacy Maintenance	1,226	1,226 (100%)	--	--	--	--

Table 11. Number and Percent Transferring to a Step-Down Level of Treatment from *Initial* Admission Level.

Initial Admission Level	Number of <i>Initial</i> Admissions to Level	Transferred to		
		Did not Transfer	Level III	Level IV-NP
Level II	1,971	1,427 (72.40%)	519 (26.33%)	25 (1.27%)
Level III	1,027	744 (72.44%)	--	283 (27.56%)

Completion Rates at Each Level of Treatment

Recall that the overall treatment completion rate calculated with BHIPS data was low – about 2.72% (see page 23). To examine whether this rate differs at each specific level, completion rates for each level were calculated using BHIPS and are in Table 12. It should be noted that TCADA methodology excludes discharges from Level I and Level IV-Pharmacy in the overall treatment completion rate. However, on an exploratory basis, this criterion was relaxed so that completion rates at Level I and Level IV-Pharmacy could be calculated; the completion rates for Levels II, III, and IV-non-Pharmacy follow the TCADA guidelines exactly.

As seen in Table 12, the completion rate does vary by level, from a high of 3.63% from Level III, to a low of 0% from Level IV – Pharmacy. Because Level I and Level IV-Pharmacy discharges are not included in the overall completion rate, rates at these levels will not impact overall completion.

Table 12. Completion Rates at Each Admission Level.

Admission Level	Completion Rate
Level I	2.24%
Level II	2.13%
Level III	3.63%
Level IV – Non-pharmacy	3.39%
Level IV – Pharmacy Maintenance	0%

Length of Stay at Each Level and Following Transfer to Step-Down Level

Table 13 describes the mean length of stay at each level as well as the mean length of stay post transfer to a subsequent level of treatment, for *all* admissions to that level, using data from the Data Warehouse. In general, stays at each level vary, with the shortest stays at Level I, and longer stays at subsequent levels. Thus, for example, the average length of treatment for all admissions to Level I is about 3 days, whereas the average length of treatment for all admissions to Level III is about 18 days. In addition, for those who transfer from Level I to Level II, the average length of stay at Level II is about 10 days. For those who transfer from Level II to Level III, length of stay at Level III averages about 17 days. Table 14 shows this information for initial admissions at each level. Overall, the data in Tables 13 and 14 suggest that once patients do transfer to a subsequent level of care, they remain in treatment for a significant amount of time. As seen in Tables 9, 10, and 11, however, getting patients to transfer appears more problematic.

Table 13. Length of Stay at Step-Down Levels of Treatment Following Each Admission Level.

Admission Level	Mean Overall Length of Stay (Std. Dev.)	Mean (Std. Dev.) Length of Stay Post Transfer to			
		Level II	Level III	Level IV-NP	Level IV-PM
Level I	2.79 (2.46)	9.91 (5.19)	14.07 (14.01)	26.00 (34.22)	116.75 (110.31)
Level II	11.07 (10.99)	--	17.06 (13.32)	22.37 (27.26)	--
Level III	17.94 (15.15)	--	--	29.84 (24.95)	--
Level IV – Non-pharmacy	25.13 (26.07)	--	--	--	--
Level IV – Pharmacy Maintenance	137.57 (96.25)	--	--	--	--

Table 14. Length of Stay at Step-Down Levels of Care Following Initial Admission Level.

Initial Admission Level	Mean Overall Length of Stay (Std. Dev.)	Mean (Std. Dev.) Length of Stay Post Transfer to	
		Level III	Level IV-NP
Level II	11.49 (12.41)	17.12 (13.25)	20.52 (27.85)
Level III	18.83 (16.14)	--	31.53 (24.95)
Level IV – Non-pharmacy	24.47 (26.21)	--	--
Level IV – Pharmacy Maintenance	137.31 (96.19)	--	--

Odds of Step-Down Transfers

Logistic regressions to predict the odds of making a step-down transfer are calculated with data from BHIPS, as these data allow a more detailed profile of client history and characteristics. Because of the relatively low number of transfers to subsequent treatment levels, however, it is difficult to examine variations in post-transfer treatment stays by sociodemographic characteristics, legal and substance abuse histories, and clients' strengths and problems. Given these problems, the only reasonable analysis is to

examine the odds of step-down transfers from initial detox treatment in Level I, based on these groups of predictors.

In general, these results are non-informative because only three variables are significantly related to the odds of step-down. These variables indicate that: (1) as compared to blacks, whites are less likely to make a step-down transfer (odds ratio = 0.67, $p < .05$); (2) as compared to all others, individuals with a primary substance abuse of heroin are less likely to make a step-down transfer (odds ratio = 0.66, $p < .05$); and (3) the greater the number of close persons involved in treatment, the greater the likelihood the client will make a step-down transfer (odds ratio = 1.03, $p < .0001$). The full results of these analyses are in Appendix B, Tables B-1 to B-3.

Summary: Transfers to Step-Down Levels of Care

In summary, the analysis of transfer to step-down levels of care indicates that the majority of admissions to any level do not transfer on. Likewise, the completion rate calculated at each level of care was low, but varied, with Level III evincing the highest rate. However, those patients who do transfer to a step-down level of care remain in treatment for a significant amount of time. Analyses to predict who is likely to make a step-down transfer were problematic due to sample size constraints and the low frequency of transfer. In a preliminary manner, however, the analyses reveal that as compared to blacks, whites are less likely to make a step-down transfer; as compared to all others, individuals with a primary substance abuse of heroin are less likely to make a step-down transfer; and the greater the number of close persons involved in treatment, the greater the likelihood the client will make a step-down transfer.

Study Question 3: Follow-Up Outcomes of Treatment

Study Question 3: What is the relationship between overall length of treatment, number of successful transitions, and outcomes measured at 60 days following final discharge from treatment? How do outcomes vary after controlling for (a) demographic information such as age, gender, ethnicity, and living situation; (b) comorbid behavioral and medical conditions; (c) involvement with the legal system; (d) substance use and history; and (e) provider assessments of clients' strengths and limitations?

Number and Timing of Follow-Up Contacts

Data from BHIPS was used to examine follow-up outcomes of treatment. Because of the limited time for the study, which only includes admissions after May 2002, the number of follow-up contacts with clients is limited. Table 15 profiles the number of follow-ups completed, and the average length between last discharge and follow-up. Overall, there are 514 follow-ups, about 19% of all admissions. As seen in the table, there are no follow-ups from Level I. 341 were contacted after discharge from Level II, on average about four months after discharge. 108 were contacted after discharge from Level III, about 110 days on average after discharge from Level III. Thirty-eight percent of admissions to Level-IV-pharmacy were contacted, on average about 106 days after discharge.

Table 15. Number of Follow-ups and Mean Number of Days Between Discharge and Follow-up.

Admission Level	Number of Admissions	Number of Follow-ups	% of Admissions to Level	Mean (std. dev.) number of days between last discharge and follow-up
Level I	1,456	0	0%	--
Level II	1,183	341	28.83%	122.72 (46.15)
Level III	361	108	29.92%	110.57 (51.28)
Level IV-Pharmacy	193	74	38.34%	106.12 (43.16)
Level IV-Non-Pharmacy	47	0	0%	--
Overall (from first admission to last discharge)	2,674	514	19.22%	118.36 (47.08)

Client Outcomes at Follow-Up

Table 16 profiles selected outcome measures at follow-up. Recall that the number of follow-up contacts for the 2,674 admissions was 514. However, the amount of missing data in the follow-up information varies tremendously, with roughly half missing for most of the outcomes. Thus, these data need to be interpreted with a great deal of caution and should be regarded as very preliminary figures.

Of those who did not have missing data, about 83% were abstinent at follow-up. Slightly less than half (44%) were employed at follow-up. About 24% had legal issues at follow-up, less than 2% had DWI arrests or public intoxication arrests, and less than 5% had other drug and alcohol-related arrests. The majority reported no problems with sickness, employment, family, peer and social contacts, emotional or psychological issues, or drugs and alcohol in the 30 days preceding the follow-up contact. At follow-up, the majority was in non-institutional settings, and less than 10% were currently in treatment.

Table 16. Client Outcomes at Follow-Up.

Outcome Indicator (number of admissions) ^{a)}	Percent of non-missing Follow-ups
ABSTINENT FOR PRIOR 30 DAYS (n=277)	
Yes	83.03%
No	16.97%
EMPLOYMENT STATUS (n=264)	
Employed	44.32%
Unemployed	55.68%
LEGAL STATUS (n=235)	
Yes	23.83%
None	76.17%
DWI ARRESTS (n=222)	
Yes	1.35%
No	98.65%
PUBLIC INTOXICATION ARRESTS (n=222)	
Yes	1.80%
No	98.20%
OTHER ARRESTS (n=222)	
Yes	4.05%
No	95.95%
SICKNESS PROBLEMS (n=263)	
None	84.41%
Some	4.94%
Daily	10.65%

Outcome Indicator (number of admissions)^{a)}	Percent of non-missing Follow-ups
EMPLOYMENT PROBLEMS (n=275)	
None	57.82%
Some	3.27%
Daily	38.91%
FAMILY PROBLEMS (n=270)	
None	74.07%
Some	4.07%
Daily	21.85%
PEER PROBLEMS (n=268)	
None	79.10%
Some	1.87%
Daily	19.03%
EMOTIONAL/PSYCHOLOGICAL PROBLEMS (n=259)	
None	78.76%
Some	4.63%
Daily	16.60%
DRUG/ALCOHOL PROBLEMS (n=275)	
None	73.09%
Some	5.09%
Daily	21.82%
LIVING ARRANGEMENT (n=246)	
Non-Institutional	83.33%
Institutional	8.94%
Homeless	3.66%
Treatment	4.07%
TREATMENT STATUS (n=511)	
In treatment	6.65%
Not in treatment	52.05%
Other	41.29%

Note. The number of follow-up contacts for the 2,674 overall admissions was 514. However, the amount of missing data in the follow-up information varies tremendously, with roughly half missing for most of the outcomes.

Changes from Admission to Follow-Up

Because of the low number of follow-ups and problems with missing data, multivariate analysis is not advised. However, to provide some evidence of program effects on follow-up characteristics, as well as an analysis of change from admission to follow-up, several univariate comparisons are provided.

The first analysis examined the relationship between length of treatment and abstinence at follow-up. This analysis contrasted those individuals who had been abstinent during the 30 days preceding the follow-up contact to those who had not. The results indicate that those who were abstinent had been in

treatment longer (mean = 28.45, standard deviation = 27.70) than those who were not abstinent (mean = 18.34, standard deviation = 19.13), a difference that is statistically significant ($p < .05$).

The second set of analyses examined differences between admission and follow-up on a number of outcome indicators. Although such an analysis does not offer causal evidence about program success, these descriptions can offer preliminary insight into program-related change and point to directions for future study. In these analyses, differences between admission and follow-up were examined for employment status, involvement in the legal system, abstinence, hospital and ER visits, and reported problems on a number of dimensions.

With respect to employment status, chi-square analysis was used to compare the number of clients employed and unemployed at admission to the number of unemployed and employed clients at follow-up. This analysis showed that, for the 253 who had follow-up data, 225 had been unemployed at admission, and 109 were unemployed at follow-up. In addition, whereas only 28 were employed at admission, 144 were employed at follow-up. This difference is statistically significant ($p < .001$), and shows that the ratio between employment and unemployment shifted from admission to follow-up, such that a greater percentage of clients were employed at follow-up than at admission.

With respect to legal status, chi-square analysis again revealed a positive shift from admission to follow-up. In this case, for the 229 who had follow-up data, 79 were involved in the legal system at admission, whereas 54 were involved at follow-up. 150 had no involvement in the legal system at admission, but at follow-up 175 had no involvement. Again, this difference is statistically significant ($p < .0001$), and shows that the ratio between legal involvement and no legal involvement shifted from admission to follow-up, such that a smaller percentage of clients were legally involved at follow-up than at admission.

Table 17 contains average admission and follow-up scores on additional indicators. All of the comparison tests were statistically significant and all point to positive change at follow-up. For example, clients were abstinent for a greater number of days at follow-up than at admission. The number of ER

and hospital visits was less at follow-up than admission. And, clients reported fewer days with problems at follow-up than admission.

Together, these are promising findings, and demonstrate positive outcomes for clients based on pre- and post-treatment comparisons. However, it must be underscored that there are potential alternative explanations for the findings that can not be ruled out in a simple one group, pre-post comparison. For example, there is no definitive way to know from these analyses whether these changes occurred because of treatment, or because of time, or because of some other unmeasured reason. Because of this, all interpretations of these findings should be made cautiously.

Table 17. Differences Between Admission and Follow-Up on Several Outcome Indicators.

Outcome Indicator	Mean (std. dev.) at Admission	Mean (std. dev.) at Follow-up	Significance
Number of days abstinent in prior 30 days	8.55 (10.73)	24.05 (11.56)	$p < .0001$
Number of hospital/ER visits ^{a)}	0.09 (0.16)	0.05 (0.19)	$p < .05$
Number of days in prior 30 days with problems regarding:			
Sickness	13.24 (14.28)	3.61 (9.39)	$p < .0001$
Employment	24.42 (11.17)	12.07 (14.52)	$p < .0001$
Family	22.57 (12.50)	7.00 (12.42)	$p < .0001$
Peers and social contacts	21.21 (13.20)	6.01 (11.86)	$p < .0001$
Emotional/psychological issues	17.95 (14.25)	5.41 (11.20)	$p < .0001$
Drugs/alcohol	23.85 (11.25)	6.94 (12.41)	$p < .0001$

Notes. a) Because the scale for hospital/ER visits is different at admission (visits within prior 12 months) and follow-up (visits since discharge), these values have been converted to monthly rates.

Summary: Follow-up Outcomes of Treatment

Preliminary analyses show that clients who remained abstinent in the 30 days prior to follow-up had been in treatment longer than those who had not remained abstinent. Further, the number of clients who were employed was greater at follow-up than admission, and the number of clients who were involved in the legal system was fewer at follow-up as compared to admission. Moreover, when compared from admission to follow-up, the number of days abstinent was higher at follow-up than at admission. In addition, clients reported fewer problems at follow-up than admission in terms of problems

with sickness, drugs, employment, family, peers and social contacts, emotional and psychological issues, and drugs and alcohol. And, clients reported fewer hospital and ER visits at follow-up than admission.

On the whole, these findings demonstrate positive outcomes for clients based on pre- and post-treatment comparisons. However, given the pre-post design of this study, explanations for the findings can not be ruled out. That is, there is no definitive way to know whether changes occurred because of treatment, or because of time, or because of some other unmeasured reason. Because of this, interpretations of this set of findings should be made cautiously.

Summary and Recommendations

The purpose of this study is to address three questions related to chemical dependency treatment provided by NorthSTAR for adults (18 years of age and older) who had admissions to NorthSTAR services between May 2002 and March 2003. Two sources provide the data for this study. First, the Data Warehouse contains enrollment and claims data for Medicaid and non-Medicaid enrollees during the study period. Second, data from admissions, discharges and follow-ups are abstracted from the *Behavioral Health Integrated Provider System (BHIPS)*. Major findings relative to each study question are summarized below.

Study Question 1: Analyses of Overall Length of Treatment

Analyses indicate that the overall length of treatment is fairly short, with about one-half of the admissions resulting in stays of 14 days or less. In addition, length of treatment varies by a number of characteristics such as sociodemographics and health, legal status and substance abuse history, and client strengths and problems. The overall treatment completion rates is low, but it is unclear to what extent potential problems in data coding or entry, or the short time frame of study, contribute to this. Reasons for discharge were examined and these analyses suggest that about 65% stop treatment either because there are no further services available or, in the majority of cases, because they transfer to non-TCADA services. The majority of non-TCADA referrals are to community-based drug and alcohol services,

including outpatient day treatment, other residential services and peer support groups such as Alcoholics Anonymous.

Study Question 2: Analyses of Step-Down Transfers

With respect to transitions to step-down levels, the results indicate that the majority of admissions to any given level do not transfer on to a subsequent step-down level. Likewise, the completion rate calculated at each level of care was low, but varied, with Level III evincing the highest rate. However, those patients who do transfer to a step-down level of care remain in treatment for a significant amount of time. Analyses to predict who is likely to make a step-down transfer were problematic due to sample size constraints and the low frequency of transfers. In a preliminary manner, however, the analyses revealed that as compared to blacks, whites were less likely to make a step-down transfer, and, as compared to all others, individuals with a primary substance abuse of heroin were less likely to make a step-down transfer. Moreover, the greater the number of close persons involved in treatment, the greater the likelihood the client will make a step-down transfer.

Study Question 3: Outcomes of Chemical Dependency Treatment

Last, selected client outcomes of chemical dependency treatment were examined. The sample available for these analyses was relatively small, and it was thus inadvisable to run multivariate analyses. These preliminary analyses, however, showed that clients who remained abstinent in the 30 days prior to follow-up had been in treatment longer than those who had not remained abstinent. Further, the number of clients who were employed was greater at follow-up than admission, and the number of clients who were involved in the legal system was fewer at follow-up as compared to admission. Moreover, when compared from admission to follow-up, the number of days abstinent was higher at follow-up than at admission. In addition, clients reported fewer problems at follow-up than admission in terms of problems with sickness, drugs, employment, family, peers and social contacts, emotional and psychological issues, and drugs and alcohol. And, clients reported fewer hospital and ER visits at follow-up than admission.

Limitations

This study is hampered by four main factors that limit the generalizability of the results. First, owing to the newness of BHIPS, the study period is short – only 11 months. This impacts the analysis of ongoing treatment trends, as well as the ability to accurately estimate follow-up data. Second, due to the short time frame, the number of admissions, discharges, and especially follow-ups available for analysis is limited. Related, the short time frame, and resultant low number of admissions for youth, precluded the analysis of data for youth. Third, with respect to BHIPS, there are problems with missing data for many of the variables, most notably those involving follow-up. Missing data not only biases estimates, but also limits the ability to apply more sophisticated multivariate statistical procedures. This, too, limits the conclusions that can be drawn from the data. Finally, conclusions about the efficacy of treatment, in terms of client outcomes, are limited by the nature of the study design. That is, this study makes comparisons from admission to follow-up – a simple pre-post design. However, this design can not rule out competing explanations for any observed changes, such as time, or other unmeasured processes.

Recommendations

The NorthSTAR Program provides unique and innovative services to its chemical dependency patients. Analyses of follow-up data point to some positive and exciting long-term effects of the NorthSTAR treatment program. The Program is also a leader in the effort it makes to collect quality treatment-related data. Even so, because of the limitations of this study, the recommendations for the Program must be regarded as preliminary.

The first recommendation is to replicate this study, as well as address the study questions with data for youth, once further data that span a longer period of time are available. In addition, if possible, it would be advisable to design a study that utilized a comparison group, to provide stronger evidence of treatment efficacy.

Second, although BHIPS is a rich data source, its complete utility is not maximized because of problems with missing data. Two possibilities are available for dealing with missing data problems. First, further training, support, and encouragement of providers may be necessary so that the data is as

detailed and accurate as possible. Second, ValueOptions may want to further consider additional fields to be required to be filled in by providers. In this way, the full richness of this detailed system can be utilized.

Third, it is important to recall that, data problems notwithstanding, this study paints a broad picture of treatment and treatment outcomes. While it is inarguably critical to analyze length of treatment, as well as transitions to step-down levels, and especially to link this to client outcomes, such an analysis does not answer important process questions. Thus, it would be an important next step to study the aspects of the treatment itself that impact length of stay, transitions, and outcomes.

Finally, chemical dependency treatment occurs in the larger system of health-care delivery. Although not addressed by the current study, further work should examine linkages between NorthSTAR and STAR services, particularly following discharge from chemical dependency treatment. It would be informative to know two things in this regard. First, does healthcare access change? That is, following treatment, do clients receive regular outpatient care, rather than receiving hospital based or ER care? Second, what is the role of healthcare providers in providing support, referrals, or links back to NorthSTAR when patients are post-discharge? An additional question or two could easily be added to the follow-up interview to begin addressing these questions. A more detailed examination would be to examine actual healthcare utilization embedded in STAR encounter data.

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Appendix A

Data Definitions

Length of Treatment Calculated from the date of initial admission to date of last discharge, with no more than a 14-day break between levels of treatment. If more than 14 days elapse, then a new treatment cycle begins.

Levels of Treatment Defined by BHIPS as:

- Level I – Detoxification
- Level II – Partial Hospitalization (residential)
- Level III – Intensive Outpatient Program
- Level IV-Nonpharmacotherapy – Supportive Outpatient
- Level IV-Pharmacotherapy – Methadone Maintenance

Defined by the Data Warehouse Service Codes as:

- Level I – Detoxification:
 - 202BH – Medically monitored 24 hour residential detoxification services
 - 203BH – Medically monitored outpatient detoxification services
- Level II – Partial Hospitalization (residential):
 - 204BH – 24 Hour residential rehabilitation program services
 - 205BH – Outpatient counseling - partial hospitalization program setting
 - 212BH – Specialized female residential services
- Level III – Intensive Outpatient Program
 - 206BH – Outpatient counseling - intensive outpatient program setting
 - 213BH – Outpatient counseling - specialized female services setting
- Level IV-Nonpharmacotherapy – Supportive Outpatient
 - 207BH – Outpatient counseling - outpatient program setting
- Level IV-Pharmacotherapy – Methadone Maintenance
 - 210BH – Pharmacological maintenance - daily medication services
 - 211BH – Outpatient counseling - pharmacological maintenance setting

Completed Treatment Defined in BHIPS using TCADA criteria for completion:

Denominator

1. Discharge date must occur within time frame of performance measurement.
2. Discharge reason must be one of:
 - 01 - No Further Services
 - 06 – Program decision to discharge
 - 07 – Client left treatment AMA
 - 08 – Client incarcerated

OR

- 22 – Transferred to another TCADA funded level and completed previous level successfully.

OR

- 33 – Referred to a non TCADA funded level and completed previous level successfully.

Numerator

1. Discharge date must occur within time frame of performance measurement.
2. Successfully completed level of service.
3. Discharge reason one of 01, 22, or 33.

Note: Level 1 Detox and Pharmacotherapy discharges are excluded from the completion measure.

Demographic Characteristics

Multiple indicators taken from the BHIPS client profile, including:

- Age (continuous in years)
- Ethnicity (Black, Hispanic, White, Other)
- Gender (male, female)
- Living Situation (institutional, non-institutional, homeless, other)
- Relationship status (married/cohabiting, single, divorced)
- Employment status (employed, unemployed)
- Disabilities (none, physical, behavioral)
- Insurance status (none, has insurance)
- Education (less than high school, high school, more than high school)
- Income (continuous in yearly dollars)

Indicators taken from the Data Warehouse include:

- Ethnicity (Black, Hispanic, White, Other)
- Age (continuous in years)
- Gender (male, female)

Legal Status Indicators

Multiple indicators from BHIPS including:

- Legal status (no, yes [if any, e.g., parole based, court mandated, etc.])
- DWI arrests (no, yes)
- Public Intoxication arrests (no, yes)
- Other arrests (no, yes)
- Any arrests (no, yes)

History of Chemical Dependency

Multiple indicators from BHIPS including:

- Prior IV drug use (no, yes)
- Primary substance type (Heroin, crack, alcohol, all others)
- Use of primary substance type in past 30 days (none, some, daily)
- Use of primary substance type in past 6 months (none, monthly weekly, daily)
- Multiple drug use (one, two or three substances)
- DSM-IV substance abuse diagnosis (diagnostic code)
- Number of prior detox/substance abuse admissions (continuous)

- Number of ER and hospital admissions (number in past 12 months)

Client Strengths and Problems

Multiple indicators from BHIPS including:

- Number of close persons involved in treatment process
- Number of past 30 days involved in support groups
- Number of past 30 days that client had problems with
 - Sickness
 - Family
 - Employment
 - Peer and social contacts
 - Emotional and psychological issues
 - Drugs and alcohol
- Provider rated impediments to treatment – language, illiteracy, medical issues, transportation, employment, or lack of family support (yes, no)

Outcome Indicators

Multiple indicators from BHIPS including:

- Employment status (employed, unemployed)
- Arrests (any arrests, no arrests)
- Legal status (legal involvement, no legal involvement)
- Number of past 30 days that client had problems with
 - Sickness
 - Family
 - Employment
 - Peer and social contacts
 - Emotional and psychological issues
 - Drugs and alcohol
- Abstinence (number of days in past 30 that were “clean”)
- Number of ER and hospital admissions (number since discharge)
- Living arrangement (non-institutional, institutional, homeless, treatment)

Appendix B
Additional Tables – Odds of Step-Down in BHIPS

Table B-1. Odds of Step-down from Level I Based on Sociodemographic and Health-Related Client Characteristics.

Predictor	Odds Ratio	Confidence Interval	Significance
Gender (Female)			
Male	1.245	(0.891, 1.741)	Non-significant
Ethnicity (Black)			
Hispanic	0.586	(0.328, 1.046)	Non-significant
White	0.670	(0.462, 0.971)	<i>p</i> < .05
Relationship Status (Married)			
Single	1.037	(0.667, 1.611)	Non-significant
Divorced	1.226	(0.788, 1.908)	Non-significant
Living Situation (Institutional/Other)			
Non-institutional	1.035	(0.241, 4.447)	Non-significant
Homeless	1.384	(0.319, 6.018)	Non-significant
Health Insurance (No)			
Yes	0.841	(0.588, 1.202)	Non-significant
Disability (None)			
Physical	0.799	(0.311, 2.050)	Non-significant
Behavioral	2.312	(0.656, 8.145)	Non-significant

Table B-2. Odds of Step-down from Level I Based on Legal Involvement and Substance Abuse History.

Predictor	Odds Ratio	Confidence Interval	Significance
Legal Involvement (No)			
Yes	1.074	(0.825, 1.398)	Non-significant
Prior IV Use (No)			
Yes	1.006	(0.782, 1.295)	Non-significant
Substance Type (all others)			
Heroin	0.663	(0.448, 0.982)	<i>p</i> < .05
Crack	1.397	(0.716, 2.726)	Non-significant
Alcohol	1.177	(0.833, 1.663)	Non-significant
Use during past 30 days (0-30 days)	1.023	(0.998, 1.048)	Non-significant
Use last 6 months (none)			
Monthly	2.338	(0.226, 24.161)	Non-significant
Weekly	3.732	(0.440, 31.668)	Non-significant
Daily	3.568	(0.405, 31.410)	Non-significant
Hospital/ER Visits in last 12 months	1.008	(0.957, 1.061)	Non-significant
Prior Detox (No)			
Yes	1.011	(0.987, 1.035)	Non-significant

Table B-3. Odds of Step-down from Level I Based on Client Strengths and Problems.

Predictor	Odds Ratio	Confidence Interval	Significance
Number of Close Persons Involved in Treatment	1.034	(1.034, 1.017)	$p < .0001$
Number days attending support groups in month preceding discharge	1.063	(0.926, 1.220)	Non-significant
Impediments to Treatment	0.951	(0.598, 1.513)	Non-significant
Number of days in month preceding admission with problems concerning:			
Sickness	0.994	(0.986, 1.003)	Non-significant
Employment	1.017	(0.977,1.058)	Non-significant
Family	1.003	(0.971,1.042)	Non-significant
Peers and social contacts	1.023	(0.980,1.068)	Non-significant
Emotional/Psychological	1.003	(0.998,1.012)	Non-significant
Drugs/alcohol	0.978	(0.922, 1.038)	Non-significant