Health Services Utilization by Individuals with Substance Abuse and Mental Disorders

Carol L. Council

Editor

Acknowledgments

Public Domain Notice

Disclaimer

Obtaining Additional Copies of Publication

Copies may be obtained, free of charge, from the National Clearinghouse for Alcohol and Drug Information (NCADI), a service for SAMHSA:

National Clearinghouse for Alcohol and Drug Information
P.O. Box 2345
Rockville, MD 20847-2345
(301) 468-2600, 1-800-729-6686, TDD 1-800-487-4889

Electronic Access to Publication

http://www.samhsa.gov
http://www.oas.samhsa.gov

Originating Office

SAMHSA, OAS
1 Choke Cherry Road, Room 7-1044
Rockville, MD 20857

September 2004

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

List of Figures

List of Tables

List of Tables (continued)

Highlights

This volume is a compendium of health services analyses on a variety of behavioral health care issues conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA), Office of Applied Studies (OAS). First, a literature review traces recent trends in access to treatment for substance use and mental disorders. Then results from analyses based on large, representative datasets and economic modeling approaches provide new insights into access, treatment choice, retention in treatment, and costs associated with treatment for substance use and mental disorders.

The in-depth review of current research findings on access to treatment for substance use and mental disorders (Chapter 2) encompasses the wider area of health care utilization and places special emphasis on financial factors impacting access to care. Key highlights from Chapter 2 include the following.

Financing and Access to Substance Use and Mental Disorder Treatment

- There is a growing awareness of the effects of financing and costs on access to treatment. Managed care and financing issues appear to be as important as nonfinancial barriers, such as the severity of the substance use disorder, in influencing access to care. Homeless people with substance use and mental disorders may have the most difficulty in accessing treatment, even if they have public health insurance.

- Managed care for substance abuse treatment not only has shifted treatment from inpatient care to outpatient care, but also has shifted the risk to providers, thus constraining provider treatment options.

Substance Use Disorder Severity and Access to Treatment

- Those with more serious behavioral illnesses may encounter more barriers to access because successful treatment for them may be more expensive and because redundant and bureaucratic procedures may pose insurmountable obstacles. However, changes in government-sponsored systems can promote access for clients with more serious disorders.

- To better understand the issues of access to services, researchers should study the entire universe of persons with substance use and mental disorders, not just those who seek treatment.

Subsequent chapters in this compendium provide insight into the organization, financing, management, and delivery of behavioral health services for substance use and mental disorders by exploring such issues as utilization, quality, cost, cost-effectiveness, and outcomes. The authors examine how the demographic characteristics of an individual affect how, when, where, and if a person will seek care, what types of care are chosen or provided, and what happens during the delivery of care. Key highlights include:

Community Hospitalizations of Those with Substance Use and Mental Disorders

- Discharges from community hospitals of those with substance use and mental disorder diagnoses grew substantially between 1990 and 1995, a time of stability in overall hospital discharges (Chapter 3).

- Although the complexity of substance use and mental disorders increased over time, the length of stay (LOS) decreased in community hospitals. The decrease was most pronounced for those with disorders related to substance use (Chapter 3).

- Patients with substance use and mental disorder diagnoses were more likely to receive uncompensated care or have Medicaid coverage than other community hospital patients (Chapter 3).

- The Federal Government's role in paying for the care of patients with substance use and/or mental disorders in community hospitals increased between 1990 and 1995, with Medicare and Medicaid paying for the treatment of more than half of discharges with such diagnoses (Chapter 3).

Admissions to Substance Abuse Treatment

- The criminal justice system was the most common source of treatment referral for adult males with alcohol as the primary substance of abuse in most States examined (Chapter 4).

- Greater disorder severity increased the likelihood of inpatient admission. In addition, daily alcohol users were significantly more likely to receive inpatient treatment than clients who did not drink in the 30 days prior to admission. Moreover, using cocaine as a secondary substance increased the likelihood of inpatient admission in most States (Chapter 4).

- Referral by an alcohol or drug treatment provider generally increased the likelihood of inpatient admission, but in many of the States examined, co-occurring mental disorders did not consistently increase the odds of inpatient admission (Chapter 4).

- Clients who were employed were less likely to have an inpatient admission; clients who paid for their own care had a lower likelihood of entering inpatient treatment (Chapter 4).

- An examination of the choice among five types of treatment (standard outpatient, intensive outpatient, long-term residential, short-term residential, and inpatient hospital) in two States revealed that those admitted to standard outpatient treatment appeared to have less severe alcohol use disorders and were more likely to be employed than those admitted to any other treatment setting. Furthermore, analyses that allowed for only two choices, inpatient and outpatient, obscured the relationships between client characteristics and treatment-setting choice (Chapter 5).

Retention of Women in Substance Abuse Treatment

- Substance abuse treatment for women at facilities offering child care services and treatment at women-only facilities were associated with a longer LOS (Chapter 6).

- Lower educational levels (fewer than 8 years) were associated with a shorter LOS among female clients (Chapter 6).

- Among adult female clients at outpatient nonmethadone facilities:

  - LOS was shorter among those aged 55 to 64 than among those aged 18 to 54.

  - The average LOS differed by race.

  - The LOS was longer among those whose primary source of payment was no payment or self-payment (Chapter 6).

- Among adult female clients at nonhospital residential facilities, the LOS was longer among women with a criminal justice system referral.

- Adult female clients in facilities offering combined mental health and substance abuse treatment services stayed in treatment longer than in those facilities not offering these services.

- Adult female clients receiving care at facilities offering prenatal care or transportation services had shorter LOS.

Costs of Substance Abuse Treatment

- Average cost per admission declined as facilities became larger, which suggests that larger facilities may be able to provide care at a lower price than smaller facilities (Chapter 7).

- Facilities with a greater proportion of clients who received Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI) had higher costs (Chapter 7).

Selection Bias in Analyses of Client Data

- Analyses of data collected by States only from facilities that receive public funds earmarked for substance abuse treatment may be biased. States may want to pursue reporting client data by all facilities, regardless of their funding status, to get a more accurate understanding of the substance use problems in their State (Chapter 8).

- Clients admitted to facilities receiving public funds earmarked for treatment of substance use disorders generally were younger, less likely to be employed, less likely to be married, less likely to have postsecondary education, and less likely to have private insurance pay for their treatment than those entering other facilities. However, variations among States were found between clients who entered facilities that accepted earmarked funds and those who entered facilities that did not accept earmarked funds (Chapter 8).

Chapter 1. Health Services Utilization by Individuals with Substance Use and Mental Disorders

Carol L. Council, M.S.P.H.
Jeremy W. Bray, Ph.D.

Behavioral health care delivery in the United States is undergoing rapid change in both its organizational and financial structures. These changes have been precipitated by the complex demands of containing costs, maintaining the quality of care, making care available to all who need treatment, and focusing resources on those forms of care that offer the best hope of successful outcomes. Although these changes are having profound effects on the structure of the treatment system and on service delivery in substance abuse treatment and mental health services programs, the nature of these changes has not been adequately studied. At the national, State, and local levels, policymakers and service providers need new knowledge to understand how these changes will affect access to needed care, the quality and effectiveness of care, the utilization of services, cost of treatment services, and the outcomes of treatment for people with acute and chronic substance use and mental disorders.

Addressing such issues as the structure, processes, and outcomes of substance abuse treatment, mental health services, prevention, and related health services is within the purview of health services research. This compendium provides important information on a number of areas that facilitate or inhibit the delivery of health services for those persons with substance use or mental disorders. It provides important insight into the organization, financing, management, and delivery of behavioral health services and explores such issues as accessibility, utilization, quality, cost, cost-effectiveness, and outcomes. It examines how the demographic characteristics of an individual affect how, when, where, and if a person will seek care; what types of care are chosen or provided; and what happens during the delivery of care. Finally, the compendium explores potential biases inherent in using many of the large datasets currently available for conducting behavioral health services research.

This chapter includes a brief introduction to health services research, a history of its development as a discipline, and how it has been used to study health care systems. In addition, a brief review of the history of behavioral health services research is included. This is followed by an overview of the remaining chapters and key issues examined in this compendium.

Health Services Research

The Institute of Medicine (IOM, 1995) defined health services research as "a multidisciplinary field of inquiry, both basic and applied, that examines the use, costs, quality, accessibility, delivery, organization, financing, and outcomes of health care services to increase knowledge and understanding of the structure, processes, and effects of health services for individuals and populations" (pp. 3 and 17). In early 2000, K. N. Lohr and D. M. Steinwachs co-chaired an ad hoc committee to develop the following revised definition for the Association for Health Services Research (AHSR), now the Academy for Health Services Research and Health Policy:

Health services research is the multidisciplinary field of scientific investigation that studies how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to health care, the quality and cost of health care, and ultimately our health and well-being. Its research domains are individuals, families, organizations, institutions, communities, and populations. (Lohr & Steinwachs, 2002, p. 16)

Health services research strives to identify the most effective ways to organize, manage, finance, and deliver high quality care; reduce medical errors; and improve patient and/or client safety.[1] A variety of disciplines study health services research issues. They include medicine, biostatistics, economics, epidemiology, management, law, nursing, pharmacy, psychology, and sociology. Health services research involves integrating epidemiologic, sociologic, economic, and other analytical sciences so that the relationships between need, demand, availability, utilization, and outcome of health services may be better understood. Its ultimate research goal is maximizing the efficiency and efficacy of health services.

In general health care, health services research has been used extensively to study health care systems and to define best practices. It has provided evidence of both what works and what does not. Health care utilization has been studied widely to determine the factors that influence treatment-seeking behaviors. The use of information gained from this research has saved billions of dollars and improved health care for many Americans.

Health services research had its beginnings in the 17th century as physicians sought to understand variations in hospital mortality rates (McCarthy & White, 2000). Until the 20th century, studies were limited in size and scope. In 1898, the American Medical Association (AMA) Committee for Scientific Research was established to provide grants for fostering medical research (AMA, 2004). The National Health Survey conducted in 1935-1936 and other studies underscored the disparities in health status and access to medical care associated with income (IOM, 1992). Government programs developed during the Great Depression shifted responsibility for many social programs to the Federal Government. During the 1940s and 1950s, as the number of physicians increased and specialization of medical practice also increased, health services research became more important. In the 1960s and 1970s, health services research became increasingly institutionalized with the development of a National Institutes of Health (NIH) Health Services Research Study Section and the journal *Health Services Research* (McCarthy & White, 2000). With the passage of Medicare legislation in 1965 and concurrent regional medical programs, there was a need for oversight and better understanding of how health services utilization would be affected. In 1966, the Comprehensive Health Planning Act was passed by Congress, and Federal funding for health services research began.

It should be noted that prior to the development of biostatistical methods and consistent data collection techniques, health services research could be done on only a small scale. The development of the fields of biostatistics and epidemiology, coupled with rapid improvements in computer hardware, software technologies, and data collection methodologies during the 1970s,

---

[1] In this compendium, we refer to "patients" in traditional health care settings (e.g., hospitals) and to "clients" in behavioral health care/social services settings (e.g., substance abuse treatment). So, in the chapter on hospitals (Chapter 3), the word "patient" is used. The other chapters primarily use the word "client."

enabled more rigorous study of such issues as access, selection of providers, service delivery, financing, and outcomes. In 1973, legislation enabling the creation of the National Center for Health Statistics (NCHS) was enacted. During the 1970s and 1980s, health economics developed, and there was increased awareness that certain patterns of medical practice were associated with better health outcomes.

From 1971 to 1982, the RAND Health Insurance Experiment was undertaken (Newhouse, 1999; Newhouse & Insurance Experiment Group, 1994). The conclusion from this study was that while the use of co-payments reduced the use of health services, there was no apparent change in the health status of most families (Freund, 1994; Normand, 1994). The "sick poor" (i.e., persons with low incomes who were ill in particular ways at the start of the experiment) were the exception. For them, access to "free" care helped in regard to those conditions. These findings had a great impact on health care reform in the United States.

Over the past three decades, large health care studies have been sponsored by the Federal Government and also by foundations such as the Henry J. Kaiser Family Foundation and the Robert Wood Johnson Foundation. Many Federal agencies, such as the Centers for Disease Control and Prevention (CDC) and the NIH maintain large ongoing studies of the Nation's health, and longitudinal datasets are now available to enable the ongoing study of various health conditions, as well as special population groups.

Health Services Research in the Behavioral Health Sciences

The great societal costs of substance use and mental illnesses, coupled with large amounts of Federal, State, and local resources devoted to the amelioration of these problems, resulted in the use of health services research methodologies to seek effective models of short- and long-term care for people with acute and chronic substance use and mental disorders. The following describes the data collection efforts and evaluations that focused on mental health services and substance abuse treatment.

Federal involvement with mental health research began in 1855 with the creation in Washington, DC, of Saint Elizabeth's Hospital, a facility for persons with mental illnesses (National Library of Medicine, 2001). A Division of Mental Hygiene was established in the Public Health Service (PHS) in 1930 and became in 1949 the National Institute of Mental Health (NIMH) (National Library of Medicine, 1998). After passage of legislation in the 1970s that provided for community-based treatment, there was increased interest in demonstrating the benefits of these large expenditures and a call for research to show the most efficacious treatments. Thus began a large-scale research agenda that evolved over the next three decades and focused on understanding substance abuse treatment and mental health services, including the need for treatment, service utilization, outcomes, and financing. Several national evaluations were undertaken, and important national databases were established. They are briefly described in the following sections.

DARP, TOPS, and DATOS

One of the first behavioral health services research studies was the Drug Abuse Reporting Program (DARP). Designed to evaluate the emerging community-based substance abuse

treatment programs, as well as the use of methadone to treat addiction, DARP began in 1968 and was planned as a client reporting system to establish a research database for treatment programs funded by the National Institute on Drug Abuse (NIDA) (Sells, 1974). DARP measured treatment outcomes on 44,000 clients admitted to 52 treatment programs from 1969 to 1973. Methadone maintenance, therapeutic community, outpatient drug-free, and outpatient detoxification programs were studied. Findings from DARP demonstrated the effectiveness of community-based treatment in reducing substance use and criminal behaviors (Hubbard et al., 1989). The study also provided useful data on the natural history of heroin use in a treated population and evidence that addicted clients treated with methadone had better outcomes if they remained in treatment for longer than 90 days (Joe, Simpson, & Hubbard, 1991; Simpson & Savage, 1980).

The Treatment Outcome Prospective Study (TOPS) was designed to expand on DARP and to provide longitudinal data on clients to allow the assessment of short- and long-term treatment outcomes and to obtain more data on client attributes, program environments, and services delivered in treatment (Allison, Hubbard, Craddock, & Rachal, 1982; Ginzburg, 1978). Outpatient methadone, short- and long-term residential, and outpatient drug-free programs in operation from 1979 to 1981 were studied.

As in earlier studies, TOPS findings suggested that treatment was cost-effective and cost-beneficial in reducing the use of heroin and other illicit drugs (Harwood, Hubbard, Collins, & Rachal, 1988). Levels of predatory crime declined during treatment and remained lower than at baseline (Harwood et al., 1988; Hubbard et al., 1989). TOPS data showed that clients with substance use disorders have a great need for mental health services (Allison et al., 1982). TOPS data also indicated that clients with more ancillary services, particularly mental health, employment, and general services, had improved outcomes (Joe et al., 1991).

The Drug Abuse Treatment Outcome Study (DATOS) was a prospective cohort study designed to evaluate treatment effectiveness in typical, stable, community-based substance abuse treatment organizations operating from 1991 to 1993. DATOS obtained data on approximately 20,000 clients in four types of treatment programs: outpatient methadone, long-term residential, outpatient drug-free, and short-term residential (Tims, Fletcher, & Hubbard, 1991). Adult clients were interviewed at admission, during treatment, and at 12 months after the termination of treatment (except for clients receiving methadone long term who were interviewed approximately 24 months after admission if they were still in treatment during the follow-up phase of the study). DATOS used a standard set of instruments to provide diagnostic profiles of clients (Fletcher, Tims, & Brown, 1997; Flynn, Craddock, Hubbard, Anderson, & Etheridge, 1997).

Findings from DATOS indicated that in each type of treatment, clients lowered their drug use from pretreatment baselines at 12 months after treatment. DATOS also was able to document the marked decrease in services provided to clients in substance abuse treatment accompanied by an increase in unmet service need in the decade since clients entered the TOPS programs. There was a shift from more expensive targeted services to the provision of core services. However, DATOS found that substance abuse treatment programs appeared to have improved how they delivered services of counseling, treatment planning, and use of aftercare (Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997; Simpson, Joe, & Brown, 1997). DATOS was particularly

important in that it was able to document the change in substance use patterns and examine outcomes for community-based cocaine abuse treatment. Moreover, it was the first national study conducted after the start of the AIDS epidemic and also after the shift to Substance Abuse Prevention and Treatment (SAPT) block grant funding.

CODAP and TEDS

The Client Oriented Data Acquisition Process (CODAP) began in 1973 and initially was developed to satisfy requirements outlined in the Drug Abuse Office and Treatment Act of 1972. At that time, 13 separate Federal agencies were involved in the provision of substance abuse treatment, and the resultant duplication of effort and conflicts arising from the situation were best resolved by the creation of a single, ongoing management reporting system, agreed upon by all Federal agencies (Blanken, 1989). This system was CODAP.

Designed to monitor drug treatment need and use, CODAP provided current information describing clients and the treatment given to them in order to aid in planning, management, and evaluation activities (NIDA, 1982). Programs for treatment of alcohol abuse were not included. All program recipients of Federal funds for drug abuse treatment and rehabilitation services were required to participate in CODAP. Data collection began in 1973. Admission reports for approximately a quarter of a million clients were submitted annually by 1,800 to 2,000 participating treatment programs (Office of Applied Studies [OAS], 2004). CODAP included no client, staff, or program surveys, and it depended on treatment units to provide data. Discharge data provided parallel information, as well as the reason for discharge. Although CODAP was not able to produce client outcome data, data available pertaining to client characteristics, geographic distribution, and drug use patterns and trends over time also greatly increased national knowledge about the epidemiology of drug use and the provision of treatment services.

The Alcohol, Drug Abuse, and Mental Health Services (ADMS) block grant program, implemented in 1981, transferred Federal funding from individual programs to the States for distribution, and required no data reporting (OAS, 2004). Thus, CODAP was no longer a required reporting process.

In 1988, the Comprehensive Alcohol Abuse, Drug Abuse, and Mental Health Amendments established a revised SAPT block grant and mandated Federal data collection on clients receiving treatment for either alcohol or drug use disorders. Work on the Treatment Episode Data Set (TEDS) began in 1989 with the issuance of 3-year development grants to States. TEDS includes admissions to facilities that are licensed or certified by State substance abuse agencies to provide substance abuse treatment (or are administratively tracked for other reasons) (OAS, 2004).

DSRS, SROS, and ADSS

In 1990, the Office of National Drug Control Policy (ONDCP) requested that NIDA conduct a nationally representative study of the treatment system. The Drug Services Research Survey (DSRS) was designed to obtain information on drug abuse treatment providers and client characteristics to supplement information from the 1989 National Drug and Alcoholism Treatment Unit Survey (NDATUS).

The DSRS had two phases. In Phase I, a representative probability sample of 1,183 drug treatment facilities was drawn from a comprehensive list of organized substance abuse treatment facilities (the 1989 NDATUS list). During Phase II, a representative subsample, stratified by facility type, of 120 drug treatment facilities was selected. The DSRS provided a picture of treatment participation and client characteristics, including demographics, prior treatment history, drug use history, and discharge status of clients at each sampled treatment facility (Batten et al., 1992, 1993).

The Services Research Outcomes Study (SROS) was sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) and was a 5-year postdischarge follow-up of a broadly representative sample of treatment facilities and clients based on the DSRS facility sample. Specifically, 1,799 clients from a sample of 99 drug treatment facilities were interviewed. The study compared client behavior in the 5 years before treatment with behavior 5 years after treatment with respect to drug and alcohol use, criminal involvement, employment, physical and mental health, and other behaviors. SROS analyzed treatment results in light of client characteristics and the type and cost of treatment services the clients received. It provided an examination of multiple treatment episodes before and after treatment in a 1990 population. SROS confirmed that both substance use and criminal behavior were reduced following inpatient, outpatient, and residential treatment for drug use disorders (OAS, 1998).

The Alcohol and Drug Services Study (ADSS) built on the work of the 1990 DSRS study with a more complex sampling frame, an enhanced sampling design, and improved measures of financing and organization. Sponsored by OAS, ADSS was designed to collect information on the characteristics of substance abuse treatment facilities and their clients and to study the relationships among facility characteristics, treatment services, and clients in treatment. OAS was interested in developing better estimates of client length of stay and the costs of treatment and to describe the posttreatment status of clients (OAS, 2003b).

The ADSS sample was selected using a multistaged, stratified design, with selection of 2,393 facilities in Phase I, a selection of a subset of Phase I responding facilities, and a selection of client discharge records in Phase II and client follow-up in Phase III. Facilities in the sampling frame were stratified by treatment type: hospital inpatient, nonhospital residential, outpatient predominantly alcohol, outpatient predominantly methadone, other outpatient, and combined treatment types (OAS, 2003b).

The ADSS cost study examined treatment costs with validated cost data from a nationally representative sample of substance abuse treatment facilities and applied its costing methodology to a representative sample of facilities. Its findings supported other studies' findings that nonmethadone outpatient treatment is substantially less expensive than residential treatment (OAS, 2003a). It also found that the cost per enrolled client day in outpatient methadone treatment was only marginally higher than the cost per enrolled client day in nonmethadone outpatient treatment. One of the most important conclusions from the ADSS cost study was the variability in unit costs within a type of treatment.

NTIES

The National Treatment Improvement Evaluation Study (NTIES) was a congressionally mandated 5-year longitudinal study of the impact of drug and alcohol treatment on clients in treatment units that received public support in 1990-1991 from SAMHSA through its Center for Substance Abuse Treatment (CSAT) demonstration grant-funding program. All recipient facilities were recruited to provide facility-level information on services, staffing, and costs. Ten percent of the facilities were purposively selected for inclusion in a client follow-up study that covered the 1993-1994 admission cohort and included a 1-year follow-up study. Client-level data were obtained for over 5,000 clients at treatment intake, at treatment exit, and 12 months after treatment exit. The study was designed to address two issues: (a) the amount of treatment required to achieve successful outcomes; and (b) the extent to which favorable outcomes persist following termination from treatment.

Findings indicated better treatment outcomes for clients in outpatient methadone treatment with longer stays in treatment who were still in the program at follow-up (Koenig, Denmead, Nguyen, Harrison, & Harwood, 1999). NTIES provided support for expansion of methadone treatment, expansion of aftercare services for clients treated with methadone, and expansion of ancillary services, such as transportation and day care to support retention in treatment. Practice implications suggested the need to develop aftercare plans prior to discharge and to provide information and referral services to help discharged clients locate alternative treatment services. NTIES underscored the need to study factors that result in increased client retention and better treatment.

NCS

The National Comorbidity Survey (NCS) was a collaborative epidemiological investigation designed to study the prevalence and correlates of disorders defined and described in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III-R) (American Psychiatric Association [APA], 1987), as well as the patterns and correlates of service utilization for these disorders. The NCS was the first survey to administer a structured psychiatric interview to a nationally representative sample. The survey was carried out in the early 1990s with a household sample of more than 8,000 respondents aged 15 to 54 years. Baseline NCS respondents were reinterviewed in 2001-2002 (NCS-2) to study the patterns and predictors of the course of mental and substance use disorders and to evaluate the effects of primary mental disorders in predicting the onset and course of secondary substance use disorders (Harvard Medical School, Office of Public Affairs, 2003; Kessler et al., 2003).

The study showed that as many as half of the U.S. population met criteria for a mental disorder at some time in their lives and that, in any given year, such mental disorders were highly concentrated in a relatively small portion of the population (5 to 8 percent) (Kessler et al., 1997). In addition, findings from the NCS indicated that 6 percent of women and 9 percent of men met criteria for alcohol dependence and that 23 percent of women and 26 percent of men met criteria for tobacco dependence (Kandel, Warner, & Kessler, 1998).

In summary, changes in the patterns of substance use, the nature of the treatment population, and the treatment system have added new challenges to behavioral health services

research. The evaluations and databases developed over the past three decades provide a good foundation to study the nature and impact of these changes. Most were developed to answer specific research and practice questions relevant at the time, and each study was costly and required long periods of time for planning, pilot testing, data collection, and data analysis. Although study methodologies improved greatly over the decades, most of the studies described above had similar methodological problems, which are inherent in studying those with substance use and mental disorders and treatment services for those populations. For example, treatment facilities and modalities change. To ensure that programs will be in operation at the end of data collection, it is prudent to select large well-established programs for study. Difficulties in following clients after treatment completion or discharge exist because such clients are highly mobile and often want anonymity after treatment completion. Some changes in the treatment milieu, occasioned by changes in financing structures and the impact of managed care, were largely unanticipated. Nonetheless, the evaluations and databases provide a rich source of information for behavioral health services researchers. To make optimal use of this information, researchers should be aware of the limitations of these datasets, as well as the societal conditions and treatment structures in place at the time of the evaluations. These factors should be considered in interpreting data on the organization and impact of treatment.

Overview of Chapters and Key Issues

The large expenditures of State and Federal dollars on substance abuse treatment and mental health services have spawned increased demand for accountability and determination of best practices. In response, the Federal Government has supported the creation of large databases that have been used to gain a better understanding of clients served and services provided. The chapters in this compendium use data from a variety of sources, including many of those described above, and provide important new knowledge.

- Chapter 2, "Access to Substance Abuse Treatment and Mental Health Services: A Literature Review," examines literature on access to treatment for substance use disorders and to services for mental illnesses.

- Chapter 3, "Substance Use and Mental Disorder Discharges from U.S. Community Hospitals in the Early 1990s, Revisited," examines trends in discharges from community hospitals nationwide of those with substance use and mental disorders between 1990 and 1995.

- Chapter 4, "Do Client Characteristics Affect Admission to Inpatient Versus Outpatient Alcohol Treatment in Publicly Monitored Programs?" uses the 1996 Treatment Episode Data Set (TEDS) to examine the association between disorder severity and admission to publicly monitored inpatient versus outpatient alcohol treatment among adult males.

- Chapter 5, "Client Choice among Standard Outpatient, Intensive Outpatient, Residential, and Inpatient Alcohol Treatment in State-Monitored Programs," examines client characteristics that are associated with client choice of treatment setting.

- Chapter 6, "Length of Stay among Female Clients in Substance Abuse Treatment," examines factors associated with retention of female clients in treatment, using ADSS Phase II data.

- Chapter 7, "A Hybrid Cost Function for Outpatient Nonmethadone Substance Abuse Treatment Facilities," uses economic modeling of administrative data from ADSS Phase II to estimate a cost function for outpatient nonmethadone substance abuse treatment facilities.

- Chapter 8, "Effects of Reporting Requirements on Estimates from the Treatment Episode Data Set (TEDS)," examines potential biases that may exist in conducting research using TEDS data.

- Chapter 9, "Conclusions and Implications," summarizes the chief findings of this compendium and discusses the implications of these findings with suggestions for future research.

The remaining discussion focuses on key issues from these chapters. These chapters provide new knowledge on such issues as access to treatment, treatment financing and costs, treatment retention, treatment choice, and some limitations of commonly used data sources.

Access, Financing, and Costs

Many of the Federal-sponsored evaluations mentioned earlier focused on issues related to populations served, services provided (including specialty services), characteristics of facilities providing treatment, and, to the extent possible, financing issues. This compendium further explores the financing of and access to substance abuse treatment and mental health services. Chapter 2 examines the literature on access to treatment for substance use and mental disorders, and it reviews a variety of attributes (with a special emphasis on financial factors) that may affect a client's ability to access treatment. In the chapter, the shift to outpatient treatment is discussed, as well as its possible ramifications. The importance of managed care and financing on access to treatment is underscored, especially among those clients with more serious behavioral health disorders. The chapter also includes a discussion of the ability of government-sponsored behavioral health care systems to improve access for those clients with more serious disorders.

Chapter 7 uses economic modeling of administrative data from Phase II of ADSS, described earlier, to estimate a cost function for outpatient nonmethadone substance abuse treatment facilities with a sample representing 9,166 facilities. In the chapter, the practice of using costs estimated from a small number of nonrandomly selected facilities to conduct cost-benefit analyses is called into question. Importantly, it is suggested not only that larger facilities may be able to provide care at a lower price than smaller facilities, but also that higher costs may be appropriate when dealing with high-risk populations, such as clients receiving supplemental security income (SSI).

The importance of considering client characteristics that affect access, as well as treatment-seeking behaviors and treatment retention, has been extensively reported upon in the health services research literature. Chapter 2 reviews the literature on client demographics and treatment-seeking behavior. TEDS data from 1996 are used in Chapter 4 to examine the

association between disorder severity and admission to publicly monitored inpatient versus outpatient alcohol treatment. Subjects studied are adult males with alcohol as a primary substance of abuse who were admitted for rehabilitation treatment in a State-monitored program in one of nine States.

In Chapter 4, clients who either paid for treatment out-of-pocket or who received publicly funded treatment are examined, as is how the source of payment varied across States. Multivariate logistic regression models were used for each State, with results indicating that greater disorder severity increased the odds of inpatient admission (an exception was co-occurring mental disorders). Those clients who were employed were less likely to have an inpatient admission, while those who were homeless, who had one prior treatment episode, and/or who were referred by an alcohol or drug treatment provider were more likely to have an inpatient admission.

Treatment Retention

As described earlier, several large research studies have indicated that a longer length of stay (LOS) is associated with better client outcomes. In Chapter 6, the ADSS Phase II dataset is used to derive a nationally representative sample of female clients discharged from substance abuse treatment facilities to examine factors associated with treatment retention in one of four types of treatment facilities: nonhospital residential treatment only, outpatient methadone treatment only, outpatient nonmethadone treatment only, or a combination of types of care. Lengths of stay in treatment are compared based on demographic, socioeconomic, and organizational characteristics. As reported in earlier evaluations, the total number of services provided to clients in treatment was found to be declining. The study described in Chapter 6 finds that with regard to women's treatment, facilities offering child care services and treatment at women-only facilities were associated with longer lengths of stay.

Data Limitations

Most databases have important limitations; care must be taken in interpreting findings obtained from them and generalizing to the entire population of those with substance use and mental disorders. Although biases are evident in earlier evaluations, as well as in Federal-maintained databases, few previous studies have examined the impact of biases on research findings. Two chapters in this compendium focus on the potential impact of such biases. Chapter 3 is a review of the findings from a 1990-1995 study that examined discharge trends from community hospitals nationwide of patients with substance use and mental disorders. The chapter includes a critique of previous studies that used the National Hospital Discharge Survey (NHDS) and focused on community hospitalizations for substance use and mental disorders. New estimates are provided in the chapter using the Agency for Healthcare Research and Quality's Nationwide Inpatient Sample (NIS). A persuasive argument is made that the NIS is the appropriate dataset to use for making such estimates. Contrary to findings from previous research, the evidence in Chapter 3 indicates that community hospitalization of patients with substance use and mental disorder diagnoses increased between 1990 and 1995. Moreover, even though those patients were diagnosed with more complex disorders, they had short hospital stays. Because health care utilization studies (e.g., the RAND Health Insurance Experiment) can

have an important impact on public policy and funding decisions, it is important to select the most appropriate dataset for studying and interpreting treatment-seeking behavior.

Chapter 8 examines biases that may be introduced into datasets, such as TEDS, as a result of State-level reporting requirements. Each State sets requirements on the types of providers or facilities that must report into the TEDS system, with some States only requiring that facilities receiving earmarked funds for substance abuse treatment report on their clients, while other States require that all facilities report regardless of their funding sources. This chapter examines whether or not selection bias occurs in the collection and reporting of data to TEDS for adult males with alcohol as a primary substance of abuse who were admitted for rehabilitation treatment. TEDS data are used from two States that collect information from both types of facilities. Findings indicate that biases do exist. Clients admitted to facilities receiving Federal earmarked funds had a different client demographic profile. Moreover, large variations in these profiles existed between States. Thus, it may be important for States to require reporting by all facilities, regardless of their funding status, if they want an accurate understanding of their substance use disorder.

Treatment Choice

Earlier research has underscored the shift of treatment services provision to outpatient settings, as well as the impact of managed care on provider treatment options. Chapter 5 examines client characteristics associated with choice of treatment setting in State-monitored facilities, including standard outpatient, intensive outpatient, short-term residential, long-term residential, and inpatient hospital rehabilitation. The chapter discusses the appropriateness of combining types of inpatient and outpatient treatment into two broad categories for analysis purposes. As in Chapter 8, this study uses 1996 TEDS data on adult males with alcohol as the primary substance of abuse in two States that collect information on all clients admitted to treatment, regardless of the use of earmarked funds. Multivariate multinomial logistic models were estimated for each State, and covariates included disorder severity and socioeconomic measures. Those admitted to the standard outpatient setting appeared to have less severe alcohol use disorders and were far more likely to be employed at admission than those admitted to other settings. These findings suggest that client treatment-setting choice should not be studied as a dichotomous choice between two types of treatment, but rather as a choice among multiple settings.

The chapters in this compendium add to the body of knowledge concerning the provision of treatment services in behavioral health care. However, it is important to note that although much of the research obtained from the general health services continuum has relevance for treating substance use and mental disorders, important differences should be considered when making policy inferences. In Chapter 9, several of the issues raised in the compendium are discussed, their implications for policymakers are presented, and areas for further research are suggested.

References

Allison, M., Hubbard, R. L., Craddock, S. G., & Rachal, J. V. (1982). *Drug abuse treatment process: Preliminary examination of the TOPS data* (RTI/1901/-1-068). Research Triangle Park, NC: Research Triangle Institute.

American Medical Association. (2004, January 7). *Chronology of AMA history: 1847 to 1899*. Retrieved February 10, 2004, from http://www.ama-assn.org/ama/pub/category/1922.html

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders (DSM-III-R)* (3rd rev. ed.). Washington, DC: Author.

Batten, H. L., Horgan, C. M., Prottas, J. M., Simon, L. J., Larson, M. J., Elliott, E. A., Bowden, M. L., & Lee, M. T. (1993). *Drug Services Research Survey, Phase I final report: Non-correctional facilities* (revised; submitted to the National Institute on Drug Abuse). Waltham, MA: Institute for Health Policy, Brandeis University. [Available at http://www.oas.samhsa.gov/dsrs.htm]

Batten, H. L., Prottas, J. M., Horgan, C. M., Simon, L. J., Larson, M. J., Elliott, E. A., & Marsden, M. E. (1992). *Drug Services Research Survey, final report: Phase II* (submitted to the National Institute on Drug Abuse). Waltham, MA: Institute for Health Policy, Brandeis University. [Available at http://www.oas.samhsa.gov/dsrs.htm]

Blanken, A. (1989, June). Evolution of a national database for drug abuse treatment clients. In *Proceedings of the Community Epidemiology Work Group: Epidemiologic trends in drug abuse*. Rockville, MD: National Institute on Drug Abuse.

Comprehensive Alcohol Abuse, Drug Abuse, and Mental Health Amendments, Pub. L. No. 100-690, Title II, ch. 2, § 2052 (1988).

Comprehensive Health Planning Act, Pub. L. No. 89-749 (1966). [Also known as the Partnership for Health Act of 1966 and its 1967 Amendments]

Drug Abuse Office and Treatment Act, Pub. L. No. 92-255 (1972).

Fletcher, B. W., Tims, F. M., & Brown, B. S. (1997). The Drug Abuse Treatment Outcome Study (DATOS): Treatment evaluation research in the United States. *Psychology of Addictive Behaviors, 11*, 216-229.

Flynn, P. M., Craddock, S. G., Hubbard, R. L., Anderson, J., & Etheridge, R. M. (1997). Methodological overview and research design for the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11*, 230-243.

Freund, D. A. (1994). "Free for All?" Lessons from the RAND Health Insurance Experiment [Book review]. *Health Affairs, 13*, 293-295.

Ginzburg, H. M. (1978). Recent developments in chemotherapy of narcotic addiction. Part VII. Evaluation of treatment effectiveness: defensive research—The Treatment Outcome Prospective Study (TOPS). *Annals of the New York Academy of Sciences, 311*, 265-269.

Harvard Medical School, Office of Public Affairs. (2003, November 11). *Study challenges proposed changes to clinical definition of mental illness: Untreated, mild forms of mental illness can become more severe over time.* Retrieved June 2, 2004, from http://www.hms.harvard.edu/news/releases/11_10kessler.html

Harwood, H. J., Hubbard, R. L., Collins, J. J., & Rachal, J. V. (1988). The costs of crime and the benefits of drug abuse treatment: A cost-benefit analysis using TOPS data. In C. G. Leukefeld & F. M. Tims (Eds.), *Compulsory treatment of drug abuse: Research and clinical practice* (pp. 209-235, NIH Publication No. 94 3713, NIDA Research Monograph 86). Rockville, MD: National Institute on Drug Abuse. [Available as a PDF at http://165.112.78.61/pdf/monographs/download86.html]

Hubbard, R. L., Craddock, S. G., Flynn, P. M., Anderson, J., & Etheridge, R. M. (1997). Overview of 1-year follow-up outcomes in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11*, 261-278.

Hubbard, R. L., Marsden, M. E., Rachal, J. V., Harwood, H. J., Cavanaugh, E. R., & Ginzburg, H. M. (1989). *Drug abuse treatment: A national study of effectiveness*. Chapel Hill, NC: University of North Carolina Press.

Institute of Medicine (G. S. Wunderlich, Ed.). (1992). *Toward a national health care survey: A data system for the 21st century*. Washington, DC: National Academy Press. [Available at http://books.nap.edu/catalog/1941.html]

Institute of Medicine (M. J. Field, R. E. Tranquada, & J. C. Feasley, Eds.). (1995). *Health services research: Work force and educational issues*. Washington, DC: National Academy Press. [Available at http://books.nap.edu/catalog/5020.html]

Joe, G. W., Simpson, D. D., & Hubbard, R. L. (1991). Treatment predictors of tenure in methadone maintenance. *Journal of Substance Abuse, 3*, 73-84.

Kandel, D. B., Warner, L. A., & Kessler, R. C. (1998). The epidemiology of substance use and dependence among women. In C. L. Wetherington & A. B. Roman (Eds.), *Drug addiction research and the health of women* (pp. 105-130, NIH Publication No. 98-4290). Rockville, MD: National Institute on Drug Abuse. [Available as a PDF at http://165.112.78.61/PDF/DARHW/105-130_Kandel.pdf]

Kessler, R. C., Crum, R. M., Warner, L. A., Nelson, C. B., Schulenberg, J., & Anthony, J. C. (1997). Lifetime co-occurrence of DSM-III-R alcohol abuse and dependence with other psychiatric disorders in the National Comorbidity Survey. *Archives of General Psychiatry, 54*, 313-321.

Kessler, R. C., Merikangas, K. R., Berglund, P., Eaton, W. W., Koretz, D. S., & Walters, E. E. (2003). Mild disorders should not be eliminated from the DSM-V. *Archives of General Psychiatry, 60*, 1117-1122.

Koenig, L., Denmead, G., Nguyen, R., Harrison, M., & Harwood, H. (1999, August). *The cost and benefits of substance abuse treatment: Findings from the National Treatment Improvement Evaluation Study (NTIES)*. Rockville, MD: Center for Substance Abuse Treatment. [Available as a PDF at http://www.icpsr.umich.edu/SAMHDA/NTIES/NTIES-PDF/REPORTS/cost-ben.pdf].

Lohr, K. N., & Steinwachs, D. M. (2002). Health services research: An evolving definition of the field. *Health Services Research, 37*, 15-17.

McCarthy, T., & White, K. L. (2000). Origins of health services research. *Health Services Research, 35*, 375-387.

National Institute on Drug Abuse. (1982). *Data from the Client Oriented Data Acquisition Process (CODAP): Annual data, 1981* (DHHS Publication No. ADM 82-1223, Statistical Series E, No. 25). Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, National Institute on Drug Abuse.

National Library of Medicine. (1998, April 27). *Images from the history of the Public Health Service: Mental health and drug abuse*. Retrieved February 10, 2004, from http://www.nlm.nih.gov/exhibition/phs_history/121.html

National Library of Medicine. (2001, May 5). *Saint Elizabeths Hospital*. Retrieved February 12, 2004, from http://www.nlm.nih.gov/hmd/medtour/elizabeths.html

Newhouse, J. P. (1999). *RAND Health Insurance Experiment [in metropolitan and non-metropolitan areas of the United States], 1974-1982* [Computer file] (ICPSR version, Santa Monica, CA: The RAND Corporation [producer], 1986). Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor].

Newhouse, J. P., & Insurance Experiment Group. (1994). *Free for all? Lessons from the RAND Health Insurance Experiment*. Cambridge, MA: Harvard University Press.

Normand, C. (1994). Views and reviews: Free for all: Lessons from the RAND Health Insurance Experiment. *British Medical Journal, 308*, 1724-1725.

Office of Applied Studies. (1998). *Services Research Outcomes Study (SROS)* (DHHS Publication No. SMA 98-3177, Analytic Series A-5). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/analytic.htm]

Office of Applied Studies. (2003a). *Alcohol and Drug Services Study (ADSS) cost study: Costs of substance abuse treatment in the specialty sector* (DHHS Publication No. SMA 03-3762, Analytic Series A-20). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available as a PDF at http://www.oas.samhsa.gov/adss.htm]

Office of Applied Studies. (2003b). *Alcohol and Drug Services Study (ADSS): The national substance abuse treatment system: Facilities, clients, services, and staffing*. Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available as a PDF at http://www.oas.samhsa.gov/adss.htm]

Office of Applied Studies. (2004). *Treatment Episode Data Set (TEDS): 1992-2001: National admissions to substance abuse treatment services* (DHHS Publication No. SMA 03-3778, Drug and Alcohol Services Information System Series S-20). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#teds2]

Sells, S. B. (Ed.). (1974). *Studies of the effectiveness of treatments for drug abuse. Volume 1: Evaluation of treatments*. Cambridge, MA: Ballinger Publishing Company.

Simpson, D. D., Joe, G. W., & Brown, B. S. (1997). Treatment retention and follow-up outcomes in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11*, 294-307.

Simpson, D. D., & Savage, L. J. (1980). Drug abuse treatment readmissions and outcomes: Three-year follow-up of DARP patients. *Archives of General Psychiatry, 37*, 896-901.

Tims, F. M., Fletcher, B. W., & Hubbard, R. L. (1991). Treatment outcomes for drug abuse clients. In R. W. Pickens, C. G. Leukefeld, & C. R. Schuster (Eds.), *Improving drug abuse treatment* (pp. 93-113, DHHS Publication No. ADM 91-1754, NIDA Research Monograph 106). Rockville, MD: National Institute on Drug Abuse. [Available as a PDF at http://165.112.78.61/pdf/monographs/download106.html]

Chapter 2. Access to Substance Abuse Treatment and Mental Health Services: A Literature Review

Albert Woodward, Ph.D.

Introduction

This chapter reviews the increasing literature on access to substance abuse treatment and mental health services. The review is focused on the factors critical in shaping access to these services. This knowledge is necessary to help make informed resource allocation decisions that will enhance access for individuals most in need of treatment.

The following sections outline the methods used in the literature review and discuss the determinants of access to substance abuse treatment and mental health services. The chapter concludes with a discussion of the findings.

Methods

To develop a body of literature for this review, three online searches of the health care literature covering the years from the mid-1990s to the present were conducted. Articles were obtained from the HealthSTAR, PsycINFO, Sociological Abstracts, and MEDLINE databases using the keywords "access" and "substance abuse treatment." A second search identified literature from the PsycINFO and MEDLINE databases using the keywords "access" and "mental health treatment and services." A third search identified literature from the MEDLINE and PubMed databases using the keywords "access" and "health care," as well as variants of the terms "substance abuse" and "mental health." After a review of the identified articles, a few were eliminated from consideration because they were not directly related to mental health services or substance abuse treatment access. Also, articles that did not present original research were eliminated. The remaining articles were considered for the literature review. Most of the articles came from "field" journals (i.e., journals specializing in mental health or substance abuse). In addition to these online journal article searches, several books, reports, and other documents were added to the review if relevant to the discussion.

Definitions of Treatment Access

Several definitions of treatment access can be applied to both mental health services and substance abuse treatment. Myers (1965) proposed that there had to be four essential elements for "good" medical care, one of which is accessibility. She defined accessibility in terms of three components: personal accessibility, comprehensive services, and quantitative adequacy. Personal accessibility means that there must be defined points of entry into the health care system. A comprehensive range of services is needed because complex problems may require input from a variety of specialties. Quantitative adequacy refers to the supply of a comprehensive range of personal health services sufficient to meet the need.

A widely used definition of access was developed by Aday, Fleming, and Andersen (1984):

> …those dimensions which describe the potential and actual entry of a given population group to the health care delivery system. The probability of an individual's entry into the health care system is influenced by the structure of the delivery system itself (the availability and organization of health care resources) and the nature of the wants, resources and needs that potential consumers may bring to the care-seeking process. (p. 13)

Aday et al. (1984) focused on personal characteristics, health behavior, and attributes of the health system. They viewed health services use as a result of a predisposition to use services, factors that facilitate or impede the use and the need for care. Donabedian (1973) developed a similar concept of access, but with a focus on the health system—access "comprises those characteristics of the resource that facilitate or obstruct use by potential clients" (p. 419).

Need, as a key component of treatment access, can be measured in terms of self-perceived health status, number of chronic conditions, or functional limitations. Clinical definitions of treatment need reflect circumstances under which a client seeks or is required to obtain treatment (Jeffers, Bognanno, & Bartlett, 1971). The decision to seek treatment typically is initiated by the patient. Patient choice is affected by need (e.g., incidence of illness), cultural-demographic characteristics, the role of the health care provider (especially in managed care) and/or family as an "agent" for the patient, and external and economic factors. The provider, acting as the patient's agent, determines the patient's demand for treatment.

Myers (1965), Aday and Andersen (1975), and Donabedian (1973) wrote before the advent and explosive growth of managed care and related changes in the health care market. As a result, their discussions of access are somewhat incomplete because they do not account for changes resulting from the growth of managed care or the competition among providers and payers (Gold, 1998; Miller, 1998). Prior to these changes, organization and financing were seen as independent, static variables among a list of system variables that influenced access. At that time, such system variables were of secondary importance to personal variables, including an individual's predisposing characteristics or their need for care (Booth, Staton, & Leukefeld, 2001). However, since the institution of managed care, attitudes have changed, and many researchers now believe that system variables may be even more important than many nonfinancial barriers to access (Berk & Schur, 1997, 1998; Sondik & Hunter, 1998).

The literature regarding access to mental health services and substance abuse treatment generally is consistent with the general health care literature in terms of the determinants of access (Woodward, Dwinell, & Arons, 1992). However, a growing number of researchers suggest that managed care has hindered access to both mental health services and substance abuse treatment (Mechanic, 1996) and to other health care services for vulnerable populations or patients with chronic conditions (Miller, 1998). Moreover, access often is measured by health care utilization data obtained in surveys. These surveys, however, usually do not include persons with mental disorders, who face barriers to access and participation in these surveys. Therefore, it is difficult to evaluate the access of those with mental disorders (Gold, 1998).

Determinants of Mental Health Services Access

The mental health services literature has examined a wide range of personal and environmental attributes that influence access to mental health services. These include demographics, health status and functional limitations, severity of condition, socioeconomic status and employment, patient view of mental illness, acculturation, ethnicity, community support, church participation, provider sensitivity, structural and operating aspects of providers, and a variety of economic and financial barriers (Woodward et al., 1992). Both financial and nonfinancial determinants or barriers to access to substance abuse treatment and mental health services are discussed in this chapter.

Severity of Illness

Research has found that patients with more serious mental illness experience difficulty in obtaining treatment for this illness (Gonzalez & Rosenheck, 2002; Wang, Demler, & Kessler, 2002). Perhaps those with more serious mental illness encounter more barriers to access than the general population because successful treatment may be more expensive due to the severity of the disorder. For example, veterans with co-occurring mental and substance use disorders incur higher overall treatment costs in Department of Veterans Affairs (VA) facilities, largely because of the severity of their conditions (Hoff & Rosenheck, 1998). Homeless persons and others with the human immunodeficiency virus (HIV) who have mental and substance use disorders have better outcomes if they are able to receive extensive services, especially substance abuse treatment (Burnam et al., 2001; Gonzales & Rosenheck, 2002). Substance abuse treatment clients who do not complete treatment appear to have more health problems at both the beginning and termination of treatment. Specifically, clients in outpatient nonmethadone treatment who do not complete treatment have a significantly greater number of diagnoses per client at both intake and discharge than those completing treatment (Woodward, Raskin, & Blacklow, 2004).

Demographics

Children and adolescents face significant obstacles in accessing mental health services and substance abuse treatment. One estimate suggests that approximately half of the children experiencing depression are not receiving care (Glied & Neufeld, 2001). Parental perceptions of children's mental illness and resulting parenting difficulties can act as a barrier to mental health services (Owens et al., 2002). Moreover, parental illness, including mental and substance use disorders, can further impede a child's access to treatment (Cornelius, Pringle, Jernigan, Kirisci, & Clark, 2001).

Race and ethnicity are attributes or predisposing factors that also can affect access to mental health services or substance abuse treatment (Snowden, 2001; Wang et al., 2002). Racial and ethnic differences in perceptions about mental illness, treatment system biases, and reliance on voluntary support networks act in ways that hamper treatment access (Dana, 2002; Kales et al., 2000; Snowden, 2001). As a result, African Americans and Hispanics are likely to receive fewer mental health services or less substance abuse treatment than needed (Wells, Klap, Koike, & Sherbourne, 2001). African Americans use proportionately fewer outpatient mental health services than white patients (Kales et al., 2000), regardless of access to private health insurance (Thomas & Snowden, 2001).

Delivery System

The mental health services system also can act as a barrier to access, even more so than can patient attributes or environmental issues. The delivery system for such care has been characterized by the President's New Freedom Commission on Mental Health (2002) as

> ... incapable of efficiently delivering and financing effective treatments—such as medications, psychotherapies, and other services—that have taken decades to develop. Responsibility for these services is scattered among agencies, programs, and levels of government. There are so many programs operating under such different rules that it is often impossible for families and consumers to find the care that they urgently need. The efforts of countless skilled and caring professionals are frustrated by the system's fragmentation. ("Letter to the President," October 29, 2002).

This message is not new. Many researchers have called for comprehensive systems of integrated care for people with mental illness, especially for those who are homeless (Dennis, Steadman, & Cocozza, 2000).

Treatment access is determined largely at the local level, where most mental health services are offered. Local market area studies of mental health services and substance abuse treatment (Condelli, Bonito, Ennett, & Fairbank, 1996; Goldsmith, Wagenfeld, Manderscheid, & Stiles, 1996) have indicated that specialty services are concentrated in more urbanized areas, providing urban populations with better access. Capacity or the availability of supply is crucial to understand access (and meet treatment need); both are influenced by the composition of treatment ownership, organization, and services and specialty mix (Schlesinger & Dorwart, 1992).

Local treatment can be restrictive and bureaucratic, making it difficult for persons with mental illness to obtain care. For example, one study found that persons with mental illness who are homeless in New York City received less Medicaid, food stamps, and other relief services than other persons who are homeless (Nuttbrock, Rosenblum, Magura, & McQuistion, 2002). Further, some rural areas have insufficient services to meet the needs of their population (Fox, Blank, Rovnyak, & Barnett, 2001; Hartley, Britain, & Sulzbacher, 2002).

Not all the changes in government programs have lessened access. The restructuring of California's public mental health system, for example, promoted access to treatment by patients with more serious mental illness (Snowden, Scheffler, & Zhang, 2002). Homeless persons with mental illnesses who receive coordinated and intensive mental health and support services have been discharged from treatment to community support services without loss of mental health status and social functioning (Rosenheck & Dennis, 2001).

Financing

Once persons with mental illnesses decide to seek treatment, they are confronted not only with the challenges of the health care system, but also with the challenge of paying for that care. Financial access to treatment is a function of ability to pay (either out-of-pocket or through private coverage or through public funding sources). In contrast, funding for most other health

care is heavily dependent on private health insurance financing (Frank, McGuire, Regier, Manderscheid, & Woodward, 1994). The literature on health care demand has focused principally on the relationship between health care demand and the demand for health insurance, as well as on the relationships between the type of health insurance package and health care utilization (Feldstein, 1973). In general, this literature includes mental illness but excludes substance use as determinants of health care utilization or health insurance choice (Frank & Manning, 1992; Keeler, Wells, Manning, Rumpel, & Hanley, 1986; Wells, Manning, Duan, Ware, & Newhouse, 1982).

Health insurance affects demand and access in two ways: Insured individuals may choose to demand more treatment services (moral hazard, in the conventional sense), or they may select specific coverage in anticipation of using services for themselves or dependents (adverse selection) (Larsen, Horgan, Marsden, & Tompkins, 1996; Steinberg, 1992). These two factors contribute to increased utilization over some optimal social welfare norm, which may be a "good thing" for those who avoid treatment (Steinberg, 1992, p. 275). Manning and Frank (1992) expressed the same idea: "As long as the incremental risk-pooling gains from reduced cost sharing more than offset the incremental increases in costs from demand response, we should expand mental health coverage" (p. 214).

Most persons seeking mental health services rely on public financing, which substitutes for health insurance and funds most mental health care (McKusick et al., 1998). This funding, however, is often inadequate to meet the needs of those with mental illness (Wang et al., 2002). Most mental health care is available through publicly funded programs that are part of the group of "safety net providers." These providers, who have been adversely affected by the changes in public financing, treat patients who might otherwise not have access to medical care (Baxter & Mechanic, 1997). Although the growth of Medicaid managed care made payments available to safety net providers, many States provide only limited mental health coverage and no methadone maintenance under Medicaid (McCarty, Frank, & Denmead, 1999).

Some public financing and private health insurance have moved from coverage of more costly inpatient hospital treatment to lower cost, but equally effective, residential care (Fenton, Hoch, Herrell, Mosher, & Dixon, 2002). Persons with mental illness often come to rely on more than one program for care. Changes in the financing of one type of program can affect other programs and access. A study of veterans with mental illnesses who used the VA mental health systems and non-VA State hospitals is illustrative (Desai & Rosenheck, 2000). In the eight States analyzed in the study, the use of State hospitals by veterans was correlated with VA funding:

> A 50% increase in VA *per capita* mental health spending was associated with a 30% decrease in veterans' use of state hospitals (elasticity of -0.6). Conversely, a 50% increase in state hospital *per capita* funding was associated with only an 11% increase in veterans' use of state hospitals (elasticity of 0.06). (p. 61)

Per capita funding of State hospitals and VA mental health systems directly affects access, as measured by utilization. The VA system has recently improved access and quality of care in comparison with that of privately insured populations (Leslie & Rosenheck, 2000).

Managed care appears to have constrained access to mental health services over the past decade. It has shifted financial risk onto providers and constrained provider treatment options through close oversight, financial incentives, and controls. However, nationally representative data are not available, and results must be interpreted with caution (Rosenbaum, Mauery, Teitelbaum, & Vandivort-Warren, 2002). For example, Cuffel and Regier (2001) observed that increased spending on behavioral health care leads to greater access. Although some studies have found that access is reduced as a consequence of managed care (e.g., Bloom et al., 2002; Leslie, Rosenheck, & Horwitz, 2001), other studies found no impact on health care utilization (e.g., Alegria et al., 2001-2002). Most of these studies have examined private-sector mental health care organizations. Referrals of patients to psychiatrists are constrained by the limits imposed by managed care plans (Grembowski et al., 2002). As mental health managed care becomes more concentrated among fewer firms, providers will have less opportunity to change their delivery systems to promote access (O'Brien, 2000). Korper and Raskin (2002) argued that the delivery system and managed care adversely have affected the treatment of older patients with substance use and mental disorders:

> Reduced time for doctor-patient interactions makes it difficult to identify patient problems with substances and drug interactions. The health care system has experienced reduced hospital lengths of stay, increased reliance on primary care physicians, dwindling outpatient resources, and reduced nursing home beds. Older adults…have fewer options as to where they can live and receive care. (p. 10)

In response to managed care, mental health care advocates have supported State and Federal legislation to make mental health benefits comparable with those of general medical care ("parity"). The effects of parity on access to mental health services are ambiguous. Managed care controls utilization by circumventing the benefit-design improvements that parity attempts to achieve (Frank & McGuire, 1998). In one large employer group, access for subgroups subject to a parity mandate was no different from that for subgroups not subject to parity—treatment prevalence rose for both types of subgroups (Zuvekas, Regier, Rae, Rupp, & Narrow, 2002). Parity can lead to improved mental health coverage and, therefore, access for a slightly higher number of people with mental illnesses. However, it also can have negative consequences, including the loss of all health insurance coverage for some people with mental illnesses (Sturm, 2000a). States with parity legislation have not experienced large increases in mental health services utilization, perhaps as a result of reductions in private health insurance coverage for mental health services (Pacula & Sturm, 2000).

Determinants of Substance Abuse Treatment Access

Need and Demographics

The need for substance abuse treatment has been estimated at the national and State levels based on responses to questions in the annual National Survey on Drug Use and Health (NSDUH), formerly the National Household Survey on Drug Abuse (NHSDA). This nationally representative survey assesses dependence and abuse of substances and treatment received (Office of Applied Studies [OAS], 2002). Findings based on this survey generally have been consistent with studies using other surveys and frequently agree with anecdotal treatment perceptions. Age at first use of alcohol or illicit drugs is a very important factor in understanding

an individual's need for treatment—the earlier the use of marijuana, for example, the greater is the likelihood for substance abuse treatment at a later age (Gfroerer, Wu, & Penne, 2002). Men are more likely to need treatment than women. The likelihood of seeking treatment increases with age up to the mid-30s and then declines; problems of substance use and need for treatment by race and ethnicity are similar to other illness conditions in the U.S. population (Flewelling, Ennett, Rachal, & Theisen, 1993; Gerstein, Foote, & Ghadialy, 1997; OAS, 1998). Family structure, living arrangements, and residential stability influence substance use and treatment need (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Johnson, Hoffman, & Gerstein, 1996).

The influence of predisposing factors—such as level of educational attainment, income, and employment status—on treatment need is still being evaluated. Because these factors often are interrelated, researchers have found it difficult to explore the separate effects of these variables. Thus, studies have somewhat contradictory findings. One study found no consistent associations among these predisposing variables and heavy or frequent use of substances, which is an indicator of treatment need (Flewelling et al., 1993). However, other studies have found a correlation between lower income and need for treatment among those over 25 years of age, but this correlation could indicate a relationship between different career and education paths and different levels of treatment need (Bachman et al., 1997; Gfroerer et al., 2002). The nature of the relationships observed between race/ethnicity and need for treatment could be confounded by the relationship between race and socioeconomic status (Flewelling et al., 1993).

Access to substance abuse treatment can be affected by such demographic factors as race/ethnicity and urbanization of residence, among others (OAS, 1998). For example, African Americans and Hispanics are less likely to have access to substance abuse treatment than are whites (Wells et al., 2001). Rural residency is a greater barrier to treatment than urban status. Rural at-risk drinkers had more difficulty obtaining care and were sick more often than their urban counterparts (Booth, Kirchner, Fortney, Ross, & Rost, 2000). Homeless persons with substance use disorders may have the most difficulty accessing treatment, even if they have public health insurance (Kushel, Vittinghoff, & Hass, 2001; Wenzel et al., 2001). Persons enrolled in a health maintenance organization (HMO) are more likely to initiate treatment after assessment if they are employed (with pressure from employers or colleagues to enter treatment) and have more serious substance use disorders (Mertens & Weisner, 2002). Persons who inject drugs or have HIV face particular barriers to care. The literature on these groups covers a wide variety of determinants of access to care. However, these studies are lacking, as these groups are difficult to study in a representative manner. Even so, there is agreement that these groups receive suboptimal care, which may be indicative of access constraints and an inability to comply with a prescribed treatment regimen (Burnam et al., 2001; Chitwood, Comerford, & McCoy, 2002; Knowlton et al., 2001; Weissman et al., 1995).

Seeking Treatment

Understanding the demand for substance abuse treatment is more complex than assessing the need for treatment. Demand depends on multiple factors—the person's behavior consequent to substance use, the seriousness of the substance use disorder, the price for treatment, patient income and education, and other market and personal characteristics. It is not uncommon for those with a health problem to delay seeking treatment. Those with substance use disorders also

are likely to deny that they need treatment (McCoy, Metsch, Chitwood, & Miles, 2001). Persons with substance use disorders often have an altered perception of their use that may contribute to their avoidance of treatment (Grossman, 1993).

When substance use disorders reach a point where an individual no longer can cope, then individuals will seek or be coerced into treatment. The time between the recognition of the need for treatment and actually seeking treatment may be as long as a decade or more (Kessler et al., 2001). The reasons for seeking treatment are "illuminating, although their logic proves to be unintelligible in some cases, and they may be evasive or deceptive in others" (Institute of Medicine [IOM], 1990, p. 109). Typically, the individual's reluctance to seek treatment has to be overcome. In many cases, the individual may have to be coerced into treatment by court order, family, or employer. The physical consequences of substance use, and subsequent attention to the disorder by health care professionals, motivate some people to seek treatment (Weisner & Matzger, 2002).

Financial Barriers

Multiple factors affect treatment access (Kessler et al., 2001), including financial barriers. As previously noted, a substantive body of literature has examined the relationship between demand for mental health services and health insurance coverage. More research remains to be done regarding the impact of insurance on substance abuse treatment access.

Many of those who seek substance abuse treatment have low incomes, which may hamper their ability to pay out-of-pocket, as well as their ability to acquire adequate health insurance coverage (Larsen et al., 1996; Sturm & Sherbourne, 2001). As a result, they often are forced to rely on subsidized treatment provided by publicly funded programs.

Persons with lower income are not the only group who face difficulties obtaining care. Older persons frequently have undiagnosed substance use disorders and, as a consequence, do not receive necessary treatment (Korper & Council, 2002). Older patients with diagnosed substance use disorders also face difficulty in obtaining needed outpatient mental health care, perhaps because of limits in Medicare benefits coverage (Brennan, Kagay, Geppert, & Moos, 2001).

The effect of managed care on access to substance abuse treatment is comparable with that for access to mental health services. Managed care, in general, shows evidence of systemic reductions in access to inpatient care for both substance use and mental disorders while increasing the reliance on outpatient treatment (Steenrod, Brisson, McCarty, & Hodgkin, 2001). Most substance abuse managed care also is "carved out" of the general health insurance plan or State Medicaid plan (Sosin & D'Aunno, 2001). As is the case with mandated mental health benefits, mandated substance abuse benefits may not increase utilization because managed care constrains that utilization (Sturm, 2000b).

States have introduced changes to welfare programs and Medicaid plans as a result of Federal legislative changes. Most of these changes have not improved access for persons with substance use disorders. For example, under welfare reform, welfare recipients with substance use disorders in the State of Washington face difficulty in obtaining treatment and vocational

counseling in their efforts to become self-sufficient (Wickizer, Campbell, Krupski, & Stark, 2000). Although treatment access may be constrained by changes to State programs, two separate studies found that substance abuse treatment access improved as a result of programs in Massachusetts and Oregon (Beinecke, Shepard, Tetreault, Hodgkin, & Marckres, 2001; Deck, McFarland, Titus, Laws, & Gabriel, 2000).

The structure and organization of treatment providers can affect access to substance abuse treatment. For-profit treatment programs are more likely to provide treatment to clients with health insurance coverage or the ability to pay—clients who generally are not treated in publicly financed treatment programs (Wheeler & Nahra, 2000). Thus, substance abuse treatment is a "two-tiered" public and private system. Centralized intake assessments prior to treatment initiation serve to place publicly financed clients into treatment programs, thereby promoting treatment access (Guydish, Woods, Davis, Bostrom, & Frazier, 2001). However, one study found lower rates of treatment placement for women after centralized intake assessment (Arfken, Borisova, Klein, di Menza, & Schuster, 2002). Women with special needs (e.g., those who are pregnant) and men and women who injected drugs were given higher priority for treatment. Treatment access can be improved for women by providing the range of social support services they need, especially services for mothers (Marsh, D'Aunno, & Smith, 2000; Nakashian, 2002).

Publicly funded treatment facilities may not have sufficient capacity to provide services to all individuals who request treatment. Changes that increase staff burden, reduce or eliminate certain services, or lessen methadone availability are likely to erode patient access to substance abuse treatment programs (Friedmann, Alexander, & D'Aunno, 1999). Too often, individuals with substance use disorders end up going through short-term detoxification multiple times before beginning more long-term treatment solutions or relying on emergency departments for palliative treatment (McCarty, Capsi, Panas, Krakow, & Mulligan, 2000; McGeary & French, 2000; Wingerson, Russo, Ries, Dagadakis, & Roy-Byrne, 2001). Methadone maintenance programs may offer access to treatment for those addicted to heroin but may have insufficient funding to provide appropriate dosage or sufficient long-term treatment (Brands, Blake, & Marsh, 2002; Joseph, Stancliff, & Langrod, 2000; Sees et al., 2000; Weinrich & Stuart, 2000). The Medicaid program could itself be a barrier to treatment for these patients in the 25 States that do not cover methadone maintenance medication (McCarty et al., 1999).

Discussion

This literature review has covered a wide variety of the attributes of access to treatment for substance use and mental disorders, with an emphasis on financial impediments. The determinants of treatment access were divided into mental health and substance use topics because much of the literature discusses them separately. Nonetheless, the determinants are similar for both mental health services and substance abuse treatment. The literature shows a growing awareness of the impact of financing and costs as critical determinants of treatment access, reflecting the growth of managed care in the past decade. This growth has affected treatment of both disorders.

Treatment access, of course, is only the first step to successful outcomes. Persons with mental or substance use disorders cannot be treated if they cannot gain access to treatment, nor can they be treated successfully if treatment is not effective. Although treatment effectiveness is

beyond the subject of this chapter, effectiveness also depends, to some extent, on access to care. The IOM (1990) report sums up treatment effectiveness:

> No single treatment "works" for a majority of the people who seek treatment. Each of the treatment modalities for which there is a baseline of adequate studies can fairly be said to work for many of the people who seek that treatment; and enough of them do find the right treatment, and stay with it long enough, to make the current aggregate of treatment programs worthwhile. (p. 191)

The IOM report points out that access to appropriate treatment frequently is constrained by the lack of capacity in treatment programs, the restrictive costs of treatment, the lack of adequate intake assessment, and the lack of information or transportation. The critical first part of treatment effectiveness is initial assessment and assignment to the appropriate treatment, which often is missing. This is true for both mental health services and substance abuse treatment.

Despite a large number of studies on the topic, the reasons that people with mental or substance use disorders seek treatment are not fully known. Booth et al. (2001) argued that

> This broader definition of access can generally only be studied from community samples, where substance using individuals are identified and followed prospectively to see how access influences their use of treatment or other services. We know that relatively few individuals with "substance use disorders" use treatment services, and it is critical to identify the effect size for access, as a potentially modifiable policy-related factor, in increasing treatment-seeking. Additional information is needed to understand more about broad inequities in access, particularly for posited and actual vulnerable and generally powerless populations such as minorities and adolescents. (p. 676)

The authors suggested that the focus of new research should be on persons with substance use disorders in the community, as distinct from those getting substance abuse treatment, if the determinants of "treatment-seeking" are to be understood.

References

Aday, L. A., & Andersen, R. (1975). *Development of indices of access to medical care*. Ann Arbor, MI: Health Administration Press.

Aday, L. A., Fleming, G. V., & Andersen, R. (1984). *Access to medical care in the U.S.: Who has it, who doesn't* (Continuing CHAS Research Series–No. 32). Chicago, IL: Pluribus Press and University of Chicago, Center for Health Administration Studies.

Alegria, M., McGuire, T., Vera, M., Canino, G., Freeman, D., Matias, L., Albizu, C., Marin, H., & Calderon, J. (2001-2002). The impact of managed care on the use of outpatient mental health and substance abuse services in Puerto Rico. *Inquiry, 38,* 381-395.

Arfken, C. L., Borisova, N., Klein, C., di Menza, S., & Schuster, C. R. (2002). Women are less likely to be admitted to substance abuse treatment within 30 days of assessment. *Journal of Psychoactive Drugs, 34,* 33-38.

Bachman, J. G., Wadsworth, K. N., O'Malley, P. M., Johnston, L. D., & Schulenberg, J. E. (1997). *Smoking, drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities.* Mahwah, NJ: Lawrence Erlbaum Associates.

Baxter, R. J., & Mechanic, R. E. (1997). The status of local health care safety nets. *Health Affairs (Millwood), 16*(4), 7-23.

Beinecke, R. H., Shepard, D. S., Tetreault, J., Hodgkin, D., & Marckres, J. (2001). Substance abuse providers' assessment of the Massachusetts Behavioral Health Program: Year 6. *Administration and Policy in Mental Health, 28,* 443-457.

Berk, M. L., & Schur, C. L. (1997). A review of the national access-to-care surveys. In S. Isaacs & J. Knickman (Eds.), *To improve health and health care 1997: The Robert Wood Johnson Foundation anthology* (pp. 53-77). San Francisco, CA: Jossey-Bass Publishers. [Available at http://www.rwjf.org/publications/publicationsPdfs/library/oldhealth/tabofc.htm]

Berk, M. L., & Schur, C. L. (1998). Measuring access to care: Improving information for policymakers. *Health Affairs (Millwood), 17*(1), 180-186. Comments in *17*, 187-190.

Bloom, J. R., Hu, T. W., Wallace, N., Cuffel, B., Hausman, J. W., Sheu, M. L., & Scheffler, R. (2002). Mental health costs and access under alternative capitation systems in Colorado. *Health Services Research, 37,* 315-340.

Booth, B. M., Kirchner, J., Fortney, J., Ross, R., & Rost, K. (2000). Rural at-risk drinkers: Correlates and one-year use of alcoholism treatment services. *Journal of Studies on Alcohol, 61,* 267-277.

Booth, B. M., Staton, M., & Leukefeld, C. (2001). Substance use health services research. *Substance Use & Misuse, 36,* 673-685.

Brands, B., Blake, J., & Marsh, D. (2002). Changing patient characteristics with increased methadone maintenance availability. *Drug and Alcohol Dependence, 66*(1), 11-20.

Brennan, P. L., Kagay, C. R., Geppert, J. J., & Moos, R. H. (2001). Predictors and outcomes of outpatient mental health care: A 4-year prospective study of elderly Medicare patients with substance use disorders. *Medical Care, 39,* 39-49.

Burnam, M. A., Bing, E. G., Morton, S. C., Sherbourne, C., Fleishman, J. A., London, A. S., Vitiello, B., Stein, M., Bozzette, S. A., & Shapiro, M. F. (2001). Use of mental health and substance abuse treatment services among adults with HIV in the United States. *Archives of General Psychiatry, 58,* 729-736.

Chitwood, D. D., Comerford, M., & McCoy, H. V. (2002). Satisfaction with access to health care among injection drug users, other drug users, and nonusers. *Journal of Behavioral Health Services & Research, 29,* 189-197.

Condelli, W. S., Bonito, A. J., Ennett, S. T., & Fairbank, J. A. (1996, March). *Drug abuse among non-metropolitan and rural adolescents: The need and availability of services: Final report* (Report No. RTI/6072-1; revision of March 1995 draft). Research Triangle Park, NC: Research Triangle Institute.

Cornelius, J. R., Pringle, J., Jernigan, J., Kirisci, L., & Clark, D. B. (2001). Correlates of mental health service utilization and unmet need among a sample of male adolescents. *Addictive Behaviors, 26,* 11-19.

Cuffel, B. J., & Regier, D. (2001). The relationship between treatment access and spending in a managed behavioral health organization. *Psychiatric Services, 52,* 949-952.

Dana, R. H. (2002). Mental health services for African Americans: A cultural/racial perspective. *Cultural Diversity & Ethnic Minority Psychology, 8*(1), 3-18.

Deck, D. D., McFarland, B. H., Titus, J. M., Laws, K. E., & Gabriel, R. M. (2000). Access to substance abuse treatment services under the Oregon Health Plan. *Journal of the American Medical Association, 284,* 2093-2099.

Dennis, D. L., Steadman, H. J., & Cocozza, J. J. (2000). The impact of federal systems integration initiatives on services for mentally ill homeless persons. *Mental Health Services Research, 2,* 165-174.

Desai, R. A., & Rosenheck, R. A. (2000). The interdependence of mental health service systems: The effects of VA mental health funding on veterans' use of state mental health inpatient facilities. *Journal of Mental Health Policy and Economics, 3*(2), 61-67.

Donabedian, A. (1973). *Aspects of medical care administration: Specifying requirements for health care.* Cambridge, MA: Harvard University Press.

Feldstein, P. J. (1973). Research on the demand for health services. In J. B. McKinlay (Ed.), *Economic aspects of health care: A selection of articles from the Milbank Memorial Fund Quarterly* (pp. 123-158). New York: Prodist for the Milbank Memorial Fund.

Fenton, W. S., Hoch, J. S., Herrell, J. M., Mosher, L., & Dixon, L. (2002). Cost and cost-effectiveness of hospital vs residential crisis care for patients who have serious mental illness. *Archives of General Psychiatry, 59,* 357-364.

Flewelling, R. L., Ennett, S. T., Rachal, J. V., & Theisen, A. C. (1993). *National Household Survey on Drug Abuse: Race/ethnicity, socioeconomic status, and drug abuse 1991* (DHHS Publication No. SMA 93-2062). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Fox, J. C., Blank, M., Rovnyak, V. G., & Barnett, R. Y. (2001). Barriers to help seeking for mental disorders in a rural impoverished population. *Community Mental Health Journal, 37,* 421-436.

Frank, R. G., & Manning, W. G. (Eds.). (1992). *Economics and mental health.* Baltimore, MD: Johns Hopkins University Press.

Frank, R. G., & McGuire, T. G. (1998). Parity for mental health and substance abuse care under managed care. *Journal of Mental Health Policy and Economics, 1*(4), 153-159.

Frank, R. G., McGuire, T. G., Regier, D. A., Manderscheid, R., & Woodward, A. (1994). Paying for mental health and substance abuse care. *Health Affairs (Millwood), 13*(1), 337-342.

Friedmann, P. D., Alexander, J. A., & D'Aunno, T. A. (1999). Organizational correlates of access to primary care and mental health services in drug abuse treatment units. *Journal of Substance Abuse Treatment, 16,* 71-80.

Gerstein, D. R., Foote, M. L., & Ghadialy, R. (1997). *The prevalence and correlates of treatment for drug problems* (DHHS Publication No. SMA 97-3135, NHSDA Series H-2). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Gfroerer, J. C., Wu, L.-T., & Penne, M. A. (2002). *Initiation of marijuana use: Trends, patterns, and implications* (DHHS Publication No. SMA 02-3711, Analytic Series A-17). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies. [Available at http://www.oas.samhsa.gov/analytic.htm]

Glied, S., & Neufeld, A. (2001). Service system finance: Implications for children with depression and manic depression. *Biological Psychiatry, 49,* 1128-1135.

Gold, M. (1998). Beyond coverage and supply: Measuring access to healthcare in today's market. *Health Services Research, 33*(3 Pt 2), 625-652. Discussion in *33*, 681-684.

Goldsmith, H. F., Wagenfeld, M. O., Manderscheid, R. W., & Stiles, D. J. (1996). Geographical distribution of organized mental health services in 1983 and 1990. In R. W. Manderscheid & M. A. Sonnenschein (Eds.), *Mental health, United States, 1996* (pp. 154-167, DHHS Publication No. SMA 96-3098). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Mental Health Services.

Gonzalez, G., & Rosenheck, R. A. (2002). Outcomes and service use among homeless persons with serious mental illness and substance abuse. *Psychiatric Services, 53,* 437-446.

Grembowski, D. E., Martin, D., Patrick, D. L., Diehr, P., Katon, W., Williams, B., Engelberg, R., Novak, L., Dickstein, D., Deyo, R., & Goldberg, H. I. (2002). Managed care, access to mental health specialists, and outcomes among primary care patients with depressive symptoms. *Journal of General Internal Medicine, 17,* 258-269.

Grossman, M. (1993). The economic analysis of addictive behavior. In M. E. Hilton & G. Bloss (Eds.), *Economics and the prevention of alcohol-related problems* (pp. 91-123, NIH Publication No. 93-3513, NIAAA Research Monograph No. 25). Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism.

Guydish, J., Woods, W. J., Davis, T., Bostrom, A., & Frazier, Y. (2001). Does centralized intake improve drug abuse treatment outcomes? *Journal of Substance Abuse Treatment, 20,* 265-273. Discussion in *20*, 275-276.

Hartley, D., Britain, C., & Sulzbacher, S. (2002). Behavioral health: Setting the rural health research agenda. *Journal of Rural Health, 18*(Suppl.), 242-255.

Hoff, R. A., & Rosenheck, R. A. (1998). Long-term patterns of service use and cost among patients with both psychiatric and substance abuse disorders. *Medical Care, 36,* 835-843.

Institute of Medicine (D. R. Gerstein & H. J. Harwood, Eds.). (1990). *Treating drug problems: Volume 1. A study of the evolution, effectiveness, and financing of public and private drug treatment systems.* Washington, DC: National Academy Press. [Available at http://books.nap.edu/catalog/1551.html]

Jeffers, J. R., Bognanno, M. F., & Bartlett, J. C. (1971). On the demand versus need for medical services and the concept of "shortage." *American Journal of Public Health, 61,* 46-63.

Johnson, R. A., Hoffman, J. P., & Gerstein, D. R. (1996). *The relationship between family structure and adolescent substance use.* Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies. [Available in WordPerfect 6.1 file format at http://www.oas.samhsa.gov/analytic.htm]

Joseph, H., Stancliff, S., & Langrod, J. (2000). Methadone maintenance treatment (MMT): A review of historical and clinical issues. *Mount Sinai Journal of Medicine, 67,* 347-364.

Kales, H. C., Blow, F. C., Bingham, C. R., Roberts, J. S., Copeland, L. A., & Mellow, A. M. (2000). Race, psychiatric diagnosis, and mental health care utilization in older patients. *American Journal of Geriatric Psychiatry, 8,* 301-309.

Keeler, E. B., Wells, K. B., Manning, W. G., Rumpel, J. D., & Hanley, J. M. (1986). *The demand for episodes of mental health services* (Report No. R-3432-NIMH). Santa Monica, CA: Rand Corporation.

Kessler, R. C., Aguilar-Gaxiola, S., Berglund, P. A., Caraveo-Anduaga, J. J., DeWit, D. J., Greenfield, S. F., Kolody, B., Olfson, M., & Vega, W. A. (2001). Patterns and predictors of treatment seeking after onset of a substance use disorder. *Archives of General Psychiatry, 58,* 1065-1071.

Knowlton, A. R., Hoover, D. R., Chung, S. E., Celentano, D. D., Vlahov, D., & Latkin, C. A. (2001). Access to medical care and service utilization among injection drug users with HIV/AIDS. *Drug and Alcohol Dependence, 64,* 55-62.

Korper, S. P., & Council, C. L. (Eds.). (2002). *Substance use by older adults: Estimates of future impact on the treatment system* (DHHS Publication No. SMA 03-3763, Analytic Series A-21). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies. [Available at http://www.oas.samhsa.gov/analytic.htm]

Korper, S. P., & Raskin, I. E. (2002). The impact of substance use and abuse by the elderly: The next 20 to 30 years. In S. P. Korper & C. L. Council (Eds.), *Substance use by older adults: Estimates of future impact on the treatment system* (pp. 5-17, DHHS Publication No. SMA 03-3763, Analytic Series A-21). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies. [Available at http://www.oas.samhsa.gov/analytic.htm]

Kushel, M. B., Vittinghoff, E., & Haas, J. S. (2001). Factors associated with the health care utilization of homeless persons. *Journal of the American Medical Association, 285,* 200-206.

Larsen, M., Horgan, C., Marsden, M., & Tompkins, C. (1996). *Health insurance coverage for substance abuse services* (submitted by the Institute for Health Policy, Brandeis University, to the Office of Applied Studies). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Leslie, D. L., & Rosenheck, R. A. (2000). Comparing quality of mental health care for public-sector and privately insured populations. *Psychiatric Services, 51,* 650-655.

Leslie, D. L., Rosenheck, R. A., & Horwitz, S. M. (2001). Patterns of mental health utilization and costs among children in a privately insured population. *Health Services Research, 36*(1 Pt 1), 113-127.

Manning, W. G., & Frank, R. G. (1992). Econometric issues in the demand for mental health care under insurance. In R. G. Frank & W. G. Manning (Eds.), *Economics and mental health* (pp. 197-217). Baltimore, MD: Johns Hopkins University Press.

Marsh, J. C., D'Aunno, T. A., & Smith, B. D. (2000). Increasing access and providing social services to improve drug abuse treatment for women with children. *Addiction, 95,* 1237-1247.

McCarty, D., Caspi, Y., Panas, L., Krakow, M., & Mulligan, D. H. (2000). Detoxification centers: Who's in the revolving door? *Journal of Behavioral Health Services & Research, 27,* 245-256.

McCarty, D., Frank, R. G., & Denmead, G. C. (1999). Methadone maintenance and state Medicaid managed care programs. *Milbank Quarterly, 77,* 341-362.

McCoy, C. B., Metsch, L. R., Chitwood, D. D., & Miles, C. (2001). Drug use and barriers to use of health care services. *Substance Use & Misuse, 36,* 789-806.

McGeary, K. A., & French, M. T. (2000). Illicit drug use and emergency room utilization. *Health Services Research, 35*(1 Pt 1), 153-169.

McKusick, D., Mark, T. L., King, E., Harwood, R., Buck, J. A., Dilonardo, J., & Genuardi, J. S. (1998). Spending for mental health and substance abuse treatment, 1996. *Health Affairs (Millwood), 17*(5), 147-157.

Mechanic, D. S. (1996). Key policy considerations for mental health in the managed care era. In R. W. Manderscheid & M. A. Sonnenschein (Eds.), *Mental health, United States, 1996* (pp. 1-16, DHHS Publication No. SMA 96-3098). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Mental Health Services.

Mertens, J. R., & Weisner, C. (2002). Predictors of alcohol and drug treatment seeking, initiation, and retention in an HMO. *Alcoholism, Clinical and Experimental Research, 26,* 416-422.

Miller, R. H. (1998). Healthcare organizational change: Implications for access to care and its measurement. *Health Services Research, 33*(3 Pt 2), 653-680. Discussion in *33*, 681-684.

Myers, B. A. (1965). *A guide to medical care administration. Volume I: Concepts and principles.* Washington, DC: American Public Health Association.

Nakashian, M. (2002). Substance abuse and welfare reform. *Journal of the American Medical Women's Association, 57*(1), 36-37, 40.

Nuttbrock, L. A., Rosenblum, A., Magura, S., & McQuistion, H. L. (2002). Psychotic ideation and receipt of government entitlements among homeless persons in New York City. *Psychiatric Services, 53,* 719-723.

O'Brien, W. H. (2000). The economics of managed care in behavioral health: Basic concepts and incentives. *Psychiatric Clinics of North America, 23*, 255-267.

Office of Applied Studies. (1998). *Prevalence of substance use among racial and ethnic subgroups in the United States, 1991-1993* (DHHS Publication No. SMA 98-3202, Analytic Series A-6). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/analytic.htm]

Office of Applied Studies. (2002). *National and state estimates of the drug abuse treatment gap: 2000 National Household Survey on Drug Abuse* (DHHS Publication No. SMA 02-3640, NHSDA Series H-14). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/TXgap/cover.htm]

Owens, P. L., Hoagwood, K., Horwitz, S. M., Leaf, P. J., Poduska, J. M., Kellam, S. G., & Ialongo, N. S. (2002). Barriers to children's mental health services. *Journal of the American Academy of Child and Adolescent Psychiatry, 41,* 731-738.

Pacula, R. L., & Sturm, R. (2000). Mental health parity legislation: Much ado about nothing? *Health Services Research, 35*(1 Pt 2), 263-275.

President's New Freedom Commission on Mental Health. (2002*). Interim report to the President.* Washington, DC: Author. [Available at http://www.mentalhealthcommission.gov/reports/reports.htm]

Rosenbaum, S., Mauery, D. R., Teitelbaum, J., & Vandivort-Warren, R. (2002). Evaluation of agreements between managed care organizations and providers of community-based mental illness and addiction disorder treatments. *American Journal of Managed Care, 8,* 135-147.

Rosenheck, R. A., & Dennis, D. (2001). Time-limited assertive community treatment for homeless persons with severe mental illness. *Archives of General Psychiatry, 58,* 1073-1080.

Schlesinger, M., & Dorwart, R. A. (1992). Falling between the cracks: Failing national strategies for the treatment of substance abuse. *Daedalus, 121*(3), 195-237.

Sees, K. L., Delucchi, K. L., Masson, C., Rosen, A., Clark, H. W., Robillard, H., Banys, P., & Hall, S. M. (2000). Methadone maintenance vs 180-day psychosocially enriched detoxification for treatment of opioid dependence: A randomized controlled trial. *Journal of the American Medical Association, 283,* 1303-1310. Comment in *ACP Journal Club*, 2000, *133*(3), 109; comment in *Journal of the American Medical Association, 283,* 1337-1339; comment and discussion in *Journal of the American Medical Association, 284,* 694-695.

Snowden, L., Scheffler, R., & Zhang, A. (2002). The impact of realignment on the client population in California's public mental health system. *Administration and Policy in Mental Health, 29,* 229-241.

Snowden, L. R. (2001). Barriers to effective mental health services for African Americans. *Mental Health Services Research, 3,* 181-187.

Sondik, E. J., & Hunter, E. L. (1998). National data experts on access measures. *Health Affairs (Millwood), 17*(1), 189-190. Comment in *17*, 180-186.

Sosin, M. R., & D'Aunno, T. (2001). The organization of substance abuse managed care. *Recent Developments in Alcoholism, 15,* 27-49.

Steenrod, S., Brisson, A., McCarty, D., & Hodgkin, D. (2001). Effects of managed care on programs and practices for the treatment of alcohol and drug dependence. *Recent Developments in Alcoholism, 15,* 51-71.

Steinberg, R. (1992). The market for drug treatment. In D. Gerstein & H. Harwood (Eds.), *Treating drug problems: Volume 2. Commissioned papers on historical, institutional, and economic contexts of drug treatment* (pp. 245-288). Washington, DC: National Academy Press. [Available at http://books.nap.edu/catalog/1971.html]

Sturm, R. (2000a). State parity legislation and changes in health insurance and perceived access to care among individuals with mental illness: 1996-1998. *Journal of Mental Health Policy and Economics, 3,* 209-213.

Sturm, R. (2000b). Managed care risk contracts and substance abuse treatment. *Inquiry, 37,* 219-225.

Sturm, R., & Sherbourne, C. D. (2001). Are barriers to mental health and substance abuse care still rising? *Journal of Behavioral Health Services & Research, 28,* 81-88.

Thomas, K. C., & Snowden, L. R. (2001). Minority response to health insurance coverage for mental health services. *Journal of Mental Health Policy and Economics, 4*(1), 35-41.

Wang, P. S., Demler, O., & Kessler, R. C. (2002). Adequacy of treatment for serious mental illness in the United States. *American Journal of Public Health, 92,* 92-98.

Weinrich, M., & Stuart, M. (2000). Provision of methadone treatment in primary care medical practices: Review of the Scottish experience and implications for US policy. *Journal of the American Medical Association, 283,* 1343-1348.

Weisner, C., & Matzger, H. (2002). A prospective study of the factors influencing entry to alcohol and drug treatment. *Journal of Behavioral Health Services & Research, 29,* 126-137.

Weissman, G., Melchior, L., Huba, G., Smereck, G., Needle, R., McCarthy, S., Jones, A., Genser, S., Cottler, L., Booth, R., et al. (1995). Women living with drug abuse and HIV disease: Drug abuse treatment access and secondary prevention issues. *Journal of Psychoactive Drugs, 27,* 401-411.

Wells, K., Klap, R., Koike, A., & Sherbourne, C. (2001). Ethnic disparities in unmet need for alcoholism, drug abuse, and mental health care. *American Journal of Psychiatry, 158,* 2027-2032.

Wells, K. B., Manning, W. G., Duan, N., Ware, J. E., & Newhouse, J. P. (1982). *Cost sharing and the demand for ambulatory mental health services* (Report No. R-2960-HHS). Santa Monica, CA: Rand Corporation.

Wenzel, S. L., Audrey Burnam, M., Koegel, P., Morton, S. C., Miu, A., Jinnett, K. J., & Greer Sullivan, J. (2001). Access to inpatient or residential substance abuse treatment among homeless adults with alcohol or other drug use disorders. *Medical Care, 39,* 1158-1169.

Wheeler, J. R., & Nahra, T. A. (2000). Private and public ownership in outpatient substance abuse treatment: Do we have a two-tiered system? *Administration and Policy in Mental Health, 27,* 197-209.

Wickizer, T. M., Campbell, K., Krupski, A., & Stark, K. (2000). Employment outcomes among AFDC recipients treated for substance abuse in Washington State. *Milbank Quarterly, 78*, 585-608, iv.

Wingerson, D., Russo, J., Ries, R., Dagadakis, C., & Roy-Byrne, P. (2001). Use of psychiatric emergency services and enrollment status in a public managed mental health care plan. *Psychiatric Services, 52,* 1494-1501.

Woodward, A. M., Dwinell, A. D., & Arons, B. S. (1992). Barriers to mental health care for Hispanic Americans: A literature review and discussion. *Journal of Mental Health Administration, 19,* 224-236.

Woodward, A. M., Raskin, I. E., & Blacklow, B. (2004). *Treatment completion and cost in substance abuse treatment.* Manuscript submitted for publication.

Zuvekas, S. H., Regier, D. A., Rae, D. S., Rupp, A., & Narrow, W. E. (2002). The impacts of mental health parity and managed care in one large employer group. *Health Affairs (Millwood), 21*(3), 148-159.

Chapter 3. Substance Use and Mental Disorder Discharges from U.S. Community Hospitals in the Early 1990s, Revisited

Sarah Q. Duffy, Ph.D.

Introduction

Managed care and behavioral health care carve-outs proliferated during the early 1990s, and research suggests these arrangements reduce inpatient mental health services and substance abuse treatment (Callahan, Shepard, Beinecke, Larson, & Cavanaugh, 1995; Etheridge, Hubbard, Anderson, Craddock, & Flynn, 1997; Goldman, McCulloch, & Sturm, 1998; Iglehart, 1996; Ma & McGuire, 1998; Mechanic, 1997b). Based on these findings, one might expect to have seen a coinciding decline in admissions to community hospitals of patients with substance use and/or mental disorders (SU/MD). Such short-term, general, non-Federal hospitals have long been involved in SU/MD treatment and have accounted for a large share of inpatient stays for those with SU/MD, including approximately 54 percent of all such stays in 1985 and 69 percent of those of Medicare beneficiaries in 1995 (Cano, Hennessy, Warren, & Lubitz, 1997; Kiesler & Simpkins, 1993; Mechanic, 1997a).

However, much of the research on managed care has relied on methods, such as simple pre- and post-comparisons of aggregate claims from privately insured populations, that may fail to capture the experience of many with SU/MD (Callahan et al., 1995; Goldman et al., 1998; Ma & McGuire, 1998). Other reports suggest that these patients may receive inadequate substitutes for inpatient mental health services, that a treatment gap exists, and that a growing percentage of the U.S. population lacks insurance (Bae, 1997; Dana, Conner, & Allen, 1996; Hirschfeld et al., 1997; Mechanic, Schlesinger, & McAlpine, 1995; Robertson, 1997; Rouse, 1998; U.S. Bureau of the Census, 1997). If the result is inadequate or fragmented community-based specialty treatment for those with SU/MD, they may be more likely to be admitted to local community hospitals for stabilization and detoxification (Olfson, 1993; Olfson & Walkup, 1997; Walkup, 1997; Wolfe & Sorensen, 1989). We examine these concerns by analyzing trends in discharges of those with SU/MD from community hospitals nationwide during the first half of the 1990s.

Two studies, one by Maynard and Cox (1998) and the other by Mechanic, McAlpine, and Olfson (1998), examined trends in community hospitalizations of those with SU/MD in the early 1990s using the National Center for Health Statistics (NCHS) National Hospital Discharge Survey (NHDS). However, their reports provided vastly different trend estimates. According to Maynard and Cox (1998), SU/MD discharges increased only 0.5 percent between 1990 and 1994. Mechanic et al. (1998), on the other hand, reported that SU/MD discharges increased by 35 percent between 1988 and 1994. Furthermore, Maynard and Cox (1998) reported that there was no change in the number of discharges with a co-occurring disorder—one substance use and one mental disorder—during the time period (a trend that Mechanic et al. did not examine).

In this study, we reexamine trends during this time period both by explaining how these different estimates could have been generated by the NHDS data and by providing new estimates

using a dataset more appropriate for examining community hospitalizations of those with SU/MD. The findings presented here will contribute to our understanding of the impact of the changes in the health care system in the early 1990s on those with SU/MD diagnoses.

Data

In this study, we use data covering 1990-1995 from the Agency for Healthcare Research and Quality's Nationwide Inpatient Sample (NIS), which contains discharge abstract records that hospitals report to State data organizations (Agency for Health Care Policy and Research, 1995). With more than 6 million records per year, it approximates a 20 percent sample of U.S. community hospitals and includes information necessary to compute national estimates and standard errors using methods for complex database designs, such as those available in SUDAAN software (Shah, Barnwell, & Bieler, 1996).

For a number of reasons, NIS data are more appropriate for studying community hospitalizations of individuals with SU/MD during the early 1990s than are the NHDS data. First, unlike the NIS, the NHDS is a sample of all short-term hospitals, including short-term psychiatric hospitals. According to one estimate, 13 percent of the discharges with mental disorder diagnoses in the NHDS were from psychiatric hospitals. Failure to account for them in the NHDS data caused at least one team of researchers to vastly overestimate the number of individuals with mental disorders receiving care in swing beds in general hospitals (Kiesler & Simpkins, 1993). The NIS also is a much larger sample than the NHDS and allows analysis of patients by more refined diagnosis categories, which is useful because those with SU/MD diagnoses are a diverse group. Finally, the NIS has been consistently coded across years, which makes it easier to use. Inconsistencies in coding across years in the NHDS were likely responsible for the results reported by Maynard and Cox (1998). These inconsistencies will be described in the next section.

Methods

Study Sample

We study discharges coded with the Clinical Classifications for Health Policy Research (CCHPR) principal diagnosis (DCCHPR1) categories, a variable available on the NIS. CCHPRs reclassify codes from the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) into broader reporting categories (Elixhauser, 1996). Clients with a DCCHPR1 listed in Table 3.1 were included in the analysis. This definition of SU/MD is consistent with much of the existing research on such hospitalizations (Cano et al., 1997; Kiesler & Simpkins, 1993; Maynard & Cox, 1998; Mechanic et al., 1998).[1] The sample sizes varied between 250,000 and 340,000 per year.

---

[1] For example, Maynard and Cox's (1998) selection criteria differed from the one reported here only in that they exclude mental retardation cases, which accounted for less than 1 percent of the sample used here. Mechanic et al. (1998) selected on a different, but related, variable. Using their selection criteria on 1995 NIS data yields a weighted estimate of SU/MD discharges that is 0.43 percent lower than the estimate reported here and a very similar distribution of discharges by type of diagnosis.

Table 3.1 Distribution of Discharges from U.S. Community Hospitals, by Principal Diagnosis CCHPR, 1990 and 1995, Substance Use and Mental Disorder Sample

Principal Diagnosis CCHPR (DCCHPR1) [1]	1990		1995		% Change
	National Estimate	% of SU/MD Sample [2]	National Estimate	% of SU/MD Sample [2]	
65 Mental Retardation	887	0.06	593	0.03	-33.14
66 Alcohol-Related Mental Disorders (acute alcohol intoxication; other and unspecified alcohol dependence; nondependent alcohol abuse; other alcohol-related mental disorders)	302,821	21.80	280,651	16.17	-7.32
67 Substance-Related Mental Disorders (opioid dependence; cocaine dependence; other, combined, and unspecified drug dependence; cocaine abuse; other, mixed, or unspecified drug abuse; other substance-related mental disorders)	111,517	8.03	240,792	13.88	115.92
68 Senility and Organic Mental Disorders (senile dementia, uncomplicated; arteriosclerotic dementia; transient organic psychotic conditions; specific nonpsychotic mental disorders due to organic brain damage; presenile dementia, uncomplicated; senile dementia with delirium; other senility and organic mental disorders)	94,290	6.79	129,795	7.48	37.66
69 Affective Disorders (major depressive disorder, single episode; major depressive disorder, recurrent episode; neurotic depression; bipolar affective disorder; manic-depressive psychosis; other affective disorders)	409,126	29.45	557,445	32.13	36.25
70 Schizophrenia and Related Disorders (paranoid schizophrenia; schizo-affective type; other schizophrenia)	186,913	13.45	238,188	13.73	27.43
71 Other Psychoses	53,299	3.84	56,457	3.25	5.93
72 Anxiety, Somatoform, Dissociative, and Personality Disorders (anxiety states; personality disorders; other anxiety, somatoform, dissociative, and personality disorders)	64,294	4.63	67,627	3.90	5.18
73 Preadult Disorders	17,606	1.27	18,086	1.04	2.73
74 Other Mental Conditions (adjustment reaction; depressive disorder, not elsewhere classified)	147,965	10.65	145,145	8.36	-1.91
75 Personal History of Mental Disorder, etc.	463	0.03	407	0.02	-12.10

CCHPR = Clinical Classifications for Health Policy Research; DCCHPR1 = CCHPR principal diagnosis; SU/MD = substance use/mental disorders.

[1] See Elixhauser (1996) or http://www.ahrq.gov for more information.

[2] Difference in distribution of DCCHPRs over time significant at better than 1 percent level.

Source: SAMHSA, Office of Applied Studies' analysis of Agency for Healthcare Research and Quality's National Inpatient Sample, 1990-1995.

We present trends for all discharges with SU/MD and for five, mutually exclusive subgroups based on principal and all secondary diagnoses. To create these subgroups, we grouped all secondary diagnoses with the CCHPR software program, which is freely available for downloading at http://www.ahrq.gov/data/hcup/ccs.htm (Elixhauser, 1996). These subgroups, which appear in Table 3.2, reflect differences in complexity and in the ability and willingness of community-based providers to treat patients (Etheridge et al., 1997; Mechanic, 1997b). For example, those with both a substance use and another mental disorder diagnosis are a distinct subgroup here because, during the early 1990s, the substance abuse treatment and mental health services systems often were separate. Changes in the health care system during that time may have made it especially difficult for patients with both types of disorders to navigate two separate systems.

Table 3.2   Diagnosis Subgroup Definitions

Diagnosis Subgroup	Includes records with...
Substance Use Only	Only substance use diagnoses (DCCHPR codes 66 or 67).
Substance Use and Mental Disorder	At least two diagnoses—at least one mental disorder (DCCHPR 65, 68-75) and at least one substance use, either one of which may be principal.
Substance Use and Medical	At least two diagnoses—a substance use principal and one non-SU/MD (DCCHPR not in 65-75).
Mental Disorder Only	Only mental disorder diagnoses.
Mental Disorder and Medical	At least two diagnoses—a mental disorder principal and at least one non-SU/MD.

DCCHPR = Clinical Classifications for Health Policy Research diagnosis code; SU/MD = substance use/mental disorders.

These methods are similar to those used by Maynard and Cox (1998), except that those authors appear to have missed a change in the way diagnoses were coded in the 1994 NHDS that required a modification to the CCHPRS formatting program.[2] Failure to account for this change likely resulted in their undercounting both the number of discharges with SU/MD and the number of those with a co-occurring disorder in the Nation's short-term hospitals reported by the NHDS in that year. This can be verified by referencing several NCHS publications (e.g., Gillum, Graves, & Kozak, 1996; Graves & Gillum, 1997) that report counts of discharges by disease category. According to these publications, the number of discharges with SU/MD diagnoses increased from approximately 1,538,000 to 2,112,000, or 37 percent, between 1990 and 1994.

Statistical Methods

We present weighted means, percentages, and age- and gender-adjusted discharge rates per 10,000 population. We discuss in the text differences that are significant at or better than the 5 percent level. For comparisons among groups of diagnoses in the same year, we computed t tests for continuous variables and chi-square (x^2) tests for categorical variables using SUDAAN

---

[2] Community hospital discharge abstract data are coded in the ICD-9-CM system. Under this system, each code can be between three and five characters in length. The data are usually right justified and filled with blanks. So, for example, the code 300.3 (obsessive-compulsive disorder) would appear on the tape as a 3003 with a blank space after it. For some reason, the 1994 NHDS data filled with dashes instead of blanks. So, 3003 appeared as "3003-" and, therefore, was not identified by the CCHPR formatting program.

(Shah et al., 1996), along the lines of the example provided with the NIS documentation (Duffy & Sommers, 1999). To examine trends in discharge rates, we computed the Estimated Annual Percentage Change (EAPC) (Ries et al., 1997). The EAPC is $100(e^m-1)$, where m is the coefficient on a regression of the natural logarithm of the standardized discharge rates on calendar year. A negative EAPC indicates that the standardized rate has declined, while a positive EAPC indicates that it has increased. We used the standard error (SE) from the regression to compute t statistics. To determine whether differences over time were significant for other variables, we computed test statistics based on the differences in value between 1990 and 1995 using a method that accounted for hospitals that appear in the sample both years. Although we focus our discussion on differences between 1990 and 1995, statistics computed using data from all 6 years confirm the trends we report.

Results

Discharges of those with SU/MD grew substantially between 1990 and 1995, and Table 3.3 shows that this growth, from 1.39 million to 1.74 million (t test, $p < 0.0001$, $df = 1,302$), contrasts with the stability of total discharges.[3] Figure 3.1, which displays age- and gender-adjusted discharge rates, reveals that those with both a substance use and mental disorder diagnosis accounted for most of the increase. Discharges of individuals with both diagnoses increased from 9.4 to 17.22 per 10,000 population (EAPC t value $= 14.774$, $p = 0.0001$, $df = 5$). Discharges with both a mental disorder and medical diagnosis increased as well, but at a lower rate, from 19.3 to 22.5 per 10,000 population (EAPC t value $= 4.222$, $p = 0.0135$, $df = 5$). A small decline in the rate of discharges with mental disorders alone, from 14.0 to 11.8 per 10,000 population (EAPC t value $= -6.288$, $p = 0.0033$, $df = 5$), only partially offsets these increases.

As the number and discharge rate of those with SU/MD grew, their average length of stay (ALOS) declined by 25 percent ($t = 7.17$, $p < 0.001$, $df = 1,302$) compared with a 13 percent decline for all discharges ($t = 9.984$, $p < 0.0001$, $df = 1,337$). Although ALOS declined for all subgroups, and the decline was most pronounced for the three substance-related subgroups, the ALOS ranking remained the same over time. Discharges with mental disorder and medical diagnoses had the longest ALOS throughout the period, which declined 20 percent ($t = 6.28$, $p < 0.001$, $df = 1,277$) while those with substance use diagnoses alone had the shortest, which declined 36 percent ($t = 4.47$, $p < 0.0001$, $df = 927$).

The age distribution of SU/MD discharges also changed substantially during this time ($\chi^2 = 242.23$, $p < 0.0001$, $df = 6$). Table 3.3 displays information on those aged 35 to 45 years, who increased the most among the groups analyzed (< 12, 12 to 17, 18 to 25, 26 to 34, 35 to 45, 46 to 64, 65 or older). They comprised the largest share of discharges with SU/MD diagnoses in 1995 at 36 percent, replacing the 26 to 34 year olds, who had the largest share of discharges in 1990. The growth of those aged 35 to 45 years occurred among all SU/MD subgroups, but was most noticeable within the substance-related subgroups.

Although the age distribution changed between 1990 and 1995, Table 3.3 also shows that the gender distribution did not. However, there were differences in these distributions between those with SU/MD and all discharges ($\chi^2 = 183.79$, $p < 0.0001$, $df = 1$), as well as across

---

[3] As expected, these counts are somewhat lower than those estimated from the NHDS.

Table 3.3 Substance Use and Mental Disorder Discharges Compared with All Discharges from U.S. Community Hospitals, 1990 and 1995

Sample	Year	Count in 1,000s	Rate[1] per 10,000 Population	Length of Stay (days)[a]	% [a,b] Male	% [a,b,c] Age 35-45	Discharge Status[b,c] % Died	% AMA	Expected Primary Pay Source[a,b] % Medicare	% Medicaid	% Private	% UCC	% Other
All Discharges	1990	35,215	1,420[d]	6.1[e]	42.2	9.6	2.8	0.8					
	1995	34,802	1,328[d]	5.3[e]	41.5	10.7	2.6	0.9	36.5	18.0	37.0	5.3	3.4
SU/MD	1990	1,389[e]	56.1[d]	12.7[e]	50.0	22.1	0.3	6.3					
	1995	1,735[e]	66.3[d]	9.5[e]	51.3	27.5	0.2	6.3	29.9	30.0	25.8	10.3	4.5
Substance Use Only	1990	144.3	5.8	8.6[e]	73.4	26.7	0.01	15.2					
	1995	163.4	6.7	5.5[e]	73.7	36.2	0.01	19.3	6.7	38.5	27.6	22.0	5.2
Substance Use and Mental Disorder	1990	233.6[e]	9.4[d]	11.5[e]	58.1	25.8	0.03	8.6					
	1995	446.2[e]	17.2[d]	8.3[e]	59.1	34.1	0.03	6.6	21.5	34.4	26.5	12.6	4.9
Substance Use and Medical	1990	185.2	7.5	10.0[e]	71.6	28.2	0.32	10.2					
	1995	223.8	8.5	6.1[e]	70.6	36.1	0.21	12.1	18.0	36.7	24.0	17.5	3.8
Mental Disorder Only	1990	346.8	14.0[d]	13.1[e]	43.1	22.4	0.05	4.52					
	1995	306.5	11.8[d]	10.6[e]	43.7	24.6	0.02	3.62	23.0	31.4	32.2	7.7	5.7
Mental Disorder and Medical	1990	479.2[e]	19.3[d]	15.2[e]	35.7	16.3	0.63	2.37					
	1995	595.3[e]	22.5[d]	12.1[e]	35.9	18.4	0.41	1.78	49.2	21.0	22.3	4.1	3.5

AMA = against medical advice; SU/MD = all substance use and mental disorder discharges; UCC = uncompensated care.

Note: The following symbols represent significant differences at or better than the 5 percent level:

[a] Distributions across subgroups in 1995 (χ^2).

[b] Distribution between all discharges and SU/MD discharges in 1995.

[c] Distribution over time (except for discharge status for substance use disorder only).

[d] Rates over time.

[e] Within groups across years.

[1] Age- and gender-adjusted discharge rate.

Source: SAMHSA, Office of Applied Studies' analysis of Agency for Healthcare Research and Quality's National Inpatient Sample, 1990-1995.

Figure 3.1 Age- and Gender-Adjusted Discharge Rates, by Subgroup, 1990 to 1995
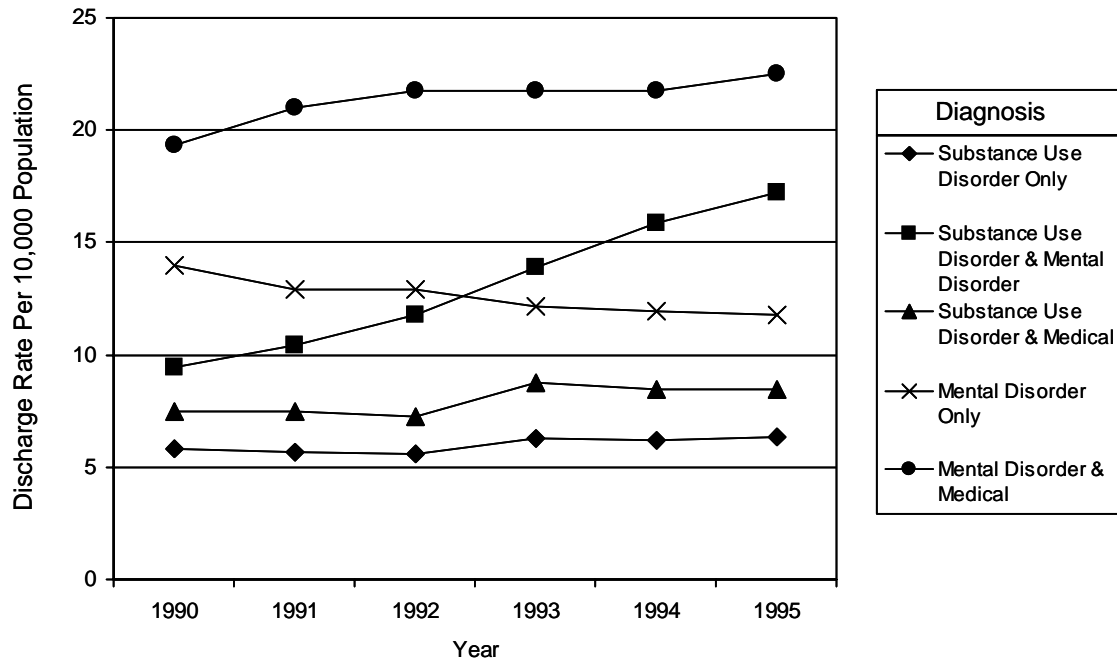
Source: SAMHSA, Office of Applied Studies' analysis of Agency for Healthcare Research and Quality's National Inpatient Sample, 1990-1995.

diagnosis groups ($\chi^2 = 866.18$, $p < 0.0001$, $df = 4$). Slightly over 51 percent of those with SU/MD diagnoses were male compared with fewer than 42 percent of all discharges. Among the subgroups, most likely to be male were those with substance use diagnoses, varying from 59.1 percent for those with co-occurring mental and substance use disorders to 73.7 percent for those with only substance use diagnoses.

We examined two rough indicators of outcomes based on patient disposition at discharge: the in-hospital mortality rate and the percentage who leave against medical advice (AMA). The distribution of SU/MD patients at discharge was significantly different from that of all discharges (1995: $\chi^2 = 827.46$, $p < 0.0001$, $df = 3$), and across SU/MD diagnosis groups ($\chi^2 = 818.52$, $p < 0.0001$, $df = 12$). Table 3.3 reveals that the in-hospital mortality rate for SU/MD discharges was substantially lower than that for all discharges. It varied among subgroups, from a low of 0.01 percent for those with substance use diagnoses alone in 1995 to a high of 0.41 percent for those with both mental disorder and medical diagnoses. However, discharges with SU/MD diagnoses, especially those with substance-related disorders, were much more likely to leave AMA than were other discharges, varying from 1.78 percent of the mental disorder and medical subgroup to 19.3 percent of the substance use only subgroup.

"Expected primary payer" is defined as the payer who is expected, at the time of the admission, to pay the hospital bill. It would be most informative to analyze this variable over time and examine separately those insured under managed care arrangements. Unfortunately, neither of these is possible due to data limitations, so the following categories are examined for 1995 only: Medicare, Medicaid, private (Blue Cross, PPO, commercial, HMO, prepaid health plan), uncompensated care (UCC: self-pay, no charge), and other coverage (Title V, workers'

compensation, CHAMPUS/CHAMPVA, other government).[4] Table 3.3 reveals that those with SU/MD diagnoses were more likely than all discharges to receive uncompensated care or have Medicaid coverage and were less likely to be covered by Medicare or private insurance ($\chi^2 = 202.87$, $p < 0.0001$, $df = 4$).

Substantial differences existed among SU/MD subgroups ($\chi^2 = 1,010.01$, $p < 0.0001$, $df = 16$). Almost 50 percent of discharges with both a mental disorder and medical diagnosis had Medicare coverage, while those diagnosed with mental disorders alone most frequently had private coverage, and those with substance-related disorders alone most frequently had Medicaid coverage. Only 4.1 percent of those with both mental disorder and medical diagnoses had no coverage compared with 22 percent of those in the substance use only subgroup.

Referring to Table 3.1, one can see that the vast majority of the SU/MD discharges had principal mental disorder diagnoses, with smaller but almost equal percentages with alcohol-related and substance-related diagnoses in 1995. However, there were changes in the distribution over time ($\chi^2 = 86.65$, $p < 0.0001$, $df = 10$). Although in 1995 the top two DCCHPRs remained Affective Disorders and Alcohol-Related Mental Disorders, the third most prevalent in 1995, Substance-Related Mental Disorders, had been fifth in 1990.

Discussion

Community hospitals remained important in caring for individuals with SU/MD diagnoses in 1995, and such patients were a growing part of community hospitals' inpatient business. While total discharges remained stable during the first half of the 1990s, we found, as did Mechanic et al. (1998), that discharges of those with SU/MD diagnoses increased substantially. Affective disorders, among mental disorders, and alcohol-related disorders, among substance use disorders, remained among the most frequent diagnoses, although abuse of other substances increased. This increase appears to have become permanent, as, according to more recent NIS data, the number of discharges from community hospitals of those with SU/MD has continued to be above 1.7 million through the year 2001 (the most recent year for which data are available), when they topped 1.9 million.

Contrary to previously published reports (Maynard & Cox, 1998), the percentage of discharges with at least one substance use and one mental disorder increased substantially during the 1990s. Although this growth may reflect more accurate diagnosis and coding, the negligible offsetting reduction in the single diagnosis categories argues against that explanation. At the same time, although a smaller percentage of patients with SU/MD diagnoses died in the hospital compared with all patients, a much larger percentage left the hospital against medical advice (AMA).

As with all discharges in 1995, Medicare and Medicaid paid for more than 50 percent of discharges for those with SU/MD diagnoses. Unfortunately, due to data limitations, we cannot compare this figure with earlier years of the NIS data. As a point of comparison, we can turn to estimates based on 1985 NHDS data, which, although they suffer from the shortcomings

---

[4] PPO = preferred provider organization; HMO = health maintenance organization; CHAMPUS = Civilian Hospital and Medical Care for the Uniformed Services; CHAMPVA = Civilian Health and Medical Program for the Department of Veterans Affairs.

described earlier, were the only nationwide hospital discharge abstract data publicly available before 1988. According to these 1985 data, commercial insurance (then consisting mostly of fee-for-service plans) paid for 44 percent of inpatients with SU/MD, followed by Medicare at 20 percent and Medicaid at 16 percent (Kiesler & Simpkins, 1993). This comparison suggests that the Federal Government's role in paying for these patients may have increased substantially since the mid-1980s.

Sharp declines in length of stay suggest that hospitals may provide short-term lifesaving services, such as detoxification and stabilization, but not treatment for their chronic underlying disorders (Jayaram, Tien, Sullivan, & Gwon, 1996; National Institute of Mental Health, 1998, 2003). Discharged patients subsequently may receive outpatient treatment, which may be entirely appropriate (Kiesler & Simpkins, 1993). However, the extent to which this is occurring is unclear given some evidence of hospitals' infrequent follow-up of patients referred to outpatient aftercare and the reluctance of many outpatient mental health providers to treat those with co-occurring mental and substance use disorders or those with medical complications, who showed the greatest increases in hospitalizations reported here (Etheridge et al., 1997; Mechanic, 1997b; Olfson, 1993; Olfson & Walkup, 1997; Walkup, 1997). Shorter stays may mean patients are being discharged or leaving AMA in sicker condition and may need to be rehospitalized (Olfson & Walkup, 1997). One limitation of the NIS (as well as the NHDS) is that it does not allow linkages across individuals, so we cannot determine whether patients are being rehospitalized.

Although these results cannot prove causality because they are based on a series of cross-sectional observations rather than following specific individuals through time, they do not diminish concern that changes during the early 1990s adversely affected those with SU/MD and may continue to affect them today. They suggest that further study into the causes of the increases in community hospital discharges of those with SU/MD and a more thorough study of effects on outcomes are warranted. Clearly, in 1995, U.S. community hospitals remained important in caring for those with SU/MD.

References

Agency for Health Care Policy and Research. (1995). *Technical supplement 5: Design of the Nationwide Inpatient Sample, Release 1. Documentation for Nationwide Inpatient Sample, Release 1* (NIS documentation for 1990-1995). Rockville MD: Author. [Documentation for 1997-2001 available at http://www.ahcpr.gov/data/hcup/]

Bae, J. P. (1997). Assessing the need, use, and developments in mental health/substance abuse care. *Health Care Financing Review, 18*(3), 1-4.

Callahan, J. J., Shepard, D. S., Beinecke, R. H., Larson, M. J., & Cavanaugh, D. (1995). Mental health/substance abuse treatment in managed care: The Massachusetts Medicaid experience. *Health Affairs (Millwood), 14,* 173-184.

Cano, C., Hennessy, K. D., Warren, J. L., & Lubitz, J. (1997). Medicare Part A utilization and expenditures for psychiatric services: 1995. *Health Care Financing Review, 18*(3)*,* 177-193.

Dana, R. H., Conner, M. G., & Allen, J. (1996). Quality of care and cost-containment in managed mental health: Policy, education, research, advocacy. *Psychological Reports, 79*(3 Pt 2), 1395-1422.

Duffy, S. Q., & Sommers, J. P. (1999). *Technical supplement 11: Calculating variances using data from the HCUP Nationwide Inpatient Sample* (technical supplements for the HCUP Nationwide Inpatient Sample, release 6). Rockville, MD: Agency for Health Care Policy and Research.

Elixhauser, A. (1996). *Clinical Classifications for Health Policy Research, Version 2: Software and user's guide* (AHCPR Publication No. 96-0046, Healthcare Cost and Utilization Project [HCUP-3], Research Note 1). Rockville, MD: Agency for Health Care Policy and Research. [Updated version, Clinical Classifications Software (ICD-9-CM) available at http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp]

Etheridge, R. M., Hubbard, R. L., Anderson, J., Craddock, S. G., & Flynn, P. M. (1997). Treatment structure and program services in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11,* 244-260.

Gillum, B. S., Graves, E. J., & Kozak, L. J. (1996). Trends in hospital utilization: United States, 1988-92. *Vital and Health Statistics 13*(124), 1-71 [Available as a PDF at http://www.cdc.gov/nchs/data/series/sr_13/sr13_124.pdf]

Goldman, W., McCulloch, J., & Sturm, R. (1998). Costs and use of mental health services before and after managed care. *Health Affairs (Millwood), 17,* 40-52. Comments in *17,* 241-244.

Graves, E. J., & Gillum, B. S. (1997). National hospital discharge survey: Annual summary, 1994. *Vital and Health Statistics 13*(128), i-v; 1-50. [Available as a PDF at http://www.cdc.gov/nchs/data/series/sr_13/sr13_128.pdf]

Hirschfeld, R. M., Keller, M. B., Panico, S., Arons, B. S., Barlow, D., Davidoff, F., Endicott, J., Froom, J., Goldstein, M., Gorman, J. M., Marek, R. G., Maurer, T. A., Meyer, R., Phillips, K., Ross, J., Schwenk, T. L., Sharfstein, S. S., Thase, M. E., & Wyatt, R. J. (1997). The National Depressive and Manic-Depressive Association consensus statement on the undertreatment of depression. *Journal of the American Medical Association, 277,* 333-340. Comments in *277,* 1433.

Iglehart, J. K. (1996). Managed care and mental health. *New England Journal of Medicine, 334,* 131-135. Comment in *335,* 56; discussion 57-58.

Jayaram, G., Tien, A. Y., Sullivan, P., & Gwon, H. (1996). Elements of a successful short-stay inpatient psychiatric service. *Psychiatric Services, 47,* 407-412.

Kiesler, C. A., & Simpkins, C. G. (1993). *The unnoticed majority in psychiatric inpatient care* (Plenum Series on Stress and Coping). New York: Kluwer Academic/Plenum Publishers.

Ma, C. A., & McGuire, T. G. (1998). Costs and incentives in a behavioral health carve-out. *Health Affairs (Millwood), 17,* 53-69.

Maynard, C., & Cox, G. B. (1998). Psychiatric hospitalization of persons with dual diagnoses: Estimates from two national surveys. *Psychiatric Services, 49,* 1615-1617.

Mechanic, D. (1997a). The challenges of managed care. *New Directions for Mental Health Services* (73), 5-10.

Mechanic, D. (1997b). The future of inpatient psychiatry in general hospitals. *New Directions for Mental Health Services* (73), 103-108.

Mechanic, D., McAlpine, D. D., & Olfson, M. (1998). Changing patterns of psychiatric inpatient care in the United States, 1988-1994. *Archives of General Psychiatry, 55,* 785-791.

Mechanic, D., Schlesinger, M., & McAlpine, D. D. (1995). Management of mental health and substance abuse services: State of the art and early results. *Milbank Quarterly, 73*(1), 19-55.

National Institute of Mental Health. (1998, November 2). *Clinical Antipsychotic Trials of Intervention Effectiveness* (RFP No. NIMH-99-DS-0001). Rockville, MD: Author. [Project description available at http://www.catie.unc.edu/]

National Institute of Mental Health. (2003). *Home page for Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE): A research program studying treatment effectiveness and outcomes in schizophrenia and Alzheimer's disease.* Retrieved October 22, 2003, from http://www.catie.unc.edu/

Olfson, M. (1993). The array of psychiatric services in general hospitals. *General Hospital Psychiatry, 15,* 277-283.

Olfson, M., & Walkup, J. (1997). Discharge planning in psychiatric units in general hospitals. *New Directions for Mental Health Services* (73), 75-85.

Ries, L. A. G., Kosary, C. L., Hankey, B. F., Miller, B. A., Harras, A., & Edwards, B. K. (Eds.). (1997*). SEER cancer statistics review, 1973-1994* (NIH Publication No. 97-2789). Bethesda, MD: National Cancer Institute.

Robertson, E. B. (1997). Introduction to mental health service delivery in rural areas. In E. B. Robertson, Z. Sloboda, G. M. Boyd, L. Beatty, & N. J. Kozel (Eds.), *Rural substance abuse: State of knowledge and issues* (pp. 413-417, NIH Publication No. 97-4177, NIDA Research Monograph 168). Rockville MD: National Institute on Drug Abuse. [Available as a PDF at http://165.112.78.61/PDF/Monographs/Monograph168/Download168.html]

Rouse, B. A. (1998). *Substance abuse and mental health statistics source book 1998* (DHHS Publication No. SMA 98-3170, Analytic Series A-4). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies. [Available at http://www.oas.samhsa.gov/sb99a.zip]

Shah, B. V., Barnwell, B. G., & Bieler, G. S. (1996). SUDAAN: *Software for the statistical analysis of correlated data. User's manual release 7.0.* Research Triangle Park, NC: Research Triangle Institute.

U.S. Bureau of the Census. (1997). *Statistical abstract of the United States: 1997* (117th ed.). Washington, DC: U.S. Government Printing Office, Superintendent of Documents. [Available as a PDF at http://www.census.gov/prod/www/statistical-abstract-us.html]

Walkup, J. (1997). Family involvement in general hospital inpatient care. *New Directions for Mental Health Services* (73), 51-64.

Wolfe, H. L., & Sorensen, J. L. (1989). Dual diagnosis patients in the urban psychiatric emergency room. *Journal of Psychoactive Drugs, 21,* 169-175.

Woodward, A., Epstein, J., Gfroerer, J., Melnick, D., Thoreson, R., & Willson, D. (1997). The drug abuse treatment gap: Recent estimates. *Health Care Financing Review, 18*(3), 5-17.

Chapter 4. Do Client Characteristics Affect Admission to Inpatient Versus Outpatient Alcohol Treatment in Publicly Monitored Programs?

Sarah Q. Duffy, Ph.D.
Gary A. Zarkin, Ph.D.
Laura J. Dunlap, M.A.

Introduction

Alcohol use disorders cost the United States some 100,000 lives and $184.6 billion annually, and 14 million people meet the diagnostic criteria for alcohol abuse and alcoholism (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2000; Subcommittee on Health Services Research, 1997). The Nation spends approximately $6.1 billion per year on treatment for those with alcohol use disorders, 63 percent of which is funded by Federal, State, and local governments (Mark et al., 1999). Of the more than 1.5 million admissions annually to substance abuse treatment facilities in the United States, almost 50 percent list alcohol as the primary substance of abuse (Office of Applied Studies [OAS], 1999).

Substance abuse treatment policy is largely a State responsibility, especially since the establishment of the Federal Substance Abuse Prevention and Treatment (SAPT) block grant program in 1981 (Jacobsen & McGuire, 1996). States undertake treatment facility credentialing and licensing, and by 1997, through either their own funding or Federal funding that they managed, States and local governments managed more than 47 percent of all substance abuse funding and 74 percent of all public funding (Coffey et al., 2001).

Descriptive evidence suggests that substantial variations in treatment systems may exist across States. For example, in 1989, per capita alcohol treatment funding varied from $5.85 in Mississippi to $51.76 in Alaska (Dayhoff, Pope, & Huber, 1994). In 1998, the proportion of clients admitted to inpatient treatment varied from 3 percent of all substance abuse treatment clients in Vermont to 30 percent in North Dakota (OAS, 2000).

Still, one aspect of the publicly funded treatment system shared by many States is insufficient publicly funded treatment capacity (e.g., see New Jersey Substance Abuse Prevention and Treatment Advisory Task Force, 2001). One way in which many States attempt to improve care and make the best use of their limited resources is by implementing guidelines to help place clients receiving publicly funded treatment in different levels of care, including whether they are treated as inpatients or outpatients (Gastfriend & McLellan, 1997; Mattson, 2003). According to these guidelines, clients with more severe substance use, emotional, and behavioral disorders are candidates for inpatient care. The purpose of this study, using the administrative data that States use to monitor their treatment systems, is to estimate the effect of disorder severity on the odds of inpatient admission and to explore how that effect varies across States.

We extend the analysis of treatment admission to the publicly monitored treatment systems in several States. In doing so, we include either those who pay for treatment out-of-pocket or those who receive publicly funded treatment to explore the extent to which results for this augmented population are consistent with the findings reported in earlier research on privately insured individuals (Goodman, Holder, Nishiura, & Hankin, 1992; Goodman, Nishiura, & Hankin, 1998). Further, we examine whether variables, such as age of first intoxication, employment, and housing status, which research has found are associated with referral to inpatient treatment (Gregoire, 2000) but that are unavailable in insurance claims data, are correlated with inpatient admission. Finally, we examine the extent to which the estimated relationships vary across States. Our findings suggest that, although there are differences across States in client characteristics and in the effect of these characteristics on admission, clients with more severe substance use disorders generally are more likely to receive inpatient treatment. These results suggest that admission decisions in the State-monitored substance abuse treatment system conform, at least to some extent, to available placement criteria. Given the considerable barriers that can exist in implementing these criteria (Gastfriend, Lu, & Sharon, 2000; Kosanke, Magura, Staines, Foote, & DeLuca, 2002), our results suggest that States' attempts to manage their substance abuse treatment resources effectively are meeting with some success.

Background

Alcohol rehabilitation treatment is aimed at changing drinking behavior and often consists of psychotherapy and sometimes pharmacotherapy. It may take place in a number of settings, including outpatient and residential specialty substance abuse treatment facilities (including some in hospitals) or the offices of private practitioners. In our work, we examine data on clients in the specialty substance abuse treatment system that is monitored by State substance abuse treatment agencies. We exclude data on those who obtain care from private practitioners and those involved only in self-help groups, such as Alcoholics Anonymous, because data on admissions to such programs are not systematically collected.

On a per-episode basis, outpatient substance abuse rehabilitation treatment costs less than inpatient rehabilitation treatment. Costs for residential programs average between $4,000 and $6,800, depending on their length, or more than twice the $1,800 cost of the average outpatient program (U.S. General Accounting Office [GAO], 1998). Inpatient treatment also may be more disruptive and costly for clients than outpatient treatment. For example, employed clients who enter inpatient treatment must miss work, either losing pay or using sick leave. If both types of treatment were equally effective for all clients, providing treatment only in outpatient settings would be most efficient. However, if the two types of treatment are not equally effective, providing solely outpatient treatment may not be cost-effective.

That these treatment options may not be equally effective for all clients has been recognized in guidelines, such as the American Society of Addiction Medicine Patient Placement Criteria (ASAM-PPC) (ASAM, 1996). The ASAM-PPCs consider indicators across several psychosocial dimensions to determine optimal client placement and suggest that clients with emotional or behavioral disorders and complications, high risk for relapse, or a poor recovery environment may benefit from inpatient treatment (ASAM, 1996; McKay et al., 1997). Although not universally accepted, the ASAM-PPCs are the most widely distributed, implemented,

discussed, and reviewed criteria available (Gartner & Mee-Lee, 1995; Mattson, 2003). Several States, such as Iowa, Colorado, Massachusetts, and New Jersey, either use the ASAM-PPCs or other similar criteria as guidelines for client placement. State modifications generally include adding treatment settings, such as halfway houses and longer-term residential treatment, not recognized in the original ASAM-PPCs (Gartner & Mee-Lee, 1995).

The results of several empirical studies conducted in the 1970s and 1980s, however, suggested that inpatient treatment may not have been worth the extra cost (Annis, 1985-1986; Miller & Hester, 1986). Miller and Hester (1986), for example, reviewed several controlled studies and concluded that few differences in outcomes arose between more intensive and less intensive programs, except in some cases where the *less* intensive programs produced superior outcomes. Such findings, coupled with the growth of managed behavioral health care, led to a decline in the number of inpatient admissions for substance abuse treatment throughout the early 1990s (Subcommittee on Health Services Research, 1997).

However, none of the controlled studies that Miller and Hester (1986) reviewed included individuals with a co-occurring mental disorder, an important clinical indicator for inpatient treatment (Pettinati, Meyers, Jensen, Kaplan, & Evans, 1993). Although one small randomized study suggested that inpatient treatment is not more effective for those who are appropriately matched to it (McKay et al., 1997), other observational studies and more recent reviews of the earlier controlled studies suggest that inpatient programs benefit those with more severe disorders (Finney, Hahn, & Moos, 1996; Finney & Moos, 1996; Gastfriend et al., 2000; Harrison & Asche, 1999; Hartmann, Sullivan, & Wolk, 1993; Mattson, 2003; Pettinatti et al., 1999; Simpson, Joe, Fletcher, Hubbard, & Anglin, 1999). The authors of these studies concluded that inpatient substance abuse treatment should remain an option.

Two studies by Goodman et al. (1992, 1998) used private insurance claims data to examine factors affecting the choice between inpatient and outpatient substance abuse treatment. The first study examined data on 879 individuals with employer-sponsored, fee-for-service health insurance with comprehensive alcoholism coverage. The authors found that admission to short-term inpatient treatment was more likely for those with a diagnosis of alcohol dependence (vs. abuse) and a co-occurring substance use and mental disorder. The second study analyzed the relative contributions of client- and employer-level factors to treatment choice by examining claims submitted on behalf of 9,878 individuals who received their health insurance through 10 large self-insured firms from 1989 to 1991. The authors found that clients were more likely to receive inpatient treatment if they had a diagnosis of dependence (vs. abuse) or a psychosis, used drugs other than opiates, were younger or male, and received hourly wages as opposed to salaries. However, a large part of the observed variation occurred at the employer level. The authors concluded that treatment choice was driven mainly by firm or health insurance administrator policy (they could not distinguish between the two) and that treatment expenditures at some firms could be reduced by shifting treatment to outpatient settings. Although these results are suggestive, they are not generalizable to those who receive treatment in the publicly monitored system, many of whom not only have no employer-sponsored health insurance, but also often are unemployed and/or homeless.

A study by Gregoire (2000) provides clues about this population. The study examined referrals to inpatient versus outpatient substance abuse treatment in a study of 3,093 individuals diagnosed as drug dependent who sought admission to publicly funded treatment in Wichita, Kansas. Although the study revealed that referrals generally were consistent with clinical criteria, the two variables that were the strongest predictors of referrals to inpatient treatment were housing and employment status. Those who were homeless and unemployed were more likely to be referred to inpatient treatment than those with stable housing and those who were employed. Although these results are suggestive, the study has some limitations. First, it examined only drug-dependent clients in a single city. Second, it concerned referrals, not admissions. Because research suggests that substantial numbers of clients fail to attend treatment as referred (e.g., see Donovan, Rosengren, Downey, Cox, & Sloan, 2001), and many clients self-refer into treatment, it is of interest to see whether these same client characteristics affect treatment choice in a broader admissions sample.

Data

We used data from the 1996 Treatment Episode Data Set (TEDS), maintained by the Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMSHA) (OAS, 1999). TEDS contains admissions data routinely collected by treatment providers at client admission and sent to State agencies, which use them to monitor their substance abuse treatment systems. These State data systems, which were enacted to satisfy the mandate to collect client data in the Comprehensive Alcohol Abuse, Drug Abuse, and Mental Health Amendments (1988), were designed with input from each State's treatment providers and with input and funding from SAMHSA. The data are submitted at regular intervals by the States in a common format to SAMHSA. The data include disorder severity information important in determining clients' treatment needs, as well as socioeconomic measures. Although these data have been used by the States and the Federal Government to generate descriptive reports, they have seldom been used for health services research (McCarty, McGuire, Harwood, & Field, 1998).

Our analysis focuses on adult males with alcohol as their primary substance of abuse. We did not include women because a variable that might be relevant to their treatment setting choice, whether or not they are pregnant, is not well reported, and another variable, whether or not they have dependent children, is not collected. We examine only alcohol clients because a relevant measure of the disorder severity for most other drugs, route of administration, also is not consistently reported.

Unfortunately, States vary in their ability to report all variables or collect data from all substance abuse treatment facilities in the TEDS universe (those receiving public substance abuse treatment funding). Therefore, we focus on nine States (Colorado, Iowa, Maine, Massachusetts, Nevada, New Jersey, New York, North Dakota, and Rhode Island) that provided data covering 90 percent or more of their estimated substance abuse treatment clients in programs receiving public funds in 1996 and that collected variables hypothesized to affect substance abuse treatment admission.

Although these data are fairly consistent across States, our review of information from each State, such as the instruction manuals that States give to providers, data collection forms, and the crosswalk between the State data systems and SAMHSA's common format, reveals that there are some differences. One important difference is the universe of reporting facilities. In some States, such as New York, all alcohol treatment facilities are required to report admissions data, regardless of whether they receive public funding or not. In North Dakota, in contrast, only the programs at the State's eight regional services centers and the State hospital report these data. In other States, such as New Jersey, only facilities receiving public funds are required to report these data, but many more do so voluntarily.

Another important difference among States is the definition of an admission. Although SAMHSA requests that States report only the initial admission to a treatment episode as an admission (OAS, 1999), the nature of the help-seeking behavior of those with substance use disorders can make it difficult for States to comply. Fewer than 53 percent of substance abuse treatment clients nationwide complete their planned treatment, and it is common for those with substance use disorders to make more than one attempt at treatment (OAS, 2004). The question then becomes, when is an admission a new admission, as opposed to a continuation of the same treatment episode? States do not provide uniform instructions to providers. Iowa, for example, instructs providers to report an admission as an initial admission only if 2 months or more have passed since the individual's last discharge; in Nevada, the relevant time period is 30 days. And although SAMHSA requests that States report changes of service (e.g., from detoxification to rehabilitation) within an episode as a transfer rather than a new admission, four of the nine States we include in our analysis do not (Maine, Massachusetts, New York, and Rhode Island). As discussed below, these differences among States are one reason we chose to estimate the model separately for each State.

Empirical Framework

Rather than rely on a standard model of health care demand, such as the Health Capital Model (Grossman, 1972; Muurinen, 1982) or the Behavioral Healthcare Model (Andersen & Newman, 1973), which have each been used in studies of the demand for behavioral health care (Haas-Wilson, Cheadle, & Scheffler, 1989; Pottick, Hansell, Gutterman, & White, 1995), we combine elements of both approaches with unique characteristics of the substance abuse treatment system and its clients to inform our empirical specification. This exploratory approach is consistent with recent calls to integrate both behavioral and economic variables in empirical behavioral health services research (Brito & Strain, 1996; Green & Kagel, 1996; Montoya, Atkinson, & Trevino, 2000).

Baseline Model

We model desired alcohol treatment intensity as an underlying, unobserved, continuous dependent variable y^* for which we have a discrete realization, y_i, that equals 1 for inpatient admission and 0 for outpatient admission. The individual's observed treatment setting is a function of his demand for alcohol treatment, which is a function of his disorder severity and other characteristics, and the availability of treatment options, which is a function of State treatment policy. Given this, and the differences in the data systems described above, we estimate

the model separately for each State. Importantly, we rejected the null hypothesis of a single pooled model based on the results of a chi-square test.

The probability that client i in State j is admitted to inpatient treatment is

$$Pr(y_{ij} = 1) = f(\alpha_j + \sum_{k=1}^{n} \beta_{jk} X_{ik} + \sum_{\ell=1}^{n} \beta_{j\ell} R_{i\ell}), \tag{1}$$

where y_{ij} equals 1 if individual i in State j is admitted to inpatient care and equals 0 otherwise; $f(\bullet)$ is the logistic function; α_j is the intercept for State j; X_{ik} is a vector of k demand variables and client characteristics; $R_{i\ell}$ is a vector of ℓ referral source indicators; and the βs are parameters to be estimated.

Virtually all health care demand models indicate that problem severity affects the intensity of care demanded. We use several variables to measure the severity of the client's substance use disorder (hypothesized effect in parentheses). *Frequency of use (+):* We include four dichotomous variables that reflect how this information is coded on each client's record at admission: daily use, use three to six times in the past week, use one to two times in the past week, and use one to three times in the past month. No use in the past month is the reference category. Although other studies have used *International Classification of Diseases* (ICD) or *Diagnostic and Statistical Manual of Mental Disorders* (DSM) code information to measure severity of substance use disorders, we believe the frequency of use variable, in combination with other variables in our model, is more appropriate for our purpose, especially given that it is better reported. Only 18 of the more than 50 States and jurisdictions that report to TEDS collect ICD or DSM data (OAS, 1999). Furthermore, of those 18 States, only 3 obtain valid values on 99 percent or more of their admissions. Frequency of use, in contrast, is collected in 47 States and jurisdictions, some 32 of which obtain it on 99 percent or more of their admissions. The fact that frequency of use is much better reported may mean that it is easier for treatment personnel to collect, and, given that they had input into the data elements that would be collected by States, perhaps more useful to them in their treatment planning decisions than DSM or ICD criteria.

We include several other variables to measure client severity as well. *Intoxication before age 15 (+):* Research suggests that individuals who first use alcohol before the age of 15 are more likely to become alcohol dependent (Grant & Dawson, 1997). We include a dichotomous variable indicating first alcohol intoxication before age 15. *Secondary substance (+)*: Having a second substance of abuse can indicate a more severe disorder. We include dichotomous variables indicating marijuana/hashish, cocaine, and other secondary substance use, with no secondary substance use as the reference category. *Number of prior treatment episodes (?)*: This variable is used in many treatment studies as an indicator of disorder severity (e.g., Etheridge, Craddock, Hubbard, & Rounds-Bryant, 1999; McLellan et al., 1999). We enter this as a categorical variable to allow the estimated relationship to be something other than linear. We include indicator variables for one prior treatment and two or more prior treatments, using no prior treatment as the reference category. *Co-occurring mental disorder (+), Homeless (+):* Based on the ASAM-PPCs, the literature on treatment effectiveness, and the results of prior research on referrals (Gregoire, 2000) and treatment matching (Kosanke et al., 2002), we expect

that those with a co-occurring mental disorder and those who are homeless may have a higher likelihood of admission to inpatient treatment. To capture this, we enter two indicator variables, one for co-occurring mental disorder and the other for homelessness.

The research mentioned earlier and other economic research (Becker & Murphy, 1988) conceptualize the behavior of those with substance use disorders as consistent with choice theory, suggesting that socioeconomic and other client characteristics should be included in models that predict their behavior. We include the following variables and note that potentially offsetting effects render the predicted direction of many of the effects uncertain. *Employment status (?):* Employed individuals have higher time cost associated with inpatient treatment and may be less likely to engage in inpatient treatment, other things equal (Kosanke et al., 2002). Furthermore, the fact that they are employed suggests that they may have a less severe disorder, and treatment providers may believe that those who are unemployed are more likely to benefit from inpatient treatment (Gregoire, 2000). On the other hand, employed individuals may be better able to pay for more intensive treatment. To examine which of these hypotheses the data support, we include a dichotomous variable indicating whether the client was employed at admission, either full- or part-time, with those who are unemployed or not members of the labor force comprising the reference category. *Education level (?)*: According to Muurinen (1982), the relationship between years of education and the demand for medical care should be negative because the rate of depreciation of the health stock should be lower for better-educated individuals. At the same time, education may proxy higher income, which may suggest a more intensive treatment choice. We included two dichotomous variables to measure education: less than high school graduate and high school graduate. Some postsecondary education is the reference category. *Age (?):* Human capital theory suggests that age has a positive effect on treatment intensity because the rate of depreciation of the health stock is a positive function of age (Muurinen, 1982). On the other hand, one version of the model by Suranovic, Goldfarb, and Leonard (1999) suggests that those who are older are more motivated to quit their substance use, perhaps making it less likely that they would need intensive treatment. Because it is unclear which effect may dominate, we enter age and age-squared to allow for a nonlinear relationship. *Race/ethnicity (?):* According to the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV), people of different races and ethnicities tend to have different cultural attitudes about and physiological responses to alcohol (American Psychiatric Association [APA], 1994). However, this variable also may capture placement in a treatment setting that was not clinically indicated because of the lack of culturally competent alternatives in the individual's area (Gartner & Mee-Lee, 1995). We include three indicator variables to capture the client's race/ethnicity (Hispanic, non-Hispanic white, and non-Hispanic black) with "other" as the reference category. This was the only way to code this information uniformly across the States included in our sample. *Marital status (-)*: Although imperfect, marital status may proxy for the ASAM-PPCs' emotional and behavioral disorders criteria. Currently married clients may have less severe emotional and behavioral disorders than those who are single, divorced, separated, or widowed, all of whom comprise the reference cell.

Another variable that may affect client placement is *season of admission (?):* The time of year the client is admitted also may affect the odds of inpatient treatment. For example, those who are seasonally employed, such as teachers and college professors, may be more likely to

accept assignment to inpatient treatment in the summer. We include indicator variables for summer, fall, and winter, with spring as the reference category.

Finally, we include indicator variables for *referral source (?).* Although the process by which clients obtain referrals, and the interplay between the various referral sources and the treatment system is admittedly complex (e.g., see Kosanke et al., 2002), we believe it is important to include referral source as a control variable. For example, although the criminal justice system is a frequent source of referral into substance abuse treatment, and referral through that system may affect client placement, we make no a priori judgment about whether criminal justice referrals are more or less likely to be admitted to inpatient alcohol treatment. The effect likely depends on the referral practices of criminal justice systems, and the availability of different types of treatment, which vary across States. For example, in some States, such as New Jersey, the State substance abuse treatment agency is actively involved in assessing prerelease inmate and parolee needs and referring clients to treatment (New Jersey Substance Abuse Prevention and Treatment Advisory Task Force, 2001). In others, the court may mandate both treatment and the modality, as the Massachusetts court does for second-time drunk driving offenders (Bureau of Substance Abuse Services, 2001). We include indicator variables for self-referral, referral by an alcohol or drug treatment provider, other medical provider referrals, and community (employer, school, etc.) referral. Referral by the criminal justice system serves as the reference cell.

Expected Payer Model

In addition to the baseline model, we present coefficients from a model including expected pay source for this admission and estimate it for each of the seven States that collected these data. Economic theory suggests that individuals who pay out of pocket for their own treatment may demand less costly treatment than those who do not. However, we only observe the expected payer for this particular admission and do not know, for example, whether the client's insurance covered both inpatient and outpatient treatment. In some cases, expected payer and treatment setting may be jointly determined if, for example, an indigent client is placed in an inpatient treatment program because no publicly funded outpatient slots are available (Gartner & Mee-Lee, 1995). Therefore, the direction of the expected payer effects is unclear a priori, and the results of the analysis should be considered tentative. We include the following categories: self-pay, Medicare, Medicaid, private, other (e.g., worker's comp), and other government funding/no charge (the reference category). The reference category includes clients whose treatment is funded by State agency funds, including those received through the Federal SAPT block grant program.

Results

Table 4.1 displays the means and standard deviations for the combined sample and by State. It shows that States varied substantially in the proportion of adult males in treatment for alcohol use disorders admitted to inpatient care, ranging from about 13 percent in Iowa to 32 percent in New York. Statistically significant differences exist across States for all variables, except for no secondary substance use and high school education.

Table 4.1 Analysis Sample Means and Standard Deviations of the Model Variables, by State and for All Nine States Pooled

	All States	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
N	113,948	4,654	17,591	3,762	10,797	1,615	10,426	62,093	1,028	1,982
Inpatient Treatment	0.255*	0.300	0.126	0.150	0.162	0.305	0.212	0.320	0.252	0.161
	(0.436)	(0.458)	(0.332)	(0.357)	(0.368)	(0.461)	(0.409)	(0.467)	(0.434)	(0.368)
Frequency of Use†										
No use in the past month	0.324*	0.358	0.389	0.532	0.055	0.363	0.218	0.353	0.332	0.324
	(0.468)	(0.480)	(0.488)	(0.499)	(0.228)	(0.481)	(0.413)	(0.478)	(0.471)	(0.468)
1 to 3 times in the past month	0.145*	0.169	0.226	0.112	0.110	0.172	0.121	0.130	0.245	0.155
	(0.352)	(0.375)	(0.418)	(0.315)	(0.313)	(0.377)	(0.326)	(0.336)	(0.430)	(0.362)
1 to 2 times in the past week	0.125*	0.130	0.125	0.042	0.239	0.107	0.186	0.099	0.121	0.192
	(0.331)	(0.337)	(0.331)	(0.200)	(0.427)	(0.309)	(0.389)	(0.298)	(0.326)	(0.394)
3 to 6 times in the past week	0.118*	0.137	0.109	0.157	0.193	0.102	0.138	0.100	0.128	0.121
	(0.322)	(0.344)	(0.312)	(0.364)	(0.395)	(0.302)	(0.345)	(0.300)	(0.335)	(0.326)
Daily	0.288*	0.206	0.151	0.157	0.402	0.257	0.337	0.318	0.174	0.208
	(0.453)	(0.404)	(0.358)	(0.364)	(0.490)	(0.437)	(0.473)	(0.466)	(0.379)	(0.406)
Age of First Intoxication Less Than 15 Years	0.387*	0.394	0.345	0.443	0.415	0.359	0.339	0.396	0.517	0.426
	(0.487)	(0.489)	(0.475)	(0.497)	(0.493)	(0.480)	(0.473)	(0.489)	(0.500)	(0.495)
Secondary Drug†										
None	0.484	0.597	0.592	0.624	0.510	0.661	0.587	0.409	0.569	0.458
	(0.500)	(0.490)	(0.491)	(0.484)	(0.500)	(0.473)	(0.492)	(0.492)	(0.495)	(0.498)
Marijuana/hashish	0.229*	0.249	0.302	0.308	0.259	0.160	0.171	0.206	0.357	0.259
	(0.420)	(0.432)	(0.459)	(0.462)	(0.438)	(0.367)	(0.376)	(0.404)	(0.479)	(0.438)
Cocaine/crack	0.229*	0.102	0.036	0.036	0.182	0.070	0.184	0.328	0.018	0.211
	(0.420)	(0.302)	(0.187)	(0.186)	(0.386)	(0.255)	(0.388)	(0.470)	(0.135)	(0.408)
Other	0.058*	0.052	0.070	0.031	0.049	0.108	0.058	0.057	0.055	0.072
	(0.235)	(0.222)	(0.255)	(0.174)	(0.215)	(0.311)	(0.234)	(0.233)	(0.229)	(0.258)

Table 4.1 Analysis Sample Means and Standard Deviations of the Model Variables, by State and for All Nine States Pooled (Continued)

	All States	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
Prior Treatment Episodes†										
None	0.325*	0.307	0.415	0.312	0.287	0.547	0.502	0.270	0.304	0.401
	(0.468)	(0.461)	(0.493)	(0.463)	(0.453)	(0.498)	(0.500)	(0.444)	(0.495)	(0.490)
1 episode	0.249*	0.218	0.287	0.285	0.241	0.289	0.251	0.239	0.215	0.258
	(0.432)	(0.413)	(0.452)	(0.452)	(0.427)	(0.453)	(0.434)	(0.426)	(0.411)	(0.438)
2 episodes or more	0.426*	0.475	0.299	0.403	0.472	0.164	0.246	0.491	0.482	0.341
	(0.495)	(0.499)	(0.458)	(0.491)	(0.499)	(0.370)	(0.431)	(0.500)	(0.500)	(0.474)
Demographics										
Age	35.770*	34.165	34.293	35.401	35.948	36.692	36.152	36.237	34.993	35.391
	(10.359)	(10.218)	(10.675)	(10.308)	(10.764)	(9.923)	(10.461)	(10.153)	(11.464)	(9.638)
Employed	0.447*	0.526	0.651	0.455	0.476	0.490	0.562	0.357	0.399	0.457
	(0.497)	(0.499)	(0.477)	(0.498)	(0.499)	(0.500)	(0.496)	(0.479)	(0.489)	(0.498)
Homeless	0.124*	0.109	0.014	0.065	0.057	0.209	0.045	0.185	0.093	0.080
	(0.330)	(0.312)	(0.116)	(0.247)	(0.231)	(0.407)	(0.208)	(0.388)	(0.291)	(0.272)
Mental disorders	0.174*	0.170	0.158	0.201	0.265	0.051	0.085	0.179	0.390	0.099
	(0.379)	(0.376)	(0.365)	(0.401)	(0.441)	(0.221)	(0.279)	(0.383)	(0.488)	(0.299)
Married	0.246*	0.244	0.338	0.206	0.191	0.302	0.253	0.231	0.208	0.221
	(0.431)	(0.429)	(0.473)	(0.404)	(0.393)	(0.459)	(0.435)	(0.421)	(0.406)	(0.415)
Education Level†										
No high school	0.318*	0.309	0.204	0.302	0.303	0.291	0.265	0.362	0.244	0.395
	(0.466)	(0.462)	(0.403)	(0.459)	(0.460)	(0.454)	(0.442)	(0.481)	(0.430)	(0.489)
High school	0.466	0.448	0.565	0.511	0.478	0.473	0.502	0.430	0.471	0.413
	(0.499)	(0.497)	(0.496)	(0.500)	(0.500)	(0.499)	(0.500)	(0.495)	(0.499)	(0.492)
Post high school	0.216*	0.243	0.230	0.188	0.219	0.236	0.233	0.208	0.281	0.192
	(0.412)	(0.429)	(0.421)	(0.390)	(0.413)	(0.425)	(0.423)	(0.406)	(0.450)	(0.394)

Table 4.1 Analysis Sample Means and Standard Deviations of the Model Variables, by State and for All Nine States Pooled (Continued)

	All States	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
Race/Ethnicity†										
Non-Hispanic white	0.674*	0.602	0.904	0.957	0.778	0.638	0.687	0.573	0.729	0.819
	(0.469)	(0.490)	(0.295)	(0.203)	(0.416)	(0.481)	(0.464)	(0.495)	(0.445)	(0.385)
Non-Hispanic black	0.191*	0.063	0.044	0.012	0.093	0.071	0.196	0.279	0.007	0.093
	(0.393)	(0.242)	(0.205)	(0.109)	(0.291)	(0.256)	(0.397)	(0.448)	(0.082)	(0.290)
Hispanic	0.106*	0.293	0.034	0.007	0.099	0.064	0.103	0.126	0.011	0.063
	(0.309)	(0.455)	(0.182)	(0.081)	(0.298)	(0.246)	(0.304)	(0.331)	(0.103)	(0.242)
Other	0.027*	0.043	0.018	0.024	0.029	0.225	0.014	0.023	0.254	0.026
	(0.164)	(0.202)	(0.133)	(0.154)	(0.167)	(0.418)	(0.118)	(0.149)	(0.439)	(0.158)
Primary Source of Referral†										
Individual	0.176*	0.177	0.176	0.173	0.201	0.146	0.193	0.168	0.196	0.215
	(0.381)	(0.382)	(0.381)	(0.378)	(0.400)	(0.353)	(0.394)	(0.374)	(0.397)	(0.411)
Alcohol/drug treatment provider	0.239*	0.150	0.072	0.150	0.177	0.063	0.099	0.343	0.094	0.109
	(0.426)	(0.358)	(0.259)	(0.357)	(0.381)	(0.243)	(0.299)	(0.475)	(0.292)	(0.312)
Other health care provider	0.078*	0.052	0.068	0.073	0.083	0.050	0.101	0.080	0.094	0.060
	(0.269)	(0.222)	(0.251)	(0.260)	(0.276)	(0.218)	(0.301)	(0.272)	(0.292)	(0.237)
School, employer, community	0.086*	0.082	0.046	0.052	0.069	0.110	0.075	0.101	0.205	0.098
	(0.280)	(0.275)	(0.210)	(0.222)	(0.253)	(0.313)	(0.263)	(0.301)	(0.404)	(0.297)
Criminal justice	0.422*	0.538	0.637	0.552	0.471	0.631	0.532	0.308	0.410	0.518
	(0.494)	(0.499)	(0.481)	(0.497)	(0.499)	(0.483)	(0.499)	(0.462)	(0.492)	(0.500)
Season Entering Treatment†										
Spring	0.265*	0.259	0.322	0.278	0.257	0.221	0.259	0.251	0.264	0.305
	(0.441)	(0.438)	(0.467)	(0.448)	(0.437)	(0.415)	(0.438)	(0.433)	(0.440)	(0.460)
Summer	0.238*	0.257	0.190	0.227	0.249	0.285	0.255	0.246	0.240	0.228
	(0.426)	(0.437)	(0.392)	(0.419)	(0.432)	(0.452)	(0.436)	(0.431)	(0.427)	(0.420)
Fall	0.239*	0.239	0.188	0.234	0.244	0.323	0.230	0.253	0.240	0.229
	(0.427)	(0.427)	(0.391)	(0.423)	(0.430)	(0.468)	(0.421)	(0.435)	(0.427)	(0.420)
Winter	0.257*	0.244	0.300	0.261	0.250	0.171	0.256	0.250	0.255	0.239
	(0.437)	(0.430)	(0.458)	(0.439)	(0.433)	(0.377)	(0.437)	(0.433)	(0.437)	(0.426)

Table 4.1 Analysis Sample Means and Standard Deviations of the Model Variables, by State and for All Nine States Pooled (Continued)

	All States	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
Expected Source of Payment†										
N	40,824	4,654	17,591	3,762	NA	1,615	10,414	NA	1,028	1,760
Self-pay	0.200*	0.402	0.065	0.175	NA	0.515	0.322	NA	0.121	0.099
	(0.400)	(0.490)	(0.247)	(0.326)	NA	(0.500)	(0.467)	NA	(0.326)	(0.300)
Private	0.141*	0.028	0.159	0.100	NA	0.057	0.185	NA	0.109	0.183
	(0.348)	(0.165)	(0.366)	(0.301)	NA	(0.233)	(0.389)	NA	(0.312)	(0.387)
Medicare	0.018*	0.007	0.016	0.012	NA	0.001	0.030	NA	0.032	0.003
	(0.132)	(0.083)	(0.127)	(0.108)	NA	(0.024)	(0.172)	NA	(0.176)	(0.058)
Medicaid	0.050*	0.005	0.053	0.125	NA	0.005	0.033	NA	0.051	0.135
	(0.219)	(0.069)	(0.223)	(0.331)	NA	(0.070)	(0.179)	NA	(0.219)	(0.342)
Other	0.044*	0.111	0.003	0.183	NA	0.032	0.042	NA	0.042	0.003
	(0.206)	(0.314)	(0.059)	(0.387)	NA	(0.175)	(0.201)	NA	(0.200)	(0.053)
Other government/no charge	0.541*	0.437	0.703	0.405	NA	0.396	0.387	NA	0.478	0.577
	(0.498)	(0.496)	(0.457)	(0.491)	NA	(0.489)	(0.487)	NA	(0.500)	(0.494)
Unknown	0.005*	0.010	0.000	0.000	NA	0.001	0.000	NA	0.168	0.000
	(0.074)	(0.101)	0.000	0.000	NA	(0.025)	0.000	NA	(0.374)	0.000

* Statistically significant differences in means among States at the 0.01 level.

†Statistically significant differences in distributions among States at the 0.01 level using Pearson's chi square.

NA = not available (States do not collect the variable).

Note: Standard deviations are included in parentheses.

Source: SAMSHA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Almost 30 percent of clients in our sample reported using alcohol daily at admission. The percentage ranged from 15 percent in Iowa to 40 percent in Massachusetts. Another third of clients reported no use in the past month, ranging from 6 percent in Massachusetts to 53 percent in Maine. The percentage of clients who reported having been first intoxicated before age 15 was somewhat less variable across States, averaging about 39 percent and ranging from 34 percent in New Jersey to 52 percent in North Dakota. Almost half of the clients did not report any secondary substance use. Marijuana was the most common secondary substance of abuse in most States, ranging from 16 percent of clients in Nevada to 36 percent in North Dakota. However, in New Jersey and New York, cocaine (including crack) was the most commonly reported secondary substance. In all States but Nevada and New Jersey, most clients had at least one prior treatment episode.

Only 17 percent of clients across States indicated a mental disorder; however, this percentage ranged from 5 percent of clients in Nevada to 39 percent in North Dakota. Homelessness also varied across States, ranging from 1.4 percent in Iowa to almost 21 percent in Nevada.

The average client in the dataset was almost 36 years old, and the majority of clients were non-Hispanic white (67 percent overall). Although age did not vary substantially across States, race/ethnicity did: The percentage of non-Hispanic white clients ranged from 57 percent in New York to 96 percent in Maine. Almost 70 percent of clients in our sample had at least a high school education, and almost 45 percent were employed. Fewer than 25 percent were currently married.

The criminal justice system was the most common route of treatment referral for clients in all States except New York, ranging from 31 percent in New York to almost 64 percent in Iowa. The most common route of referral in New York was an alcohol or drug treatment provider (34 percent). In all States but New York and North Dakota, self-referral was the second most common referral route.

Baseline Models

Table 4.2 shows the coefficients from our baseline logit models. Clients with more severe alcohol disorders, as measured by TEDS data, generally were more likely to receive inpatient alcohol treatment. However, there were differences across the States in the estimated magnitudes. Daily alcohol users were significantly more likely to receive inpatient treatment than clients who did not use in the 30 days prior to admission (omitted category). In Colorado, clients who reported daily alcohol use in the past 30 days were twice as likely to enter inpatient treatment as clients who reported no use in the past 30 days (based on e^β, which gives the effect of a one-unit change in the independent variable on the odds of inpatient treatment, where β is the estimated coefficient). In the other States exhibiting this relationship, the increases in the odds due to daily use were much larger (e.g., 4.5 in New Jersey, 7.2 in New York, 11.1 in Iowa). The exception is Massachusetts, where the frequency of use variables were not statistically significant. Reporting cocaine as a secondary substance of abuse increased the odds of inpatient admission in all States except North Dakota (which, as shown in Table 4.1, also has the lowest proportion of clients, 2 percent) and Massachusetts. Effects ranged from 1.44 in Iowa to 4 in Rhode Island. On the other

Table 4.2 Probability of Seeking Inpatient Alcohol Abuse Treatment: Coefficients and Standard Errors from Baseline Logit Models

	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
N	4,654	17,591	3,762	10,797	1,615	10,426	62,093	1,028	1,982
Frequency of Use									
1 to 3 times in the past month	-0.358***	0.403***	-0.311	0.109	0.537**	-0.605***	0.005	1.922***	-0.012
	(0.127)	(0.090)	(0.245)	(0.149)	(0.236)	(0.169)	(0.043)	-0.537	(0.284)
1 to 2 times in the past week	0.152	0.926***	-1.017*	0.239*	0.701**	-0.249*	0.670***	2.853***	-0.198
	(0.127)	(0.097)	(0.572)	(0.136)	(0.271)	(0.133)	(0.044)	(0.662)	(0.320)
3 to 6 times in the past week	0.334***	1.703***	-0.375*	0.018	1.183***	0.686***	1.258***	2.760***	0.551**
	(0.119)	(0.088)	(0.202)	(0.142)	(0.248)	(0.112)	(0.038)	(0.635)	(0.274)
Daily	0.767***	2.403***	0.368**	-0.043	2.095***	1.507***	1.980***	3.263***	1.570***
	(0.108)	(0.078)	(0.151)	(0.140)	(0.194)	(0.093)	(0.028)	(0.600)	(0.212)
Age of First Intoxication Less Than 15 Years	0.136*	0.107*	0.307**	0.167**	0.032	0.050	0.064***	0.266	0.269
	(0.081)	(0.057)	(0.135)	(0.066)	(0.154)	(0.063)	(0.023)	(0.376)	(0.171)
Secondary Drug									
Marijuana/hashish	0.253***	-0.278***	0.350**	-0.136*	-0.112	-0.113	0.273***	-0.824**	0.169
	(0.094)	(0.065)	(0.148)	(0.075)	(0.209)	(0.091)	(0.034)	(0.389)	(0.249)
Cocaine/crack	0.651***	0.369***	0.991***	0.162*	0.855***	0.452***	0.636***	-0.031	1.407***
	(0.123)	(0.118)	(0.278)	(0.089)	(0.291)	(0.079)	(0.029)	(1.108)	(0.213)
Other	0.511***	0.170*	0.059	-0.166	0.289	0.616***	0.489***	-1.419	1.732***
	(0.162)	(0.096)	(0.299)	(0.163)	(0.227)	(0.113)	(0.047)	(0.917)	(0.269)
Prior Treatment Episodes									
1 episode	0.094	0.230***	0.032	1.803***	0.545***	0.175**	0.733***	-0.360	0.481**
	(0.114)	(0.068)	(0.215)	(0.092)	(0.169)	(0.076)	(0.037)	(0.588)	(0.240)
2 episodes or more	0.236**	0.428***	0.336*	1.028***	0.306	0.001	0.829***	-0.814	0.972***
	(-0.101)	(0.066)	(0.189)	(0.096)	(0.208)	(0.076)	(0.034)	(0.514)	(0.209)

Table 4.2 Probability of Seeking Inpatient Alcohol Abuse Treatment: Coefficients and Standard Errors from Baseline Logit Models (Continued)

	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
Demographics									
Age	0.153***	0.037***	0.037	0.091***	0.058	-0.027*	-0.040***	-0.074	-0.005
	(0.022)	(0.013)	(0.033)	(0.017)	(0.046)	(0.016)	(0.006)	(0.091)	(0.060)
Age squared	-0.002***	-0.001***	0.000	-0.001***	-0.001	0.000	0.000***	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
No high school education	-0.020	0.221***	-0.554***	-0.547***	0.047	0.239***	-0.079**	0.125	-1.088***
	(0.112)	(0.082)	(0.181)	(0.087)	(0.214)	(0.088)	(0.031)	(0.506)	(0.000)
High school education	0.149	0.112*	-0.527***	-0.256***	0.128	0.086	0.005	0.351	-0.309
	(0.097)	(0.067)	(0.165)	(0.074)	(0.181)	(0.078)	(0.030)	(0.455)	(0.212)
Employed	-1.608***	-0.995***	-1.870***	-0.043	-2.085***	-0.923***	-0.856***	-0.645	-0.970***
	(0.082)	(0.056)	(0.212)	(0.065)	(0.166)	(0.066)	(0.029)	(0.411)	(0.205)
Non-Hispanic white	0.145	-0.830***	-0.609*	0.433**	0.205	-0.266	0.024	-0.632	0.555
	(0.189)	(0.153)	(0.322)	(0.194)	(-0.192)	(0.270)	(0.077)	(0.397)	(0.540)
Non-Hispanic black	-0.091	-0.673***	0.074	-0.473**	-0.003	-0.500*	-0.043	-1.449	0.246
	(0.239)	(0.188)	(0.635)	(0.232)	(-0.323)	(0.277)	(0.079)	(2.112)	(0.583)
Hispanic	-0.032	-0.811***	-3.073***	0.291	-2.334***	-0.167	-0.347***	0.384	0.243
	(0.196)	(0.215)	(1.158)	(0.220)	(0.589)	(0.286)	(0.083)	(2.867)	(0.646)
Homeless	0.508***	1.748***	3.346***	1.188***	0.354*	1.699***	0.256***	1.919***	2.073***
	(0.124)	(0.163)	(0.254)	(0.143)	(0.187)	(0.138)	(0.027)	(0.589)	(0.245)
Mental disorders	-0.497***	0.141**	-0.044	-0.415***	-0.058	1.172***	-0.156***	7.375***	-0.071
	(0.107)	(0.065)	(0.142)	(0.082)	(0.334)	(0.090)	(0.028)	(0.866)	(0.247)
Married	-0.106	-0.456***	-0.130	0.093	-0.182	-0.080	-0.025	0.483	-0.205
	(0.096)	(0.061)	(0.182)	(0.076)	(0.174)	(0.076)	(0.029)	(0.452)	(0.223)

Table 4.2 Probability of Seeking Inpatient Alcohol Abuse Treatment: Coefficients and Standard Errors from Baseline Logit Models (Continued)

	Colorado	Iowa	Maine	Massachusetts	Nevada	New Jersey	New York	North Dakota	Rhode Island
Primary Source of Referral									
Individual	-0.264**	0.206***	1.567***	-2.641***	0.525**	1.190***	0.170***	-0.189	0.640***
	(0.110)	(0.070)	(0.203)	(0.136)	(0.216)	(0.083)	(0.038)	(0.446)	(0.212)
Alcohol/drug treatment provider	1.274***	1.475***	2.606***	-1.491***	1.415***	1.561***	1.846***	ne	1.406***
	(0.119)	(0.080)	(0.199)	(0.091)	(0.307)	(0.099)	(0.032)		(0.239)
Other health care provider	-0.284*	0.447***	1.857***	-4.360***	0.764**	1.085***	0.319***	-3.462***	0.800**
	(0.169)	(0.089)	(0.246)	(0.453)	(0.311)	(0.099)	(0.047)	(0.873)	(0.328)
School, employer, community	-1.477***	-0.464***	0.824**	-3.844***	-0.944***	0.316**	0.083*	3.594***	-0.389
	(0.196)	(0.147)	(0.337)	(0.344)	(0.273)	(0.126)	(0.045)	(0.504)	(0.348)
Season Entering Treatment									
Summer	0.090	0.206***	0.034	-0.257***	-1.486***	0.088	0.036	0.524	0.287
	(0.105)	(0.075)	(0.177)	(0.084)	(0.209)	(0.082)	(0.031)	(0.527)	(0.223)
Fall	-0.056	0.067	-0.130	-0.216***	-1.846***	0.007	-0.032	-0.285	0.291
	(0.109)	(0.078)	(0.180)	(0.083)	(0.208)	(0.089)	(0.031)	(0.496)	(0.233)
Winter	0.037	0.247***	-0.167	-0.150*	-0.247	0.043	0.000	0.278	0.067
	(0.107)	(0.068)	(0.176)	(0.082)	(0.222)	(0.082)	(0.031)	(0.513)	(0.223)
Intercept	-3.642***	-2.918***	-3.171***	-3.972***	-1.370	-1.909***	-2.187***	-7.936***	-3.911***
	(0.460)	(0.301)	(0.779)	(0.399)	(0.924)	(0.421)	(0.148)	(1.958)	(1.257)
Pseudo R^2	0.2446	0.2528	0.4650	0.2451	0.3913	0.3290	0.3340	0.7900	0.4082

ne = not estimable (see text).

* Significant at 0.10 level. ** Significant at 0.05 level. *** Significant at 0.01 level.

Note: Standard errors in parentheses.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

hand, marijuana/hashish as a secondary substance significantly increased the odds of inpatient admission in three of the nine States (Colorado, Maine, and New York) and decreased it in two others (Iowa and North Dakota). Reporting other drugs as a secondary substance increased the odds of inpatient admission in four of the nine States (Colorado, New Jersey, New York, and Rhode Island) and was insignificant in the other States. Another severity measure, age of first intoxication younger than 15, significantly increased the odds of inpatient admission in three of nine States (Maine, Massachusetts, and New York) and was insignificant in all others. Having one prior treatment episode increased the odds of admission to inpatient treatment compared with having no prior treatment in the six States for which it was significant (Iowa, Massachusetts, Nevada, New Jersey, New York, and Rhode Island). Effects ranged from 1.2 in New Jersey to 6.06 in Massachusetts. Having two or more prior treatment episodes also increased the odds of inpatient treatment for clients in Colorado, Iowa, Massachusetts, New York, and Rhode Island. Effects ranged from 1.3 in Colorado to 2.8 in Massachusetts. Having two or more prior treatment episodes was not significant in the other four States.

The presence of a co-occurring mental disorder increased the odds of inpatient admission in only three States (Iowa, New Jersey, and North Dakota). Contrary to expectations based on clinical criteria and previous studies of insured individuals, it significantly *decreased* the odds in Colorado, Massachusetts, and New York and it was insignificant in the other three States. Homelessness, on the other hand, significantly increased the odds of inpatient admission in eight of the nine States examined, and the effect was generally large.

Several socioeconomic variables were significantly associated with the probability of inpatient treatment, and, again, the results varied across States. Age was significant in four of the nine States, in all cases in a nonlinear form. Employed clients were significantly less likely to be admitted to inpatient treatment in seven of the nine States (Colorado, Iowa, Maine, Nevada, New Jersey, New York, and Rhode Island). The education variables were significant in six of the nine States but revealed inconsistent effects. Race/ethnicity variables were significant in five of the nine States, and in four States (Iowa, Maine, Nevada, and New York), Hispanic clients were less likely to have been admitted to inpatient treatment, other things equal. Marital status was significant in only one State, and season of admission was significant in three States but with no discernible pattern.

In all States except Massachusetts and North Dakota, individuals referred by an alcohol or drug treatment provider had greater odds of entering inpatient treatment than those referred by the criminal justice system. In Massachusetts, being referred by an alcohol or drug treatment provider decreased the odds of entering inpatient treatment. In North Dakota, all those referred by an alcohol or drug treatment provider entered outpatient treatment, which is why we do not report parameter estimates for that cell. In six States (Iowa, Maine, Nevada, New Jersey, New York, Rhode Island), individuals who self-referred into treatment had higher odds of being admitted to inpatient treatment than those referred by the criminal justice system.

Expected Payer Model

Descriptive statistics on the expected payer analysis file variables are displayed at the end of Table 4.1. In most States, the primary expected payer was other government funding/no

charge. The proportion of clients in this category, which includes those whose care is funded by the SAPT block grant, ranged from 39 percent in New Jersey to 70 percent in Iowa. The second most frequent expected payer in most States was the individual, ranging from 6.5 percent in Iowa to over 51 percent in Nevada. Taken together, these two categories of expected payer account for 74 percent of the clients in the sample, revealing that this is a very different population than that studied in the research mentioned earlier (Goodman et al., 1992, 1998).

Table 4.3 displays the coefficients and standard errors from our expected payer model. Coefficients and standard errors on the additional variables, which did not change much from those in the baseline model, are available from the lead author upon request. Massachusetts and New York are excluded from Table 4.3 because they did not collect data on expected payer. For Nevada, we do not report estimated parameters for Medicaid and Medicare as expected payer because all of those with Medicaid or Medicare entered outpatient treatment. Similarly, we do not report parameter estimates for other insurance in Rhode Island because all clients with that payer were admitted to outpatient treatment, or unknown insurance in North Dakota, as all clients with that payer were admitted into inpatient treatment. In Nevada and Rhode Island, the number of clients with these payers was fewer than 10, rendering any inference inconclusive at best. In North Dakota, however, the payer for almost 17 percent of the clients was unknown at the time of admission, providing better evidence of an association.

As Table 4.3 reveals, in five of the seven States, individuals who were expected to pay for care themselves had significantly lower odds of entering inpatient treatment than those in the omitted category (i.e., other government funding/no charge). Individuals with private health insurance, Medicare, or Medicaid also in many cases had lower odds of entering inpatient treatment facilities than individuals with other government funding/no charge. A notable exception was North Dakota, in which individuals with private health insurance, Medicare, or Medicaid had much higher odds of entering inpatient treatment and in which all of those with unknown insurance entered outpatient treatment.

Discussion

This study examined the effects of the severity of the alcohol use disorder, as measured by routinely collected administrative data, on the odds of admission to alcohol treatment programs in nine States. In contrast to previous studies, which used claims data from clients with employer-sponsored health insurance, our data include clients who were unemployed, uninsured, and homeless. Our results reveal that having a more severe disorder generally increased the odds of inpatient treatment, but the magnitude, and sometimes the direction, of the estimated effects vary across the nine States considered here.

Individuals with more severe substance use disorders (as measured by more frequent alcohol use, use of cocaine as a secondary substance, and a prior treatment episode), as well as those who were homeless, generally had higher odds of admission to inpatient treatment. Those who were employed had consistently lower odds of inpatient admission. Thus, Gregoire's (2000) finding extends to admission, at least in these nine States. Whether employed persons really have less severe disorders, or choose outpatient treatment due to time constraints or some other reason,

Table 4.3 Probability of Seeking Inpatient Alcohol Abuse Treatment, by State: Coefficients and Standard Errors on the Expected Payer Variables

	Colorado	Iowa	Maine	Nevada	New Jersey	North Dakota	Rhode Island
N	4,654	17,591	3,762	1,615	10,414	1,028	1,760
Expected Source of Payment							
Self-pay	-1.239***	0.182*	-1.369***	-1.076***	-1.263***	-0.273	-1.209***
	(0.101)	(0.101)	(0.384)	(0.175)	(0.098)	(1.488)	(0.320)
Private	-0.708**	-0.153*	-1.501***	0.242	-0.115	2.401***	-3.446***
	(0.300)	(0.081)	(0.370)	(0.333)	(0.092)	(0.849)	(0.748)
Medicare	-0.007	-0.004	-1.433**	ne	-0.354**	2.760**	ne
	(0.417)	(0.156)	(0.645)		(0.155)	(1.095)	
Medicaid	-0.964*	-0.344***	-0.556***	ne	-0.973***	2.573***	-3.572***
	(0.575)	(0.109)	(0.170)		(0.159)	(0.928)	(0.549)
Other	2.054***	-0.531	-1.155***	-1.899***	-0.021	4.323***	ne
	(0.140)	(0.476)	(0.198)	(0.501)	(0.128)	(1.274)	
Unknown	-0.775*	na	na	ne	na	ne	na
	(0.397)						
Pseudo R^2	0.3509	0.2542	0.4850	0.4217	0.3496	0.8108	0.5011

na = not applicable (i.e., the State had no clients in that category).

ne = not estimable (see text).

* Significant at 0.10 level. ** Significant at 0.05 level. *** Significant at 0.01 level.

Notes: Standard errors in parentheses.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

is a question for future research. Taken together, our findings suggest that client placement in these State substance abuse treatment systems appear, at least to some extent, to conform with the current thinking on client placement.

However, co-occurring mental disorders did not play a consistent role across even most States, and it was negatively related to the likelihood of inpatient treatment in several. This is surprising given its importance as a clinical indicator for inpatient treatment and its significance in earlier studies (Goodman et al., 1992, 1998). We cannot tell whether we obtain our results because individuals with co-occurring mental disorders are less likely to choose inpatient treatment settings, are less likely to be referred to them, or are refused admission to them. However, of note is that two of the three States for which co-occurring mental disorders increased the odds of inpatient admission, New Jersey and North Dakota, had special programs for those with both mental and substance use disorders (New Jersey Substance Abuse Prevention and Treatment Advisory Task Force, 2001; North Dakota Department of Human Services, 2003). Iowa, the third State for which co-occurring mental disorders significantly increased the odds of inpatient admission, had two characteristics that might have worked together to promote appropriate placement. The first was that it promulgated its own set of client placement guidelines, which, similar to the ASAM-PPCs, consider emotional and behavioral factors in client placement (Chemical Dependency Treatment Programs of Iowa, Iowa Substance Abuse Program Directors Association, & Iowa Department of Public Health, 1991). The second is that it was one of the first public systems in the country to contract with a behavioral managed care company (Division of Criminal and Juvenile Justice Planning, 1998). Taken together, these results suggest that States may need to take steps in lieu of or in addition to promulgating guidelines to promote admission of clients with co-occurring mental disorders to inpatient treatment. Both Colorado and Massachusetts had guidelines at the time, but in both States we find that co-occurring mental disorders *decreased* the odds of inpatient admission (Gartner & Mee-Lee, 1995; O'Keefe & Fisher, 2001). Further research is needed to determine the effect of specific State policies on client placement.

Another finding meriting further examination is that, in the four States for which it was significant, Hispanic ethnicity reduced the odds of inpatient admission. Again, we cannot discern whether this is because Hispanic individuals chose not to enter inpatient treatment, were not screened as carefully, or because culturally competent inpatient treatment was unavailable. Although the latter might be understandable in Maine, which reported having only 26 Hispanics in treatment in 1996, it would be less understandable in New York and Nevada, which have substantial Hispanic populations.

Finally, of mention is the finding that, in seven of our nine States, referral by an alcohol or drug treatment provider is strongly and positively associated with inpatient treatment. One possible explanation for this finding may be that providers of inpatient detoxification treatment believe that clients should be stepped down gradually to lower levels of care, so they refer their clients to inpatient treatment programs, as found in a small study by Kosanke et al. (2002). Because we cannot link records to create an episode for a given client, we are unable to test this hypothesis empirically. However, it is a plausible explanation for our empirical finding.

In other chapters in this compendium, we extend the research on setting choice. Chapter 5 investigates the choice among types of inpatient treatment (hospital, long-term residential, and short-term residential) and outpatient treatment (standard outpatient and intensive outpatient). Chapter 8 investigates the effect of reporting requirements, one of the ways in which State data systems diverge, on estimates of the effects of client characteristics on treatment setting choice.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (DSM-IV)* (4th ed.). Washington, DC: Author.

American Society of Addiction Medicine. (1996). *Patient placement criteria for the treatment of substance-related disorders* (2nd ed., ASAM PPC-2). Chevy Chase, MD: Author.

Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly: Health and Society, 51*(1), 95-124.

Annis, H. M. (1985-1986). Is inpatient rehabilitation of the alcoholic cost effective? Con position. *Advances in Alcohol & Substance Abuse, 5,* 175-190.

Becker, G. S., & Murphy, K. M. (1988). A theory of rational addiction. *Journal of Political Economy, 96,* 675-700.

Brito, D. L., & Strain, C. K. (1996). A model of the consumption of alcohol. In L. Green & J. H. Kagel (Eds.), *Advances in behavioral economics: Volume 3. Substance use and abuse* (pp. 163-182). Norwood, NJ : Ablex Publishing Corporation.

Bureau of Substance Abuse Services. (2001, January). *Substance abuse prevention, treatment, and services directory 2001 revised.* Boston, MA: Massachusetts Department of Public Health.

Chemical Dependency Treatment Programs of Iowa, Iowa Substance Abuse Program Directors Association, & Iowa Department of Public Health. (1991). *Iowa client/placement criteria for the treatment of psychoactive substance use disorder.* Des Moines, IA: Authors.

Coffey, R. M., Mark, T., King, E., Harwood, H., McKusick, D., Genuardi, J., Dilonardo, J., & Chalk, M. (2001). *National estimates of expenditures for substance abuse treatment, 1997* (SAMHSA Publication No. SMA-01-3511). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment and Center for Mental Health Services. [Available at http://csat.samhsa.gov/idbse/sa01ch1.asp]

Comprehensive Alcohol Abuse, Drug Abuse, and Mental Health Amendments, Pub. L. No. 100-690, Title II, ch. 2, § 2052 (1988).

Dayhoff, D. A., Pope, G. C., & Huber, J. H. (1994). State variations in public and private alcoholism treatment at specialty substance abuse treatment facilities. *Journal of Studies on Alcohol, 55,* 549-560.

Division of Criminal and Juvenile Justice Planning. (1998*). Substance abuse treatment. Excerpted from Iowa criminal and juvenile justice plan: 1998 update.* Des Moines, IA: Iowa Department of Human Rights.

Donovan, D. M., Rosengren, D. B., Downey, L., Cox, G. B., & Sloan, K. L. (2001). Attrition prevention with individuals awaiting publicly funded drug treatment. *Addiction, 96,* 1149-1160.

Etheridge, R. M., Craddock, S. G., Hubbard, R. L., & Rounds-Bryant, J. L. (1999). The relationship of counseling and self-help participation to patient outcomes in DATOS. *Drug and Alcohol Dependence, 57,* 99-112.

Finney, J. W., Hahn, A. C., & Moos, R. H. (1996). The effectiveness of inpatient and outpatient treatment for alcohol abuse: The need to focus on mediators and moderators of setting effects. *Addiction, 91,* 1773-1796. Discussion in *91*, 1803-1820.

Finney, J. W., & Moos, R. H. (1996). The effectiveness of inpatient and outpatient treatment for alcohol abuse: Effect sizes, research design issues, and explanatory mechanisms. *Addiction, 91,* 1803-1820.

Gartner, L., & Mee-Lee, D. (Consensus Panel Co-Chairs). (1995). *The role and current status of patient placement criteria in the treatment of substance use disorders* (Treatment Improvement Protocol [TIP] Series 13). Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment. [Available at http://www.treatment.org/Externals/Tip-13/TIP-13toc.html]

Gastfriend, D. R., Lu, S. H., & Sharon, E. (2000). Placement matching: Challenges and technical progress. *Substance Use & Misuse, 35,* 2191-2213.

Gastfriend, D. R., & McLellan, A. T. (1997). Treatment matching: Theoretic basis and practical implications. *Medical Clinics of North America, 81,* 945-966.

Goodman, A. C., Holder, H. D., Nishiura, E., & Hankin, J. R. (1992). A discrete choice model of alcoholism treatment location. *Medical Care, 30,* 1097-1110.

Goodman, A. C., Nishiura, E., & Hankin, J. R. (1998). A discrete choice model of drug abuse treatment location. *Health Services Research, 33,* 125-145.

Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse, 9,* 103-110.

Green, L., & Kagel, J. H. (Eds.). (1996). *Advances in behavioral economics: Volume 3. Substance use and abuse.* Norwood, NJ: Ablex Publishing Corporation.

Gregoire, T. K. (2000). Factors associated with level of care assignment in substance abuse treatment. *Journal of Substance Abuse Treatment, 18,* 241-248.

Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy, 80,* 223-255. [Available at http://ideas.repec.org/a/ucp/jpolec/v80y1972i2p223-55.html]

Haas-Wilson, D., Cheadle, A., & Scheffler, R. M. (1989). Demand for mental health services: An episode of treatment approach. *Southern Economic Journal, 56,* 219-232.

Harrison, P. A., & Asche, S. E. (1999). Comparison of substance abuse treatment outcomes for inpatients and outpatients. *Journal of Substance Abuse Treatment, 17,* 207-220.

Hartmann, D. J., Sullivan, W. P., & Wolk, J. L. (1993). Inpatient and outpatient outcomes in Missouri's alcohol and drug treatment programs. *Journal of Health & Social Policy, 5*(2), 67-76.

Jacobsen, K., & McGuire, T. G. (1996). Federal block grants and state spending: The Alcohol, Drug Abuse, and Mental Health block grant and state agency behavior. *Journal of Health Politics, Policy and Law, 21,* 753-770.

Kosanke, N., Magura, S., Staines, G., Foote, J., & DeLuca, A. (2002). Feasibility of matching alcohol patients to ASAM levels of care. *American Journal on Addictions, 11,* 124-134.

Mark, T., Coffey, R. M., King, E., Harwood, H., McKusick, D., Genuardi, J., & Das, M. (1999). *National spending estimates for mental health, alcohol and other drug abuse treatment, 1987-1997: Draft round-two report* (Contract deliverable for Contract No. 270-96-007, Project 1: Task 19). Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration.

Mattson, M. E. (2003). The search for a rational basis for treatment selection. In M. Galanter (Ed.), *Recent developments in alcoholism: Volume 16. Research on alcoholism treatment* (pp. 97-113). New York: Kluwer Academic/Plenum Publishers.

McCarty, D., McGuire, T. G., Harwood, H. J., & Field, T. (1998). Using state information systems for drug abuse services research. *American Behavioral Scientist, 41,* 1090-1106.

McKay, J. R., Cacciola, J. S., McLellan, A. T., Alterman, A. I., & Wirtz, P. W. (1997). An initial evaluation of the psychosocial dimensions of the American Society of Addiction Medicine criteria for inpatient versus intensive outpatient substance abuse rehabilitation. *Journal of Studies on Alcohol, 58,* 239-252.

McLellan, A. T., Hagan, T. A., Levine, M., Meyers, K., Gould, F., Bencivengo, M., Durell, J., & Jaffe, J. (1999). Does clinical case management improve outpatient addiction treatment. *Drug and Alcohol Dependence, 55*(1-2), 91-103.

Miller, W. R., & Hester, R. K. (1986). Inpatient alcoholism treatment: Who benefits? *American Psychologist, 41,* 794-805.

Montoya, I. D., Atkinson, J. S., & Trevino, R. A. (2000). Economics as a factor in models of behavioral motivation and change. *Substance Use & Misuse, 35,* 329-346.

Muurinen, J. M. (1982). Demand for health: A generalised Grossman model. *Journal of Health Economics, 1*(1), 5-28.

National Institute on Alcohol Abuse and Alcoholism. (2000, June). *10th special report to the U.S. Congress on alcohol and health* (NIH Publication No. 00-1583). Rockville, MD: U.S. Department of Health and Human Services, National Institutes of Health. [Available at http://www.niaaa.nih.gov/publications/10report/intro.pdf & http://www.niaaa.nih.gov/publications/publications.htm]

National Institute on Alcohol Abuse and Alcoholism. (2001). *Alcoholism: Getting the facts* (NIH Publication No. 96-4153). Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health. [Available at http://www.niaaa.nih.gov/publications/booklet.htm]

New Jersey Substance Abuse Prevention and Treatment Advisory Task Force. (2001). *Improving substance abuse treatment in New Jersey.* Trenton, NJ: New Jersey Department of Health and Senior Services. [Available as a PDF download at http://www.ncaddnj.org/publicAffairs/taskforce.htm]

North Dakota Department of Human Services. (2003). *Home page of the North Dakota Department of Human Services.* Retrieved October 16, 2003, from http://lnotes.state.nd.us/dhs/dhsweb.nsf

Office of Applied Studies. (1999). *Treatment Episode Data Set (TEDS): 1992-1997: National admissions to substance abuse treatment services* (DHHS Publication No. SMA 99-3324, Drug and Alcohol Services Information System Series S-7). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#teds2]

Office of Applied Studies. (2000). *Uniform Facility Data Set (UFDS): 1998 data on substance abuse treatment facilities* (DHHS Publication No. SMA 00-3463, Drug and Alcohol Services Information System Series S-10). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#nssats2]

Office of Applied Studies. (2004). *Alcohol and Drug Services Study (ADSS) Phase II: Client record abstract report* (DHHS Publication No. SMA 04-3974, Analytic Series No. A-27). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/adss.htm and http://www.oas.samhsa.gov/analytic.htm]

O'Keefe, M. L., & Fisher, E. N. (2001). *Overview of substance abuse treatment services: Fiscal year 2001.* Colorado Springs, CO: Colorado Department of Corrections. [Available as a PDF at http://www.doc.state.co.us/AlcoholDrug/pdfs/annual01.pdf]

Pettinati, H. M., Meyers, K., Evans, B. D., Ruetsch, C. R., Kaplan, F. N., Jensen, J. M., & Hadley, T. R. (1999). Inpatient alcohol treatment in a private healthcare setting: Which patients benefit and at what cost? *American Journal on Addictions, 8,* 220-233.

Pettinati, H. M., Meyers, K., Jensen, J. M., Kaplan, F., & Evans, B. D. (1993). Inpatient vs outpatient treatment for substance dependence revisited. *Psychiatric Quarterly, 64,* 173-182.

Pottick, K., Hansell, S., Gutterman, E., & White, H. R. (1995). Factors associated with inpatient and outpatient treatment for children and adolescents with serious mental illness. *Journal of the American Academy of Child and Adolescent Psychiatry, 34,* 425-433.

Simpson, D. D., Joe, G. W., Fletcher, B. W., Hubbard, R. L., & Anglin, M. D. (1999). A national evaluation of treatment outcomes for cocaine dependence. *Archives of General Psychiatry, 56,* 507-514.

Subcommittee on Health Services Research, National Advisory Council on Alcohol Abuse and Alcoholism. (1997). *Improving the delivery of alcohol treatment and prevention services: A national plan for alcohol health services research: Executive summary* (NIH Publication No. 4224). Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism. [Available at http://www.niaaa.nih.gov/publications/exsum.htm]

Suranovic, S. M., Goldfarb, R. S., & Leonard, T. C. (1999). An economic theory of cigarette addiction. *Journal of Health Economics, 18*(1), 1-29.

U.S. General Accounting Office. (1998, March 27). *Drug abuse: Research shows treatment is effective, but benefits may be overstated* (GAO/HEHS-98-72). Washington, DC: U.S. Government Printing Office. [Available as a PDF at http://www.gao.gov/]

Chapter 5. Client Choice among Standard Outpatient, Intensive Outpatient, Residential, and Inpatient Alcohol Treatment in State-Monitored Programs

Sarah Q. Duffy, Ph.D.
Laura J. Dunlap, M.A.
Gary A. Zarkin, Ph.D.

Introduction

Treatment for those with substance use disorders has evolved over the years from a largely inpatient to a largely outpatient activity. In the 1970s and early 1980s, treatment providers believed that inpatient was the only acceptable treatment setting because individuals needed to be removed from their environments to overcome their disorders (Washton, 1997). However, several studies conducted in the mid-1980s concluded that outcomes were the same for both treatment settings, and, because outpatient treatment is less costly, it was more cost-effective (Annis, 1985-1986; Miller & Hester, 1986). Those findings, coupled with the growth of managed behavioral health care and the burden on the treatment system caused by the influx of cocaine-addicted clients in the mid- to late 1980s, led treatment to shift from predominantly inpatient to predominantly outpatient settings (Washton, 1997). By October 1, 1998, 89 percent of the almost 1 million individuals in treatment for substance use disorders were in some form of outpatient treatment (Office of Applied Studies [OAS], 2000). By that time, however, there also was a growing recognition that although many clients may not need inpatient treatment, some needed more structure than is provided in the standard outpatient (SOP) settings (Gottheil, 1997). This increased structure could be provided by intensive outpatient (IOP) treatment. By 1998, approximately 20 percent of clients in treatment nationwide were in IOP treatment (OAS, 2000).

In this chapter, we extend the research on treatment-setting choice by examining the association between characteristics of alcohol-abusing clients and admission to State-monitored inpatient hospital (IPH), short- or long-term residential (STR or LTR), IOP, or SOP rehabilitation treatment settings. Earlier studies of the choice between inpatient and outpatient treatment provided evidence that both alcohol disorder severity factors, such as frequency of use, and socioeconomic variables, such as homelessness and employment status, were associated with admission or referral to inpatient versus outpatient treatment (Goodman, Holder, Nishiura, & Hankin, 1992; Goodman, Nishiura, & Hankin, 1998; Gregoire, 2000), but Chapter 4 in this compendium indicates that those relationships varied across States. A study of care authorizations made by a managed behavioral health care organization among inpatient/acute, residential, partial hospitalization, intensive outpatient, and standard outpatient treatment found that age and severity variables were positively associated with referrals to a more intensive treatment (Marques et al., 2001). In this chapter, we study the choice of admission to one of five types of treatment settings among those in the State-monitored treatment sector of two States to examine whether it is appropriate to combine types of inpatient and outpatient treatment into two broad choices for analyses of this population. Then we explore whether the same general findings regarding the associations between client severity and socioeconomic variables and

treatment-setting choice are revealed when the determinants of treatment-setting choice are examined in a five-choice model.

To do so, we used data from the 1996 Treatment Episode Data Set (TEDS) for adult males from Iowa and New Jersey with alcohol as the primary substance of abuse. Our findings suggest that it is preferable to examine treatment-setting choice as a five-setting choice rather than collapsing it into an inpatient versus outpatient choice. We find that the key distinctions among clients occur between SOP and all other clients. Those who enter SOP treatment have less severe alcohol disorders and are more likely to be employed than are those who enter any other type of setting.

Treatment Settings

As defined by the American Society of Addiction Medicine's Patient Placement Criteria (ASAM-PPCs), IOP (Level II) falls between traditional SOP (Level I) and residential/inpatient services (Level III) in terms of treatment intensity. For adults, IOP treatment generally involves a structured day or evening treatment program of 9 hours of skilled treatment services provided each week.[1] Such services may include individual and group counseling, family therapy, educational groups, occupational and recreational therapy, psychotherapy, or other therapies (ASAM, 1996). SOP treatment encompasses similar nonresidential services as IOP that are provided in regularly scheduled sessions. However, SOP treatment generally consists of fewer than 9 contact hours per week. Both SOP and IOP treatment are geared toward individuals who do not suffer from severe medical problems and who prefer a modality that fits well with their daily work schedule. However, IOP treatment may be more appropriate for individuals whose emotional conditions distract from recovery, so they need monitoring in excess of that provided under SOP treatment. These individuals may also be resistant to treatment and lack a supportive recovery environment, both of which signal the need for a more structured program.

Residential treatment serves clients who need a safe and stable living environment to develop sufficient recovery skills (ASAM, 1996). It provides organized services by designated treatment personnel who provide a planned regimen of care in a 24-hour setting. Residential treatment can be classified according to intensity (ASAM, 1996) or length of stay. In our data, short-term residential (STR) treatment is defined as 30 days or fewer with long-term residential (LTR) treatment lasting for more than 30 days. Inpatient hospital (IPH) treatment is usually more intensive than residential treatment but with shorter lengths of stay.

Data

As in Chapter 4, we used data from the 1996 Treatment Episode Data Set (TEDS), maintained by the Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMSHA) (OAS, 1999). TEDS contains admissions data collected by treatment providers and sent to State agencies, which use them to monitor their substance abuse treatment systems. The data are submitted at regular intervals by the States in a common format to SAMHSA. The data include admissions information—such as the primary and secondary substances of abuse, frequency of use, age at first use, source of referral, number of prior

---

[1] In the TEDS data, States are to identify as IOP treatment the client receives that lasts 2 or more hours per day on 3 or more days per week (OAS, 1999).

treatment episodes, and planned type of service—as well as mental health and socioeconomic measures. Our analysis focused on adult males with alcohol as their primary substance of abuse. We did not include women because a variable that might be relevant to their treatment setting choice, whether or not they are pregnant, is not well reported.

Unfortunately, all States do not report all variables or collect data from all substance abuse treatment facilities in the TEDS universe (i.e., those receiving public substance abuse treatment funding). Therefore, we focused on two States, Iowa and New Jersey, that differentiated IOP admissions from SOP admissions, provided data covering 90 percent or more of their estimated substance abuse treatment clients in programs receiving public funds in 1996, and collected data from some private facilities on a voluntary basis. These States also collected variables hypothesized to affect alcohol treatment choice.

Empirical Framework

Our empirical specification was motivated by random utility theory, which is commonly used to model choice behavior when the alternatives are naturally discontinuous (Ben-Akiva & Lerman, 1985). Random utility theory assumes that the consumer is rational and that he or she can compare alternatives based on his or her tastes and preferences. The individual's characteristics, which are associated with his or her tastes and preferences, as well as other individual-specific variables that may affect choice, enter an objective function, the utility function, that the individual is assumed to maximize. The individual does that by selecting the alternative that provides him or her with the highest utility. Thus, the coefficients, which can be estimated using maximum likelihood methods, are based on revealed preference exhibited by a sample of individuals.

We assumed that the individual chooses from among five alternative treatment settings: IPH, STR, LTR, IOP, and SOP. Formally, the individual maximizes the following utility function, U_i:

$$U_i \;=\; U_i(\text{IPH, STR, LTR, IOP, SOP}), \tag{1}$$

where

IPH	=	inpatient hospital,
STR	=	short-term residential,
LTR	=	long-term residential,
IOP	=	intensive outpatient, and
SOP	=	standard outpatient.

The level of utility that individual i obtains from setting j is a function of the individual's characteristics (X_i):

$$U_{ij} = \; U_j(X_i), \qquad j = (\text{IPH, STR, LTR, IOP, SOP}), \; i = 1,..., N, \tag{2}$$

where N is the number of individuals in the sample.

Random utility theory assumes that there is a deterministic portion of each of these utilities, which is known with certainty to the individual making the choice, and a random

component, which is due to measurement error or some other process that clouds the analyst's ability to fully model the individual's utility. Assuming a linear functional form, the deterministic portion of the utility function for the five setting choices is

$$\mu_{ij} = \beta_j X_i, \qquad j = (IPH, STR, LTR, IOP, SOP), i = 1,..., N, \qquad (3)$$

where μ_{ij} is the deterministic component of the individual's utility from each choice, X_i is as defined above, and the $\beta_j's$ are choice-specific coefficients on individual characteristics. To obtain the full random utility model for each choice, we added on an error term, ϵ_{ij}, assumed to be distributed jointly according to the extreme value distribution, to yield (4):

$$U_{ij} = \mu_{ij} + \epsilon_{ij}. \qquad (4)$$

The probability that individual i will choose treatment setting j is the probability that setting j will bring the individual the greatest utility:

$$Prob\ (U_{ij} > U_{ik}),\ for\ all\ k \neq j. \qquad (5)$$

Given the distributional assumption noted above, and removing an indeterminacy, we have

$$Pr(Y_i = j) = \frac{e^{\beta_j X_i}}{1 + \sum_{k=1}^{J-1} e^{\beta_j X_i}}, \qquad (6)$$

where J is the total number of choices (in our case, five treatment settings) (Greene, 2000). We estimated the model using standard multinomial logit (MNL) techniques. We chose this approach over an ordinal approach based on an underlying latent variable, such as the one used by Marques et al. (2001), because although these treatment settings may vary with regard to the intensity of services, we do not believe that intensity is the only factor clients use in deciding among settings. Furthermore, as has been noted elsewhere, it is not always true that inpatient treatment settings provide the most intensive treatment (Samarasinghe, 1996). For these reasons, we chose the multinomial model, which does not impose an ordering a priori.

We included several individual-specific characteristics in the model, based on prior research on treatment-setting choice (Goodman et al., 1992, 1998; Gregiore, 2000; also see Chapter 4). The variables are similar to those used in Chapter 4, but they have been collapsed as necessary to allow estimation of the MNL model.[2]

Substance Use Disorder Severity

Previous studies of treatment-setting choice revealed that disorder severity affects the intensity of care received, as would be predicted by models of health services utilization and demand. This suggests that individuals with more severe alcohol disorders may receive greater

---

[2] Specifically, small cell sizes led to unreasonably large point estimates and standard errors in the MNL model. To increase cell sizes, we combined categories for a number of independent variables.

utility from choosing a more intensive treatment setting. We used several variables to measure the individual's alcohol use disorder severity.

Frequency of Use: We hypothesized that the greater the frequency of alcohol use, the more severe the individual's disorder, and the greater the likelihood that the individual will demand a more intensive treatment setting. We included two dichotomous variables that measure frequency of use in the month prior to admission: used 3 or more times in the week before admission; and used at least once in the month prior, but less than 3 times in the week prior to admission. No use in the past month was the reference category.

Intoxication Before Age 15: Research suggests that individuals who first use alcohol before the age of 15 are more likely to become alcohol dependent (Grant & Dawson, 1997), suggesting that they may demand more intense treatment. We included a dichotomous variable indicating first alcohol intoxication before age 15.

Secondary Substance: Having a secondary substance of abuse can indicate a more severe alcohol use disorder. We included a dichotomous variable that equaled 1 if the client used any secondary substance, 0 otherwise.

Prior Treatment: Prior treatment is used in many treatment studies as another indicator of disorder severity (e.g., Etheridge, Craddock, Hubbard, & Rounds-Bryant, 1999; French & Zarkin, 1992; Hubbard et al., 1989; McLellan et al., 1999; Simpson, Joe, Rowan-Szal, & Greener, 1995). We entered this as a dichotomous variable that equaled 1 if the individual had at least one prior treatment, 0 otherwise.

Co-Occurring Mental Disorders, Homelessness: Based on the ASAM-PPCs and the results of prior research on treatment choice (e.g., Goodman et al., 1992, 1998; also see Chapter 4), we expected that those with a co-occurring mental disorder and those who are homeless may have a higher likelihood of entering more intensive treatment setting. To capture this, we entered two indicator variables, one for co-occurring mental disorder and the other for homelessness.

Socioeconomic and Demographic Characteristics

Several authors have conceptualized addictive behavior as consistent with choice theory and suggested that socioeconomic variables should be included in models examining choice behavior among those with substance use disorders (Becker & Murphy, 1988; Brito & Strain, 1996; Green & Kagel, 1996; Montoya, Atkinson, & Trevino, 2000). We included several variables to measure these characteristics.

Employment Status: Employed individuals have higher time cost associated with inpatient treatment, other things equal, and therefore may gain greater utility from some form of outpatient treatment. Furthermore, the fact that they are employed suggests that they may have a less severe disorder in ways we cannot otherwise measure. Our research on the inpatient/outpatient choice found that employed individuals are less likely to enter inpatient treatment settings (see Chapter 4). To examine whether a similar relationship is uncovered when we consider a more finely divided set of treatment-setting options, we included a dichotomous variable that equaled 1 if the client was employed at admission, either full- or part-time, and 0 for those who were unemployed or not members of the labor force.

Expected Payer: Economic models suggest that individuals who pay out of pocket for their own treatment may demand less costly treatment than those who do not. However, we only observed the expected payer for this particular admission and did not know, for example, whether the client's insurance covered both inpatient and outpatient treatment. In some cases, a payer may limit the individual's choice set if, for example, an indigent client chooses an inpatient treatment program because no publicly funded outpatient slots are available. Therefore, the direction of the expected payer effects is unclear a priori, and the variables should be thought of as control variables. The estimated coefficients may not accurately reflect any direct causal effect of pay source on treatment choice. We included the following three categories: (a) self-pay, (b) private health insurance, and (c) Medicare, Medicaid, and other insurance. Other government funding and no charge formed the reference category. The reference category consisted of clients whose treatment was funded by State agency funds, including those received through the Federal Government's Substance Abuse Prevention and Treatment (SAPT) block grant program.

Education Level: Based on Muurinen (1982), better-educated individuals may be less likely to demand care or may demand less intensive care because, all else equal, the rate of depreciation of the health stock should be lower for better-educated individuals. At the same time, better-educated individuals may have higher income, which may mean they can afford a more intensive treatment choice. We included a dichotomous variable to measure education, which equaled 1 if the client had at least a high school education, 0 otherwise.

Age: Human capital theory suggests that age has a positive effect on an individual's choice of treatment intensity because the rate of depreciation of health stock is a positive function of age (Muurinen, 1982). On the other hand, Suranovic, Goldfarb, and Leonard (1999) suggested that those who are older are more motivated to quit using substances, perhaps making it less likely that they would need intensive treatment. Therefore, we entered age without an a priori prediction on the sign of its impact.

Race/Ethnicity: Research has shown that people of different races and ethnicities have different cultural attitudes about seeking treatment and the types of treatment sought (Arroyo, Westerberg, & Tonigan, 1998; Lundgren, Amodeo, Ferguson, & Davis, 2001; Sheikh & Furnham, 2000). We included three indicator variables to capture the client's race/ethnicity: Hispanic, non-Hispanic black, and other race. Non-Hispanic white was the reference category.

Marital Status: Although imperfect, marital status may proxy for the ASAM-PPCs' emotional and behavioral disorders criteria. Currently married clients may have less severe emotional and behavioral disorders than those who are single, divorced, separated, or widowed. Marital status also may proxy a more stable living environment, more family responsibilities, or more family support, all of which may make it less likely that a married individual would enter the inpatient or residential settings. The variable equaled 1 if the individual was currently married, 0 otherwise.

Referral Source: An individual's referral source may influence his choice of treatment setting and the utility he derives from that choice. The referral may help the individual choose a treatment setting by providing him with information about the best treatment choice for his needs; or the referral source may limit the individual's choice set, causing him to choose from among the remaining options.

Clients who self-refer into alcohol treatment may do so more because of life problems associated with their use of alcohol than because of their alcohol use (Majella Jordan & Oei, 1989). These individuals may be more likely to enter a program based on convenience than on their clinical needs. Likewise, clients referred by third parties, such as their schools, employers, or physicians, also may choose a program based more on convenience than on clinical factors because they may be entering treatment to appease their referrer. On the other hand, clients referred by an alcohol or drug treatment provider, who may have knowledge of clinical placement criteria, may be more likely than others to be referred to the setting most consistent with their needs.

Finally, the criminal justice system has became a frequent source of referral into alcohol treatment. The likelihood that clients referred in this way will choose treatment consistent with their needs depends, in part, on the placement criteria used by the referring criminal justice system (CJS). Clients with a criminal justice referral may face a limited choice set. For example, they may face a simple choice between the treatment setting dictated by the criminal justice agency or incarceration. However, in our data a CJS referral also may occur for clients with other CJS involvement, such as being on parole, on work or home furlough, or for a civil commitment. Therefore, having a CJS referral does not necessarily mean that treatment referred was required in lieu of prison. The client may still face a choice among multiple treatment settings. We included three dichotomous variables that indicated whether the client was referred by an alcohol or drug abuse treatment provider; another medical care provider; his employer or school; or was self-referred. CJS referral was the reference category.

Season of Admission: The time of year the client is admitted also may affect the likelihood that an individual chooses inpatient treatment. For example, those who are seasonally employed, such as teachers and college professors, may be more likely to choose inpatient treatment in the summer. We included indicator variables for summer, fall, and winter, with spring as the reference category.

Specification Tests

Because most of the literature on treatment-setting choice examined a simple dichotomous choice between inpatient and outpatient treatment, we first tested whether combining the treatment settings into those two broad categories was supported by the data. To do so, we ran a series of likelihood ratio chi-square tests to determine whether the coefficient vectors for each possible pair of treatment-setting choices were significantly different. The results appear below.

We then tested whether the multinomial logit (MNL) model was an appropriate way to estimate our model. MNL is a popular way to estimate polychotomous choice models, such as the one we estimate here, because of its relative ease of estimation and interpretation. However, use of the MNL also imposes the rather restrictive "irrelevance of independent alternatives" (IIA) assumption. Behaviorally, IIA implies that the ratio of the utility levels between two choices, say IPH and SOP, remain constant regardless of how many other choices there are. We implemented two tests that are frequently used to test this assumption—the Hausman and Small-Hsiao tests. The results appear below.

Results

Descriptive Statistics

Table 5.1 displays the mean values and proportions by State of the variables included in our analysis. It shows that there are several statistically significant differences in the variable means and proportions between the two States. To determine statistical significance, we conducted simple *t* tests of the means for the continuous variables and chi-square tests for differences in proportions for the dichotomous and categorical variables. Unless otherwise indicated, differences discussed in the text are significant at or better than the 5 percent level. As Table 5.1 shows, we found that statistically significant differences existed between the Iowa and New Jersey clients for all variables except secondary substance use and using drugs prior to 15 years of age.

In both States, the majority of clients entered SOP, although the proportion was somewhat higher in Iowa (71 percent) than New Jersey (59 percent). Clients next most frequently entered IOP, 16 percent in Iowa compared with almost 20 percent in New Jersey. STR was the next most frequent setting, accounting for 8.7 percent of the admissions in Iowa and almost 10 percent in New Jersey. LTR was the fourth most frequent treatment setting for Iowa clients, while it was the fifth most frequent for New Jersey clients. IPH, on the other hand, was the fifth most frequent for Iowa clients, and the fourth most frequent for New Jersey clients.

Turning to the explanatory variables, Iowa and New Jersey clients differed on measures of disorder severity, although not always in the same direction. For example, in New Jersey almost 48 percent of the clients had used alcohol more than 3 times in the week prior to admission compared with only 26 percent of the clients in Iowa. Almost 39 percent of the clients in Iowa had no drug use in the week prior to admission compared with fewer than 22 percent of the clients in New Jersey. However, in Iowa almost 59 percent of the clients had at least one prior treatment episode compared with fewer than 50 percent in New Jersey. Clients in both States were similarly likely to have a secondary drug of abuse (approximately 41 percent) and to have become intoxicated prior to age 15 (approximately 34 percent). Fewer than 9 percent of clients in New Jersey indicated a mental disorder compared with almost 16 percent of clients in Iowa. Homelessness also varied between the two States, with fewer than 2 percent of clients in Iowa being homeless at treatment admission compared with almost 5 percent of clients in New Jersey.

Differences between the two States also existed among the socioeconomic and demographic variables. Almost 66 percent of clients in Iowa were employed at treatment admission compared with only 56 percent of clients in New Jersey. About 30 percent of clients in New Jersey paid for their own treatment (i.e., self-paid) compared with fewer than 7 percent in Iowa. Other government/no pay was the overwhelming payment form for clients in Iowa, accounting for 70 percent, compared with only about 39 percent of clients in New Jersey. More consistent across States was the proportion of clients whose expected payer was either private health insurance (16 percent in Iowa and 18.4 percent in New Jersey) and or another payer (7.2 percent in Iowa and 10.5 percent in New Jersey).

Table 5.1 Variable Means for Iowa and New Jersey

Variable	Iowa	New Jersey
Number of Observations	17,495	10,151
Treatment Setting (dependent variable)*		
Inpatient hospital (IPH)	0.015	0.065
	(0.123)	(0.247)
Short-term residential (STR)	0.087	0.099
	(0.282)	(0.299)
Long-term residential (LTR)	0.025	0.049
	(0.156)	(0.216)
Intensive outpatient (IOP)	0.160	0.199
	(0.366)	(0.399)
Standard outpatient (SOP)	0.713	0.588
	(0.452)	(0.492)
Alcohol Use Prior to Admission*		
Used at least 3 times in the week before admission	0.261	0.475
	(0.439)	(0.499)
Used at least 1 time in the month before admission	0.353	0.308
	(0.478)	(0.462)
No use in the past month	0.386	0.218
	(0.487)	(0.413)
Had a secondary substance of abuse	0.407	0.415
	(0.491)	(0.493)
Intoxicated prior to 15 years of age	0.343	0.338
	(0.475)	(0.473)
Had at least one prior treatment episode***	0.585	0.498
	(0.493)	(0.500)
Existing mental disorder***	0.159	0.087
	(0.365)	(0.282)
Homeless at treatment admission***	0.014	0.046
	(0.117)	(0.210)
Employed at treatment admission***	0.655	0.560
	(0.475)	(0.496)
Expected Form of Payment*		
Self-pay	0.066	0.321
	(0.248)	(0.467)
Private health insurance	0.160	0.184
	(0.367)	(0.388)
Other pay (e.g., Medicaid, Medicare, worker's compensation)	0.072	0.105
	(0.259)	(0.307)
Other government pay, no charge	0.702	0.389
	(0.457)	(0.488)
High school graduate*	0.796	0.733
	(0.403)	(0.442)

Table 5.1 Variable Means for Iowa and New Jersey (continued)

Variable	Iowa	New Jersey
Age of respondent***	34.292	36.131
	(10.674)	(10.425)
Race/Ethnicity*		
Non-Hispanic white	0.905	0.6824
	(0.294)	(0.466)
Non-Hispanic black	0.043	0.199
	(0.204)	(0.399)
Hispanic	0.034	0.105
	(0.181)	(0.306)
Other race	0.018	0.014
	(0.132)	(0.119)
Married***	0.338	0.250
	(0.473)	(0.433)
Referral Source to Treatment*		
Self-referred	0.177	0.194
	(0.382)	(0.395)
Alcohol/drug treatment provider	0.073	0.099
	(0.260)	(0.299)
Other (employer, school, physician)	0.114	0.175
	(0.318)	(0.380)
Criminal justice referral	0.636	0.532
	(0.481)	(0.499)
Season of Admission*		
Spring	0.323	0.258
	(0.468)	(0.438)
Summer	0.189	0.258
	(0.392)	(0.438)
Fall	0.188	0.231
	(0.390)	(0.421)
Winter	0.300	0.253
	(0.458)	(0.435)

*** Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

Note: Standard deviations are in parentheses; t tests and chi-square tests were used where appropriate.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

About 91 percent of clients in Iowa were non-Hispanic white compared with only 68 percent of clients in New Jersey. Fewer than 5 percent of clients in Iowa were non-Hispanic black compared with almost 20 percent of clients in New Jersey. A minority of clients in both States were currently married, about 34 percent of clients in Iowa compared with 25 percent in New Jersey, but most clients in both States had at least a high school education (about 80 percent in Iowa and 73 percent in New Jersey).

The criminal justice system (CJS) was the most common route of treatment referral for clients in both States although a significantly greater proportion of clients in Iowa were CJS-referred compared with New Jersey (64 percent in Iowa vs. 53 percent in New Jersey). The second most common route for both States was self-referral, which was the route to treatment for almost 18 percent of clients in Iowa and more than 19 percent of those in New Jersey. A significantly greater proportion of clients in New Jersey were referred by the next most common referral category, referral by the client's employer, school, or health care provider other than an alcohol or drug treatment provider, compared with Iowa (almost 18 vs. 11 percent), while the least common route in both States was an alcohol or drug treatment provider (7.3 percent in Iowa and 9.9 percent in New Jersey).

Finally, season of admission appeared to differ somewhat across the States. Although New Jersey had a fairly even distribution of clients admitted across the four seasons, about 25 percent in each season, more than 60 percent of clients in Iowa were admitted in winter and spring compared with fewer than 40 percent in fall and summer.

Specification Tests

Pooling

The results of the likelihood ratio tests appear in Table 5.2. These tests reveal that the null hypothesis of no difference in the coefficients for each pair can be rejected at better than the 1 percent level. Thus, we ran our MNL model with all five treatment settings as distinct outcomes.

IIA Tests

Unfortunately, the two tests that are commonly used to test for IIA, the Small-Hsiao and Hausman tests, frequently arrive at different conclusions. Table 5.3 shows that was the case when we tested our data. Therefore, the results of the IIA tests were inconclusive. We explored using a multinomial probit model, which also can be used for multinomial choice estimation and does not suffer from IIA, but which can be difficult to estimate with more than three choices unless other restrictive assumptions are imposed. We attempted to run the model for both States using assumptions (standard deviation = 1; correlation = 0.5) that are far from those implied by the MNL. Although we could not get the New Jersey model to converge, we did successfully estimate the Iowa model. Because the results from that model were similar qualitatively to the MNL Iowa model, and because we did not have unequivocal information that the IIA was violated by our data, we believe the MNL results are reasonable and report them here.

Table 5.2 Likelihood Ratio Test for Pooling

Categories Tested		Chi-Square	Degrees of Freedom	$p >$ Chi-Square
IPH	STR	361.700	23	0.000
IPH	LTR	560.325	23	0.000
IPH	IOP	471.707	23	0.000
IPH	SOP	890.473	23	0.000
STR	LTR	425.733	23	0.000
STR	IOP	1,096.722	23	0.000
STR	SOP	2,514.803	23	0.000
LTR	IOP	1,074.206	23	0.000
LTR	SOP	1,308.670	23	0.000
IOP	SOP	1,009.398	23	0.000

IOP = intensive outpatient.

IPH = inpatient hospital.

LTR = long-term residential.

SOP = standard outpatient.

STR = short-term residential.

Null hypothesis: All coefficients expect intercepts associated with given pair of outcomes are 0
(i.e., categories can be collapsed).

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Table 5.3 Hausman and Small-Hsiao Tests of Irrelevance of Independent Alternatives (IIA) Assumption: Iowa and New Jersey

	Hausman Results		Small-Hsiao Results	
Category Omitted	Chi-Square Value	p Value	Chi-Square Value	p Value
Iowa				
Inpatient hospital (IPH)	-5.136	-----	78.490	0.000
Short-term residential (STR)	25.112	1.000	76.239	0.000
Long-term residential (LTR)	-32.088	-----	75.345	0.000
Intensive outpatient (IOP)	-26.465	-----	79.938	0.000
New Jersey				
Inpatient hospital (IPH)	-55.732	-----	74.294	0.000
Short-term residential (STR)	-51.492	-----	76.996	0.000
Long-term residential (LTR)	8.772	1.000	67.746	0.000
Intensive outpatient (IOP)	-72.283	-----	103.954	0.000

Null hypothesis: Odds (Outcome-*J* vs. Outcome-*K*) are independent of other alternatives.

Note: If chi-square < 0, the estimated model does not meet asymptotic assumptions of the test.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Multivariate Results

Tables 5.4 through 5.7 present the results from our MNL estimation for Iowa and New Jersey. Estimated coefficients from MNL models can be difficult to interpret because the sign of the coefficient may not be equivalent to the change in the probability due to a change in the independent variable. Therefore, in Tables 5.4 and 5.5, we present the estimated marginal effects (*me*) of each explanatory variable (x_i) on each alternative *j*. The marginal effects were estimated at the means of the independent variables, and their standard errors were computed using the Delta Method. To further aid in interpretation, we used those marginal effects to compute the percentage change in the predicted probability of each outcome as a function of each independent variable. Those results, which we discuss in the text, appear in Tables 5.6 and 5.7. We present the results separately for the two States.

Iowa

Severity Variables. Table 5.6 reveals that several of the variables measuring the alcohol use disorder severity had significant effects on treatment-setting admission among clients in Iowa. As might be expected based on previous research, clients with greater severity prior to treatment entry (as measured by frequency of alcohol use) were more likely to enter what are usually thought of as more intensive treatment settings. The main distinction, however, appears to be between SOP and all other settings. Admission to SOP treatment was generally associated with lower levels of severity. For example, having used alcohol 3 or more times in the week before entering treatment decreased the probability of entering SOP compared with not having used in the month before treatment. The marginal effect of -0.343 (see Table 5.4) translates into approximately a 44 percent decline in the probability of entering SOP.[3] The marginal effect of -0.102 of use in the past month translates into a 13.2 percent lower probability of entering SOP compared with not having used in the past month. Intoxication prior to age 15 reduced the probability of SOP admission by about 3 percent compared with having begun using later. Those with at least one prior treatment had a 4.8 percent lower probability of entering SOP than did those with no prior treatment. Being homeless at admission led to a 36 percent lower probability of entering the SOP setting.

In contrast, most severity variables generally were positively associated with entry into settings more likely to provide more intensive treatment. For example, those who drank more than 3 times in the week before treatment had a 55.2 percent higher probability of entering IOP treatment than those who had not drunk in the month before treatment, and those who drank at least once in the month before treatment had a 28.6 percent higher probability of entering IOP treatment. Likewise, those who became intoxicated prior to age 15 had an 8.2 percent higher probability of entering IOP treatment than those who started drinking later.

---

[3] The percentage change in the probability is equal to the marginal effect divided by the predicted probability. In this case, that is -0.343 / 0.772 = -0.444.

Table 5.4 Marginal Effects for the Choice of Substance Abuse Treatment Setting: Iowa

Variable	Inpatient Hospital (IPH)	Short-Term Residential (STR)	Long-Term Residential (LTR)	Intensive Outpatient (IOP)	Standard Outpatient (SOP)
Number of Observations	270	1,518	437	2,791	12,479
Alcohol Use Prior to Admission					
Used at least 3 times in the week	0.023***	0.224***	0.007***	0.089***	-0.343***
before admission	(0.004)	(0.011)	(0.002)	(0.009)	(0.012)
Used at least 1 time in the month	0.006***	0.052***	-0.003**	0.046***	-0.102***
before admission	(0.002)	(0.006)	(0.001)	(0.008)	(0.009)
Intoxicated prior to 15 years of age	-4.86E-4	0.009**	0.002	0.013**	-0.023***
	(0.001)	(0.003)	(0.001)	(0.007)	(0.007)
Had a secondary substance of abuse	-1.38E-4	-0.007**	0.001	-1.48E-4	0.006
	(0.001)	(0.003)	(0.001)	(0.006)	(0.007)
Had at least one prior treatment	-0.001	0.015***	0.011***	0.012	-0.037***
episode	(0.001)	(0.003)	(0.001)	(0.006)	(0.007)
Existing mental disorder	0.004***	0.004	0.003**	-0.011	2.43E-4
	(0.001)	(0.004)	(0.001)	(0.008)	(0.009)
Homeless at admission	0.012**	0.158***	0.043***	0.066	-0.279***
	(0.005)	(0.029)	(0.010)	(0.038)	(0.047)
Employed at admission	-0.003***	-0.060***	-0.015***	-0.028***	0.105***
	(0.001)	(0.004)	(0.002)	(0.007)	(0.008)
Expected Form of Payment					
Self-pay	0.013***	0.009	-0.004***	0.164***	-0.183***
	(0.003)	(0.006)	(0.001)	(0.016)	(0.016)
Private health insurance	0.010***	-0.013***	-0.007***	0.180***	-0.169***
	(0.002)	(0.004)	(0.001)	(0.011)	(0.012)
Other pay (e.g., Medicaid,	0.012***	-0.012***	-0.007***	0.014	-0.007
Medicare, worker's	(0.003)	(0.004)	(0.001)	(0.013)	(0.014)
compensation)					
High school graduate	-0.002***	-0.003	-0.002	-0.001	0.009
	(0.001)	(0.004)	(0.001)	(0.008)	(0.009)
Age of respondent	1.10E-4	-2.43E-4	3.17E-5	1.43E-6	1.01E-4
	(3.00E-5)	(1.50E-4)	(5.00E-5)	(3.00E-4)	(3.40E-4)
Race/Ethnicity					
Non-Hispanic black	-0.002	0.032***	-3.12E-4	0.068***	-0.098***
	(0.001)	(0.009)	(0.002)	(0.017)	(0.019)
Hispanic	0.004	-4.80E-4	-0.001	0.012	-0.015
	(0.003)	(0.009)	(0.003)	(0.017)	(0.019)
Other race	0.004	0.068***	0.003	-0.005	-0.069**
Married	-0.003***	-0.016***	-0.006***	-0.016***	0.041***
	(0.001)	(0.003)	(0.001)	(0.006)	(0.007)

Table 5.4 Marginal Effects for the Choice of Substance Abuse Treatment Setting: Iowa (continued)

Variable	Inpatient Hospital (IPH)	Short-Term Residential (STR)	Long-Term Residential (LTR)	Intensive Outpatient (IOP)	Standard Outpatient (SOP)
Referral Source to Treatment					
Self-referred	0.002**	0.006	0.011***	-0.021***	0.002
	(0.001)	(0.004)	(0.003)	(0.008)	(0.009)
Alcohol/drug treatment provider	0.002	0.089***	0.067***	-0.071***	-0.087***
	(0.002)	(0.010)	(0.009)	(0.010)	(0.016)
Other (employer, school,	0.003***	0.005	0.006**	-0.024***	0.009
physician)	(0.001)	(0.005)	(0.002)	(0.009)	(0.011)
Season of Admission					
Summer	-0.001	0.023***	-0.002	0.023**	-0.043***
	(0.001)	(0.005)	(0.001)	(0.009)	(0.010)
Fall	-0.002***	0.015***	-0.002	0.009	-0.021**
	(0.001)	(0.005)	(0.001)	(0.009)	(0.010)
Winter	0.002***	0.007	0.002	0.010	-0.022**
	(0.001)	(0.004)	(0.001)	(0.008)	(0.009)

*** Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

LR chi-square: 5028.39. Prob > chi-square: 0.0000. Pseudo R-square: 0.1592.

Note: Standard errors are in parentheses.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Table 5.5 Marginal Effects for the Choice of Substance Abuse Treatment Setting: New Jersey

Variable	Inpatient Hospital (IPH)	Short-Term Residential (STR)	Long-Term Residential (LTR)	Intensive Outpatient (IOP)	Standard Outpatient (SOP)
Number of Observations	663	1,006	498	2,018	5,966
Alcohol Use Prior to Admission					
Used at least 3 times in the week	0.061***	0.047***	0.004***	0.170***	-0.281***
before admission	(0.009)	(0.007)	(0.001)	(0.014)	(0.015)
Used at least 1 time in the month	0.026***	-0.043***	-0.003	0.082***	-0.062***
before admission	(0.008)	(0.007)	(0.001)	(0.017)	(0.018)
Intoxicated prior to 15 years of age	2.35E-4	0.002	0.001	0.024**	-0.028**
	(0.002)	(0.005)	(0.001)	(0.010)	(0.012)
Had a secondary substance of abuse	6.42E-5	0.031***	0.002**	0.075***	-0.108***
	(0.002)	(0.005)	(0.001)	(0.011)	(0.012)
Had at least one prior treatment	0.009***	-0.004	0.005***	0.034***	-0.044***
episode	(0.002)	(0.005)	(0.001)	(0.010)	(0.011)
Existing mental disorder	0.084***	0.025***	-0.004***	-0.078***	-0.028
	(0.011)	(0.009)	(0.001)	(0.015)	(0.022)
Homeless at admission	0.016**	2.04E-4	0.083***	-0.132***	0.032
	(0.007)	(0.011)	(0.018)	(0.022)	(0.035)
Employed at admission	-0.016***	-0.051***	-0.011***	-0.079***	0.157***
	(0.003)	(0.006)	(0.002)	(0.011)	(0.013)

Table 5.5 Marginal Effects for the Choice of Substance Abuse Treatment Setting: New Jersey (continued)

Variable	Inpatient Hospital (IPH)	Short-Term Residential (STR)	Long-Term Residential (LTR)	Intensive Outpatient (IOP)	Standard Outpatient (SOP)
Expected Form of Payment					
Self-pay	0.003	-0.093***	-0.006***	-0.088***	0.184***
	(0.003)	(0.006)	(0.001)	(0.012)	(0.013)
Private health insurance	0.034***	-0.017***	-0.007***	0.142***	-0.153***
	(0.006)	(0.005)	(0.001)	(0.017)	(0.019)
Other pay (e.g., Medicaid,	0.038***	-0.033***	-0.007***	0.079***	-0.078***
Medicare, worker's	(0.007)	(0.004)	(0.001)	(0.018)	(0.020)
compensation)					
High school graduate	0.002	-0.014***	-0.001	0.018	-0.006
	(0.002)	(0.005)	(0.001)	(0.011)	(0.013)
Age of respondent	4.66E-5	-0.001***	-5.25E-6	-2.91E-5	0.001
	(8.00E-5)	(2.40E-4)	(4.00E-5)	(0.001)	(0.001)
Race/Ethnicity					
Non-Hispanic black	-0.007***	-0.018***	0.001	0.029**	-0.005
	(0.002)	(0.005)	(0.001)	(0.013)	(0.014)
Hispanic	-0.010***	0.020**	1.98E-4	-0.051***	0.041**
	(0.002)	(0.009)	(0.001)	(0.016)	(0.018)
Other race	-0.001	0.014	0.005	-0.104***	0.086**
	(0.007)	(0.024)	(0.006)	(0.033)	(0.042)
Married	-0.003	0.006	-0.004***	-1.30E-4	0.001
	(0.002)	(0.006)	(0.001)	(0.012)	(0.013)
Referral Source to Treatment					
Self-referred	0.045***	0.058***	0.009***	0.056***	-0.167***
	(0.007)	(0.010)	(0.002)	(0.014)	(0.017)
Alcohol/drug treatment provider	-0.003	0.163***	0.047***	0.039**	-0.245***
	(0.003)	(0.020)	(0.009)	(0.019)	(0.024)
Other (employer, school,	0.019***	0.063***	-0.001	0.080***	-0.161***
physician)	(0.005)	(0.010)	(0.001)	(0.015)	(0.017)
Season of Admission					
Summer	-0.003	0.016**	0.001	-0.009	-0.005
	(0.002)	(0.007)	(0.001)	(0.013)	(0.015)
Fall	-0.009***	0.022***	0.001	-0.005	-0.009
	(0.002)	(0.008)	(0.001)	(0.014)	(0.016)
Winter	-0.006***	0.020***	0.001	0.019	-0.035**
	(0.002)	(0.007)	(0.001)	(0.013)	(0.015)

*** Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

LR chi-square: 7,326.61. Prob > chi-square: 0.0000. Pseudo R-square: 0.3036.

Note: Standard errors are in parentheses.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Table 5.6 Marginal Effects as a Proportion of the Predicted Probability of Each Outcome: Iowa

Variable	Inpatient Hospital (IPH)	Short-Term Residential (STR)	Long-Term Residential (LTR)	Intensive Outpatient (IOP)	Standard Outpatient (SOP)
Number of Observations	0.004	0.053	0.009	0.162	0.772
Alcohol Use Prior to Admission					
Used at least 3 times in the week before admission	5.628***	4.234***	0.760***	0.552***	-0.444***
Used at least 1 time in the month before admission	1.456***	0.989***	-0.285**	0.286***	-0.132***
Intoxicated prior to 15 years of age	-0.122	0.161**	0.198	0.082**	-0.030***
Had a secondary substance of abuse	-0.035	-0.133**	0.096	-0.001	0.008
Had at least one prior treatment episode	-0.152	0.283***	1.277***	0.071	-0.048***
Existing mental disorder	1.011***	0.072	0.314**	-0.067	0.000
Homeless at admission	3.104**	2.977***	4.729***	0.406	-0.361***
Employed at admission	-0.644***	-1.123***	-1.672***	-0.172***	0.136***
Expected Form of Payment					
Self-pay	3.267***	0.172	-0.406***	1.013***	-0.237***
Private health insurance	2.456***	-0.249***	-0.779***	1.110***	-0.219***
Other pay (e.g., Medicaid, Medicare, worker's compensation)	2.922***	-0.230***	-0.732***	0.088	-0.009
High school graduate	-0.589***	-0.065	-0.205	-0.007	0.011
Age of respondent	0.027	-0.005	0.004	0.000	0.000
Race/Ethnicity					
Non-Hispanic black	-0.405	0.606***	-0.035	0.419***	-0.127***
Hispanic	0.901	-0.009	-0.063	0.075	-0.019
Other race	0.897	1.275***	0.280	-0.030	-0.089**
Married	-0.627***	-0.309***	-0.644***	-0.102***	0.053***
Referral Source to Treatment					
Self-referred	0.608**	0.105	1.220***	-0.128***	0.002
Alcohol/drug treatment provider	0.411	1.678***	7.478***	-0.438***	-0.113***
Other (employer, school, physician)	0.819***	0.100	0.665**	-0.147***	0.012
Season of Admission					
Summer	-0.271	0.434***	-0.182	0.141**	-0.056***
Fall	-0.551***	0.290***	-0.177	0.057	-0.027**
Winter	0.624***	0.135	0.256	0.062	-0.028**

*** Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Table 5.7 Marginal Effects as a Proportion of the Predicted Probability of Each Outcome: New Jersey

Variable	Inpatient Hospital (IPH)	Short-Term Residential (STR)	Long-Term Residential (LTR)	Intensive Outpatient (IOP)	Standard Outpatient (SOP)
Number of Observations	0.016	0.061	0.006	0.219	0.699
Alcohol Use Prior to Admission					
Used at least 3 times in the week before admission	3.820***	0.770***	0.724***	0.777***	-0.402***
Used at least 1 time in the month before admission	1.617***	-0.706***	-0.472	0.375***	-0.089***
Intoxicated prior to 15 years of age	0.015	0.040	0.166	0.111**	-0.040**
Had a secondary substance of abuse	0.004	0.505***	0.346**	0.343***	-0.154***
Had at least one prior treatment episode	0.592***	-0.068	0.973***	0.154***	-0.064***
Existing mental disorder	5.307***	0.418***	-0.811***	-0.354***	-0.039
Homeless at admission	0.998**	0.003	15.062***	-0.601***	0.046
Employed at admission	-1.028***	-0.835***	-1.977***	-0.361***	0.225***
Expected Form of Payment					
Self-pay	0.162	-1.535***	-1.035***	-0.400***	0.263***
Private health insurance	2.167***	-0.279***	-1.288***	0.650***	-0.218***
Other pay (e.g., Medicaid, Medicare, worker's compensation)	2.374***	-0.539***	-1.225***	0.363***	-0.111***
High school graduate	0.157	-0.230***	-0.106	0.081	-0.008
Age of respondent	0.003	-0.014***	-0.001	0.000	0.001
Race/Ethnicity					
Non-Hispanic black	-0.437***	-0.290***	0.106	0.132**	-0.007
Hispanic	-0.623***	0.324**	0.036	-0.234***	0.059**
Other race	-0.062	0.238	0.950	-0.476***	0.122**
Married	-0.185	0.097	-0.702***	-0.001	0.001
Referral Source to Treatment					
Self-referred	2.836***	0.958***	1.551***	0.255***	-0.240***
Alcohol/drug treatment provider	-0.210	2.681***	8.454***	0.180**	-0.351***
Other (employer, school, physician)	1.216***	1.045***	-0.208	0.365***	-0.231***
Season of Admission					
Summer	-0.211	0.271**	0.258	-0.043	-0.007
Fall	-0.547***	0.367***	0.123	-0.023	-0.013
Winter	-0.367***	0.328***	0.266	0.087	-0.049**

*** Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

The proportionate effect of a change in severity measures on the probability of entry into LTR treatment was not always as great as it was for IOP. Although using alcohol 3 or more times in the week before admission increased the probability of entry into LTR by 76 percent compared with 55 percent for IOP, use in the past month actually decreased the probability of entering LTR treatment by about 29 percent. Intoxication prior to age 15 did not significantly affect the probability of entry into LTR, although it had for IOP. Other measures of severity, however, did have a greater proportional effect on the probability of entering into LTR than they did on admission to IOP. A prior treatment episode, for example, increased the probability of entering LTR by 128 percent, being homeless increased it by 473 percent, and having an existing mental disorder increased it by 31 percent. None of these three variables affected the probability of entry into IOP.

Severity measures had a more mixed effect on the probability of admission to STR treatment. On the one hand, the frequency of use variables had large impacts on the probability of admission. Use 3 or more times in the week before admission increased the probability of admission to STR by 423 percent, which is an enormous impact compared with its effect on LTR. Use at least one time in the past month increased the probability of admission to STR about 99 percent compared with a decrease of 28.5 percent for LTR. Unlike LTR, having been intoxicated prior to age 15 increased the probability of STR admission by 16.1 percent. Having had prior treatment also increased the probability of admission to STR, although by a smaller 28.3 percent compared with 128 percent for LTR. Those who were homeless had an increased probability of admission to STR of about 298 percent compared with those who were not homeless, which was somewhat smaller than the effect on the probability of admission to LTR. On the other hand, those with a secondary substance of abuse had a 13.3 percent lower probability of entering STR than did those without a secondary substance of abuse. Secondary substance use was not significantly associated with the probability of entering LTR. A client having a mental disorder had no higher or lower probability of entering STR than did someone without a mental disorder, in contrast to LTR where having a mental disorder did increase the probability of admission.

As for the IPH setting, frequency of use again affected the probability of admission, and the effects were greater than they were in STR. Use at least 3 times in the week prior to treatment increased the probability of IPH by about 563 percent compared with no use, which was somewhat larger than its effect on the probability of entry into STR. Use at least once in the past month increased the probability of IPH by about 146 percent compared with no use. Both of these magnitudes were larger than those for STR and LTR. However, although both intoxication before age 15 and having had a prior treatment episode increased the probability of STR admission, neither affected the probability of IPH admission. Homeless clients had a 310 percent higher probability of IPH treatment compared with those who were not homeless, which was slightly larger than the effect of homelessness on the probability than it was for STR, but smaller than that for LTR. Those having a mental disorder at admission, on the other hand, had a 101 percent greater probability of IPH treatment than did those without one, which was larger than its impact on the probability of admission to STR or LTR.

Socioeconomic and Demographic Variables. A distinction between SOP and all other treatment settings appears again with respect to employment. Clients who were employed at admission had a significantly higher probability of entering SOP treatment than did unemployed

97

clients, and a significantly lower probability of entering any of the more intensive settings. Employment had the largest proportional negative impact on entry to LTR and the smallest on entry to IOP.

There also were differences among the effects of expected source of payment on the probability of admission to each setting, but they were not as might be expected. As mentioned earlier, the estimated coefficients may not accurately measure the effect of expected payer on the probability of entry because the two may be codetermined. These variables should be thought of as control variables. We found that self-payment was associated with a 23.7 percent lower probability of entering SOP, the least costly option, than was the reference group, charity care or other government assistance (excluding Medicaid or Medicare). Self-payment also was associated with a more than 100 percent higher probability of entering IOP, but a 40.6 percent lower probability of entering LTR. We found similar results for private health insurance and other sources of payments (e.g., Medicaid, Medicare, worker's compensation). Compared with the reference cell, private insurance coverage was associated with a lower probability of entering SOP and a higher probability of entering IOP or IPH. However, in contrast to self-payment, private insurance coverage was associated with a lower probability of entering either residential setting compared with the reference cell. Other payment source was likewise positively associated with admission to IPH and a lower probability of admission to either type of residential setting. However, its association with entry into either type of outpatient setting was no different statistically than the reference cell.

We found some evidence that the SOP setting in Iowa was further distinguished from the other settings with regard to the race/ethnicity variables. We found that non-Hispanic black clients in Iowa had a 41.9 percent higher probability of entering IOP and a 60.6 percent higher probability of entering STR than non-Hispanic white clients, but non-Hispanic black clients had a 12.7 percent lower probability of entering SOP compared with non-Hispanic white clients. A similar pattern emerged for those of other race when compared with non-Hispanic whites. Those of other race had an 8.9 percent lower probability of entering SOP, but a 127.5 percent higher probability of entering STR than did non-Hispanic whites. However, the probability that Hispanics would enter any of the treatment settings was not different from that of whites.

A distinction between SOP and all other treatment settings existed in Iowa for marital status as well. Married clients had a 5.3 percent greater probability of entering SOP than did those not currently married and a lower probability of entering any other treatment setting. The proportional effect on these probabilities was greatest for LTR and smallest for IOP.

Referral Source and Season of Admission. Referral source also was associated with treatment-setting choice in Iowa, although this time the pattern was somewhat different. Rather than having the demarcation at SOP as with most of the other variables, it appeared between IOP treatment and the inpatient treatments. Compared with those referred by the CJS, those who were referred by any other source had a lower probability of entering the IOP setting. However, those with any other referral source had a higher probability of entering one of the inpatient settings, especially LTR.

Finally, we found that season of admission also affected choice in Iowa with clients entering treatment in summer, fall, or winter months being less likely to enter SOP than clients entering treatment during the spring.

New Jersey

Severity Variables. As in Iowa, the main distinction with respect to most severity variables appears to have been between clients admitted to SOP compared with those admitted to all other treatment settings (Table 5.7). Again, those with higher severity levels had lower probabilities of entering SOP. Those who drank alcohol 3 or more times in the week before admission were 40.2 percent less likely to enter SOP than were those who did not drink in the month prior to treatment. Those who drank at least once in the past month were 8.9 percent less likely to enter SOP. Secondary substance use, intoxication prior to age 15, and having at least one prior treatment episode also decreased the probability of entering SOP by 15.4, 4.0, and 6.4 percent, respectively, compared with their reference categories. However, those who were homeless at admission or had a mental disorder were no more or less likely to enter an SOP setting in New Jersey than were those who did not.

On the other hand, those who drank alcohol 3 or more times in the week before treatment had a 77.7 percent higher probability of entering IOP treatment than those who had not drunk at all. Those who drank at least once in the month before treatment had a 37.5 percent higher probability of entering IOP than those who did not drink in that time period. Those with secondary drug use, who first became intoxicated before age 15, or who had at least one prior treatment episode also had higher probability of admission to IOP treatment than those who did not. Those who were homeless or who had an existing mental disorder were less likely to enter IOP treatment than those who were not homeless or did not have a mental disorder.

Those who were homeless did, however, have a significantly higher probability of entering LTR than those who were not. Those who drank alcohol at least 3 times in the month before admission, had a secondary substance of abuse, or had at least one prior treatment episode also had a greater probability of admission to LTR. However, those who drank at least once in the month before treatment or had become intoxicated with alcohol before age 15 had the same probability of entering LTR as those who did not, and those who had an existing mental disorder had a significantly lower probability of entering LTR than those who did not.

In contrast, clients with an existing mental disorder did have a 41.8 percent higher probability of admission to STR than those who did not have a mental disorder. Additionally, those who drank at least 3 times in the week prior to admission had a 77 percent higher probability of entering STR than those who did not drink in the month prior to admission, and those with secondary substance use had a 50.5 percent higher probability of doing so. However, those who drank at least once in the past month had a 71 percent lower probability of entering STR than those who did not, and neither intoxication prior to age 15 nor homelessness had any effect on the probability.

Regarding entry to IPH, almost all of the severity variables that were significant were positively associated with the probability of admission. Those who drank alcohol at least 3 times in the week prior to treatment were 382 percent more likely to enter IPH than were those who

had not drunk during that time, while those who drank at least once in the month prior to admission had an almost 162 percent higher probability. Those with at least one prior treatment episode had a 59.2 percent higher probability of admission to IPH, those who were homeless a 99.8 percent higher probability, and those with an existing mental disorder almost a 530.7 percent higher probability. The exceptions were secondary drug use and intoxication before age 15, which did not significantly affect the probability of entry into the IPH setting.

Socioeconomic and Demographic Variables. As was the case in Iowa, employment at admission was significantly negatively associated with entry into all settings except SOP. Those who were employed had a 36.1 percent lower probability of entering IOP, a 197.7 percent lower probability of entering LTR, an 83.5 percent lower probability of entering STR, and a 102.8 percent lower probability of entering IPH than those who were not employed. In contrast, those who were employed at admission had a 22.5 percent higher probability of entering SOP treatment compared with those who were not employed.

The results for expected payer were again not straightforward, but again care should be used in their interpretation. In contrast to Iowa, self-payment was positively associated with entry to SOP and negatively associated with the presumably more expensive IOP, LTR, and STR than was the reference category, government funding or charity care. However, self-payment was not associated with entry into IPH. The associations revealed for the other payment sources, on the other hand, were more similar to those in New Jersey. Private insurance or other pay source (e.g., Medicaid, Medicare) was associated with a lower probability of entering SOP and higher probabilities of entering the presumably more expensive IOP and IPH than the reference category, but a lower probability of entering either type of residential care.

Race and ethnicity variables were significantly associated with entry into the various modes of treatment. Although Hispanics and those in the other race category had a higher probability of entering SOP and a lower probability of entering IOP than did non-Hispanic whites (the reference category), neither group was any more or less likely to enter LTR. Hispanics had a higher probability of entering STR, but a lower probability of entering IPH than did non-Hispanic whites. Non-Hispanic blacks were more likely to enter IOP, less likely to enter both STR and IPH, but equally likely as non-Hispanic whites to enter the other two treatment settings.

In contrast to Iowa, marital status did not strongly affect the probability of entry into most settings. The only significant effect of marital status was on the probability of entering LTR. Clients who were married had a 7.02 percent lower probability of entering LTR than those who were unmarried.

Referral Source and Season of Admission. Referral source was strongly associated with the probability of entering different treatment settings in New Jersey, although the pattern was somewhat different than it was in Iowa. In New Jersey, those referred by any of the other sources (e.g., self-referral, alcohol/drug treatment provider) had a significantly lower probability of entering SOP than did those who were referred by the CJS. Clients referred by these other sources also had significantly higher probabilities of entering both IOP and STR than did the CJS clients. In addition, those who self-referred had significantly higher probabilities of entering both

LTR and IPH than those referred by the CJS, while those referred by an employer, school, or physician had significantly higher probabilities of being admitted to the STR and IPH settings.

As for season of admission, clients who were admitted to treatment in the fall and winter had a significantly higher probability of entering STR, and a lower probability of entering IPH, than did those who were admitted to treatment in the spring. Those admitted in the winter had a 4.9 percent lower probability of entering SOP treatment than those entering in the spring.

Discussion

As in our earlier work on choice of alcohol treatment setting, we found that, in general, those with more severe alcohol use disorders were admitted to treatment settings generally considered more intensive, but that socioeconomic and demographic variables also affected treatment-setting admission. However, when extending the analysis to a polychotomous choice among several different treatment settings, rather than a dichotomous choice between inpatient and outpatient, the major distinction appeared between SOP and all other treatment settings, including IOP. In both States, clients with more severe alcohol use disorders, as measured by such variables as frequency of use, intoxication prior to age 15, and having had a prior treatment episode, generally had a reduced probability of being admitted to SOP, but an increased probability of being admitted to any of the more intensive settings. Furthermore, the results do not suggest an inherent ordering among the more intensive settings. The proportionate effects of the severity variables were not always monotonically related to the continuum of intensity as it is often described, for example, by the ASAM criteria. These findings, along with the results of the chi-square test, suggest that treatment settings can be better studied as a polychotomous, rather than dichotomous, choice, and that a multinomial approach is more appropriate than an ordinal approach.

Our analysis revealed other key similarities between the Iowa and New Jersey client samples regarding treatment-setting choice. For example, in both States, clients who were employed were significantly more likely to enter SOP and less likely to enter any of the other treatment settings than were unemployed clients. Also similar in both States was the pattern associated with private health insurance coverage. Private health insurance was associated with a higher probability of entering IOP or IPH, but lower probability of entering SOP or either form of residential care than government assistance or charity care. Furthermore, clients referred by an alcohol or drug treatment provider in either State were more likely to enter STR and LTR and less likely to enter SOP treatment compared with clients referred through the CJS.

Our analysis also revealed some interesting differences between the two States. For example, in New Jersey clients who self-referred, were referred by an alcohol or drug treatment provider, or were referred by another source were more likely to enter IOP treatment compared with clients referred by the CJS. However, in Iowa we found the opposite to be true in that self-referred clients, clients referred by an alcohol or drug treatment provider, and clients referred by another source were less likely to enter IOP. Another interesting difference was the pattern revealed for self-payment. In Iowa, self-payment was positively associated with entering IOP and negatively associated with entering SOP compared with the reference cell. In New Jersey, we again found the opposite, with self-payment being positively associated with entering SOP and negatively associated with IOP compared with the reference cell. Further research using data

that is sufficient to identify the possibly joint determination of payment source and treatment setting is needed to fully understand the effects of expected source of payment on the probability of entry into the various settings.

Although the results differed to some extent across the two States considered here, in both States, there is evidence that client placement is associated with the severity of the client's disorder, suggesting that clients are gaining admission to the facilities that may best meet their needs. Furthermore, use of IOP suggests that they are attempting to use their limited resources in the most cost-effective way. This finding suggests that States have been able to adapt to changes in the treatment practices in ways that both improve services and contain costs.

References

American Society of Addiction Medicine. (1996). *Patient placement criteria for the treatment of substance-related disorders* (2nd ed.). Chevy Chase, MD: Author.

Annis, H. M. (1985-1986). Is inpatient rehabilitation of the alcoholic cost effective? Con position. *Advances in Alcohol & Substance Abuse, 5*(1-2), 175-190.

Arroyo, J. A., Westerberg, V. S., & Tonigan, J. S. (1998). Comparison of treatment utilization and outcome for Hispanics and non-Hispanic whites. *Journal of Studies on Alcohol, 59*, 286-291.

Becker, G. S., & Murphy, K. M. (1988). A theory of rational addiction. *Journal of Political Economy, 96*, 675-700.

Ben-Akiva, M., & Lerman, S. R. (1985). *Discrete choice analysis: Theory and application to travel demand*. Cambridge, MA: MIT Press.

Brito, D. L., & Strain, C. K. (1996). A model of the consumption of alcohol. In L. Green & J. H. Kagel (Eds.), *Advances in behavioral economics: Volume 3. Substance use and abuse* (pp. 163-182). Norwood, NJ: Ablex Publishing Corporation.

Etheridge, R. M., Craddock, S. G., Hubbard, R. L., & Rounds-Bryant, J. L. (1999). The relationship of counseling and self-help participation to patient outcomes in DATOS. *Drug and Alcohol Dependence, 57*, 99-112.

French, M. T., & Zarkin, G. A. (1992). The effects of drug abuse treatment on legal and illegal earnings. *Contemporary Policy Issues, 10*, 98-110.

Goodman, A. C., Holder, H. D., Nishiura, E., & Hankin, J. R. (1992). A discrete choice model of alcoholism treatment location. *Medical Care, 30*, 1097-1110.

Goodman, A. C., Nishiura, E., & Hankin, J. R. (1998). A discrete choice model of drug abuse treatment location. *Health Services Research, 33*(1), 125-145.

Gottheil, E. (1997). Intensive outpatient treatment: Methods and outcomes. *Journal of Addictive Diseases, 16*(2), xv-xix.

Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse, 9*, 103-110.

Green, L., & Kagel, J. H. (Eds.). (1996). *Advances in behavioral economics: Volume 3. Substance use and abuse*. Norwood, NJ: Ablex Publishing Corporation.

Greene, W. H. (2000). *Econometric analysis* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Gregoire, T. K. (2000). Factors associated with level of care assignment in substance abuse treatment. *Journal of Substance Abuse Treatment, 18*, 241-248.

Hubbard, R. L., Marsden, M. E., Rachal, J. V., Harwood, H. J., Cavanaugh, E. R., & Ginzburg, H. M. (1989). *Drug abuse treatment: A national study of effectiveness*. Chapel Hill, NC: University of North Carolina Press.

Lundgren, L. M., Amodeo, M., Ferguson, F., & Davis, K. (2001). Racial and ethnic differences in drug treatment entry of injection drug users in Massachusetts. *Journal of Substance Abuse Treatment, 21*, 145-153.

Majella Jordan, C., & Oei, T. P. (1989). Help-seeking behaviour in problem drinkers: A review. *British Journal of Addiction, 84*, 979-988.

Marques, P. R., Zaloshjna, E., Miller, T. R., Waehrer, G. M., Danseco, E. R., Levy, D. T., Romano, E. O., & Teti, L. O. (2001). Financial risk, plan types, and authorizations for managed alcohol treatment services. *American Journal of Managed Care, 7*, 1151-1161.

McLellan, A. T., Hagan, T. A., Levine, M., Meyers, K., Gould, F., Bencivengo, M., Durell, J., & Jaffe, J. (1999). Does clinical case management improve outpatient addiction treatment. *Drug and Alcohol Dependence, 55*(1-2), 91-103.

Miller, W. R., & Hester, R. K. (1986). Inpatient alcoholism treatment: Who benefits? *American Psychologist, 41*, 794-805.

Montoya, I. D., Atkinson, J. S., & Trevino, R. A. (2000). Economics as a factor in models of behavioral motivation and change. *Substance Use & Misuse, 35*, 329-346.

Muurinen, J. M. (1982). Demand for health: A generalised Grossman model. *Journal of Health Economics, 1*(1), 5-28.

Office of Applied Studies. (1999). *Treatment Episode Data Set (TEDS): 1992-1997: National admissions to substance abuse treatment services* (DHHS Publication No. SMA 99-3324, Drug and Alcohol Services Information System Series S-7). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#teds2]

Office of Applied Studies. (2000). *Uniform Facility Data Set (UFDS): 1998 data on substance abuse treatment facilities* (DHHS Publication No. SMA 00-3463, Drug and Alcohol Services Information System Series S-10). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#nssats2]

Samarasinghe, D. (1996). The meaning of treatment and setting. *Addiction, 91*, 1810-1811.

Sheikh, S., & Furnham, A. (2000). A cross-cultural study of mental health beliefs and attitudes towards seeking professional help. *Social Psychiatry and Psychiatric Epidemiology, 35*, 326-334.

Simpson, D. D., Joe, G. W., Rowan-Szal, G., & Greener, J. (1995). Client engagement and change during drug abuse treatment. *Journal of Substance Abuse, 7*, 117-134.

Suranovic, S. M., Goldfarb, R. S., & Leonard, T. C. (1999). An economic theory of cigarette addiction. *Journal of Health Economics, 18*(1), 1-29.

Washton, A. M. (1997). Evolution of intensive outpatient treatment (IOP) as a "legitimate" treatment modality. *Journal of Addictive Diseases, 16*(2), xxi-xxvii.

Chapter 6. Length of Stay among Female Clients in Substance Abuse Treatment

Olivia Silber Ashley, Dr.P.H.
Lev Sverdlov, M.D., Ph.D.
Thomas M. Brady, Ph.D.

Introduction

Research suggests that increased length of stay (LOS) in substance abuse treatment is associated with improved postdischarge outcomes (Comfort, Loverro, & Kaltenbach, 2000; Gottheil, McLellan, & Druley, 1992; Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997; Luchansky, He, Krupski, & Stark, 2000; McKay, Alterman, McLellan, & Snider, 1994; Pettinati et al., 1996; Simpson, Joe, & Broome, 2002; Simpson, Joe, Fletcher, Hubbard, & Anglin, 1999; Simpson, Joe, & Rowan-Szal, 1997b). Favorable outcomes measured in these studies after exposure to substance abuse treatment included abstinence from drugs, gains in employment, and decreases in criminal behaviors. Among pregnant women receiving residential substance abuse treatment, longer stay in treatment prior to delivery has resulted in reduced likelihood of adverse birth outcomes (Clark, 2001). In addition, clients with shorter stays are at increased risk of poor outcomes, such as readmission to treatment (Moos, Brennan, & Mertens, 1994a; Moos, Mertens, & Brennan, 1994b).

Although research indicates that LOS in treatment is a strong predictor of posttreatment success, studies of LOS in treatment have been problematic. For example, definitions of LOS vary widely, and study samples are typically small and nonrepresentative (Ashley, Marsden, & Brady, 2003; Bartholomew, Rowan-Szal, Chatham, & Simpson, 1994; Egelko, Galanter, Dermatis, & DeMaio, 1998; McComish et al., 1999; Roberts & Nishimoto, 1996; Stark, 1992; Wobie, Eyler, Conlon, Clarke, & Behnke, 1997). In addition, many studies examining the predictors of retention in substance abuse treatment programs have focused on retention in therapeutic communities (Condelli, 1994; De Leon, Melnick, & Kressel, 1997) or have been limited to homeless or other public treatment populations (De Leon et al., 1997; Kingree, 1995; McCusker, Bigelow, Luippold, Zorn, & Lewis, 1995; Westreich, Heitner, Cooper, Galanter, & Guedj, 1997). Studies examining the predictors of retention in substance abuse treatment programs generally have used samples with few or no women (e.g., De Leon et al., 1997; Westreich et al., 1997) because the treatment population has been historically male.

Although a few studies have shown that women stay longer in treatment than men (e.g., Broome, Flynn, & Simpson, 1999), most studies have found that, in contrast, men stay in treatment longer than women (Arfken, Klein, di Menza, & Schuster, 2001; Baekeland & Lundwall, 1975; Mammo & Weinbaum, 1993; McCaul, Svikis, & Moore, 2001; Sayre et al., 2002; Simpson, Joe, Broome, et al., 1997a; Stark, 1992). Furthermore, research indicates that different factors influence treatment retention for women than men, including income, referral source, age, and payer type (Green, Polen, Dickinson, Lynch, & Bennett, 2002; Kingree, 1995; Mertens & Weisner, 2000). Hser, Polinsky, Maglione, and Anglin (1999) reported that matching clients to treatment based on gender-specific needs resulted in longer stays in treatment. Unique

substance abuse treatment needs for women include child care services, women-only treatment, and prenatal care services.

More comprehensive data on LOS of women in substance abuse treatment facilities by individual and treatment-related characteristics are needed to help clinicians identify women at risk for shorter LOS and to develop strategies to improve retention. Information about the impact of child care and other gender-specific factors for women on treatment retention is particularly needed to address the unique substance abuse treatment needs of women, including the welfare of their children.

Empirical Model

Anderson and colleagues described a model of access and utilization of health care services that incorporated domains of "individual determinants" of health care utilization (Aday et al., 1999). Predisposing characteristics occur before onset and include demographic characteristics (e.g., age, race/ethnicity, education). Enabling characteristics include such factors as referral source for treatment and insurance status. The model suggests that organizational characteristics (e.g., provision of child care services and women-only facilities) also influence access and utilization. The distinction among predisposing, enabling, and organizational characteristics is used in our study to examine factors accounting for variation in retention among women.[1]

Predisposing Characteristics: Age, Race, and Education

Age has been shown to be an important determinant of LOS in treatment, as some reports show that older adults remain in treatment longer (Wickizer et al., 1994). For example, analyses of women in residential drug treatment programs in the Drug Abuse Treatment Outcome Study (DATOS) found that age had a significant positive effect on retention (Grella, Joshi, & Hser, 2000). In addition, race/ethnicity has been found to be associated with LOS (McCaul et al., 2001). For example, in a study based in a health maintenance organization (HMO) outpatient alcohol and drug treatment program (Mertens & Weisner, 2000), characteristics predictive of retention among women included belonging to racial/ethnic groups other than African American. Education also has been related to LOS. In general, higher educational attainment is associated with longer LOS (Kelly, Blacksin, & Mason, 2001; Knight, Logan, & Simpson, 2001).

Other predisposing characteristics affecting LOS have been identified, including marital status, presenting substance abuse problem at admission, severity of substance use, age at first use, and mental disorder symptom severity (Fishman, Reynolds, & Riedel, 1999; Joe, Simpson, & Broome, 1999; Lang & Belenko, 2000; Maglione, Chao, & Anglin, 2000; Mertens & Weisner, 2000; Rowan-Szal, Joe, & Simpson, 2000; Veach, Remley, Kippers, & Sorg, 2000; Williams & Roberts, 1991). Although these characteristics are not major variables of interest in the present study, our analyses controlled for many of these potentially confounding variables.

---

[1] The model also describes need characteristics, which refer to the level or severity of the illness. Identifying severity of substance abuse was not possible in the present study because of data limitations.

Enabling Characteristics: Referral Source and Payment Source

Prior research has associated LOS in treatment with referral source (Wickizer et al., 1994). Women often are referred to substance abuse treatment through child protective services or the criminal justice system. One federally sponsored project supporting 35 residential treatment programs for substance-abusing pregnant or postpartum women found that child protective services or the criminal justice system referred 37 percent of female clients (Clark, 2001). Involvement with the criminal justice system has been associated with longer stays in substance abuse treatment, even if the criminal justice system was not the primary source of referral for treatment (Green et al., 2002; Grella, Anglin, Wugalter, Rawson, & Hasson, 1994; Nishimoto & Roberts, 2001).

Payment source may be a factor in predicting LOS in substance abuse treatment. Many insurance plans (including Medicare, Medicaid, and private plans) limit outpatient visits and residential stays for substance abuse treatment (Sharfstein, Stoline, & Goldman, 1993; Zarkin & Dunlap, 1999). In a study of outpatient admissions for alcohol treatment from New Jersey, type of insurance coverage was associated with the likelihood of dropping out of treatment (Mammo & Weinbaum, 1993).

Organizational Characteristics: Substance Abuse Treatment Programming for Women

Because the tendency of women to leave treatment earlier than men might be attributed to the inability of treatment programs to meet the complex medical, social, and emotional needs of women, research suggests that treatment programming factors need to be included in studies of retention (Roberts & Nishimoto, 1996). Studies have begun to examine the efficacy of substance abuse treatment programming for women and the "active ingredients" in programs that might be associated with improved outcomes among women, including retention (Copeland, Hall, Didcott, & Biggs, 1993; Stark, 1992).

One programmatic characteristic of substance abuse treatment intended to increase access and LOS for women is the provision of ancillary social services, such as child care. Limited access to child care services is one of the most important and frequently cited barriers to treatment among women who seek help (Allen, 1995; Coletti, 1998; Copeland, 1997; Grella, 1997; Wechsberg, Craddock, & Hubbard, 1998).

Studies also have found that programmatic changes to enable women to bring their children into residential treatment were associated with increased LOS (Hughes et al., 1995; Stevens, Arbiter, & Glider, 1989; Wobie et al., 1997). One study suggested that the earlier a mother's infant resides with her in the treatment setting, the longer her stay in treatment will be (Wobie et al., 1997). However, these studies were conducted with small samples of women in residential treatment.

Another characteristic of substance abuse programming associated with increased LOS for women is the provision of women-only treatment (Grella, 1999; Roberts & Nishimoto, 1996), which may foster longer stays in treatment by creating an environment more focused on women's issues. Women-only facilities are more likely than mixed-gender facilities to retain particularly vulnerable women, such as lesbian women, women with a history of physical or sexual abuse, or

women who have worked in the sex trade (Copeland & Hall, 1992; Fullilove, Lown, & Fullilove, 1992; Grella, 1997; Pottieger, Inciardi, & Tressell, 1996).

Although these studies highlight factors important to retention for women, more nationally representative data are needed to examine client and organizational characteristics among subgroups of women in multiple types of treatment facilities. The current study increases our understanding of women and substance abuse treatment by examining LOS and experiences specific to females with substance use disorders. It also analyzes data from a large, nationally representative sample of clients in treatment facilities, making the findings more generalizable than those from previous studies, which have been limited to small convenience samples based at single treatment sites. In addition, no prior studies have analyzed a national sample of substance abuse treatment facilities to examine the role of organizational characteristics, such as on-site child care and women-only facilities, in enhancing the LOS of females with substance use disorders.

Methods

This chapter uses data from the Alcohol and Drug Services Study (ADSS), a nationally representative study designed to collect data about substance abuse treatment facilities, clients in treatment, and posttreatment status. The ADSS data, collected from 1996 to 1999, provide an important research opportunity to explore the experiences of women in substance abuse treatment. ADSS examined the characteristics of public and private substance abuse treatment facilities with active programs in all 50 States and the District of Columbia. More than 18,000 facilities were identified from the Substance Abuse and Mental Health Services Administration (SAMHSA) National Facility Register (NFR) and other supplementary independent sources or organizations. For additional information about the methods for ADSS, see Office of Applied Studies (OAS, 2003).

The sampling scheme varied by type of care in order to produce the best estimates of all treatment programs. To ensure reasonably precise and stable estimates of reported variables, hospital inpatient, residential, outpatient methadone, and combined facilities were oversampled relative to their proportional allocation.

For the Phase I survey of treatment programs, a screening telephone interview was administered between October 1996 and April 1997. The screening garnered responses from 2,395 treatment facilities representing 12,387 treatment facilities nationwide. The Phase I questionnaire administered by phone with facility directors collected information concerning each facility's most recent 12-month data on admissions, discharges, and treatment services offered.

At Phase II, the sample of 2,395 Phase I facility respondents was further reduced by eliminating hospital inpatient facilities, facilities in which 100 percent of clients were treated for alcohol use disorders, and facilities outside primary sampling units (PSUs). Of 1,052 remaining Phase I facilities, a target Phase II facility sample was set of 306 facilities, and 280 cooperated with all steps of the Phase II study protocol.[2] Substance abuse treatment discharges during the

---

[2] This total includes 234 facilities in the original Phase II facility sample and 46 facilities added to replace nonresponding facilities.

most recent 6 months were listed for these 280 facilities, and client discharge records were randomly selected from the client lists. To be included on the list, clients must have spent at least 1 day in treatment or have had at least one outpatient visit. Client-level discharge data were abstracted from facility records for 5,005 clients. A client record abstract form was used during site visits conducted with facility directors or administrators between August 1997 and April 1999. Facilities participating in Phase II data collection were assured that the information they shared was confidential.[3]

Upon completion of Phase II data collection, no imputation was performed to fill in missing values for key variables. Full sample weights were created. The sum of the full sample weights for each of the client records in the ADSS Phase II client abstract file provides the estimate of 2,229,060 total discharged clients in the population in a 12-month period. For the purpose of the present study, the Phase I and Phase II files were merged.

Sample

Of the 5,005 clients included in ADSS Phase II, 1,334 records were for female substance abuse treatment clients; 95 records were excluded because they indicated that the client was younger than age 18. The analyses used data from the remaining 1,239 records of adult female substance abuse treatment clients aged 18 or older (representing 504,177 clients nationwide). The final sample included females discharged from nonhospital residential treatment, outpatient methadone treatment, outpatient nonmethadone treatment, and combinations of these types of care.[4]

Measures

Measures of LOS and client characteristics were based on information abstracted from client treatment records during Phase II of ADSS. LOS was indicated by the number of days between the client's date of admission and the date of discharge from a substance abuse treatment facility. Exact age at admission was recorded. For descriptive analyses, clients were grouped into six age categories: 18 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, and 65 years or older. For multivariate analyses, age was treated as a continuous variable, and clients were grouped into three racial groups (white, unknown/not mentioned, and all other races),[5] three educational groups (less than high school graduate, high school graduate/general equivalence diploma [GED] or higher, and unknown/not mentioned), two referral groups (criminal justice system vs. all other referral sources), and five payment groups (no payment or client self-payment, private health insurance, criminal justice system, Medicaid or Medicare, and other funding). Organizational characteristics were measured using data from Phase I of ADSS. A dichotomous variable was created to distinguish client records at facilities offering child care services from those at facilities not offering such services, as well as facilities serving women only.

---

[3] For information on confidentiality procedures in ADSS, see the full methodology report (OAS, 2003).
[4] All 196 client records from outpatient methadone facilities were excluded from analyses of women-only versus mixed-gender facilities because just two outpatient methadone facilities in the ADSS sample treated women only.
[5] Ethnicity was measured in a separate field on the client abstract form. Because 27 percent of the ADSS data regarding ethnicity was missing, this variable was not included in the analyses.

Analytic Approach

Based on previous research, we hypothesized that predisposing characteristics of older age, white race, and higher educational attainment, as well as the enabling characteristic of criminal justice referral to treatment, would be associated with longer stay in treatment. We hypothesized that private health insurance, Medicaid, or Medicare payment for treatment would be associated with decreased LOS. We further hypothesized that organizational characteristics of receiving treatment at facilities offering child care services or at women-only facilities would be associated with longer stay in treatment.

One of the major issues confronting studies of treatment retention is how to address differences in LOS among types of care (Roberts & Nishimoto, 1996; Smith, North, & Fox, 1995; Strantz &Welch, 1995). Because many prior studies examining retention have analyzed clients separately by type of care received, descriptive analyses in the present study were stratified by type of care. Multivariate analyses were conducted on the full sample of adult female clients to preserve the large sample. Accordingly, three dummy variables were included in the model indicating treatment at residential facilities, outpatient nonmethadone facilities, or facilities offering a combination of types of care. Inasmuch as outpatient methadone facilities involve much longer stays in treatment than other types of care, and because ADSS collected only a subset of client information from records at outpatient methadone facilities, client records from outpatient methadone treatment facilities were excluded from the multivariate analysis. In addition, because LOS is associated with marital status, having children, presenting substance use disorder at admission, and receiving treatment at facilities offering transportation services (Broome et al., 1999; Fishman & Reynolds, 1999; Friedmann, Lemon, & Stein, 2001; Mammo & Weinbaum, 1993; Mertens & Weisner, 2000; Rowan-Szal et al., 2000; Veach et al., 2000; Williams & Roberts, 1991), the multivariate analysis controlled for these client and organizational characteristics.[6] Although LOS has not been linked in the research literature with receiving treatment at facilities offering prenatal care or combined substance abuse treatment and mental health services, the multivariate analysis controlled for these organizational characteristics to avoid possible confounding.

Statistical procedures. Descriptive analyses used F tests to compare the distributions of mean LOS between (1) female clients with differing predisposing and enabling characteristics, (2) female clients at facilities offering child care services and female clients at facilities not offering child care services, and (3) clients at women-only facilities and female clients at mixed-gender facilities. Statistically significant differences in LOS were examined using two-tailed Student's t tests. Descriptive analyses of LOS were conducted using sample weights developed by Westat and using WesVar (Westat, Inc., 2000) and jackknife variance estimation.

Correlations between organizational characteristics were calculated to test for multicollinearity of variables prior to modeling and to test assumptions about relationships between these characteristics. Although many organizational characteristics were significantly correlated, Pearson product-moment correlation coefficients were relatively low (range = -0.09 to 0.40), indicating that multicollinearity was not an issue in the analysis. Therefore, all

---

[6] Co-occurring mental disorders also have been linked to LOS among women (Broome et al., 1999; Haller, Miles, & Dawson, 2002; Joe et al., 1999; Lang & Belenko, 2000; Mertens & Weisner, 2000), but missing data prevented inclusion of this control variable.

organizational characteristics were included in one model. Survival analysis, specifically Cox's proportional hazard regression (Hosmer & Lemeshow, 1999; Parmar & Machin, 1995), was used to model LOS. Survival analysis considers situations in which (1) a dependent variable represents a time to a terminal event, and (2) the duration of the study is limited in time. In this analysis, the terminal event was discharge from treatment. An observation is considered censored by the end of the study period if the terminal event had not yet occurred or if the observation was followed up to a certain time point, after which there was no further information on the client. For the purpose of this analysis, the time of study was determined as 3,000 days, and observations with a longer stay in treatment than 3,000 days were considered to be censored.

Hazard ratios (HRs) and 95 percent confidence intervals (CIs) were calculated. HR is a comparative measure of the association between exposure (measured in terms of one or more independent variables) and an outcome (e.g., discharge from treatment) over time for a defined population. In Cox's hazard regression analysis, it is assumed that (1) a hazard function is constant over time, and (2) all deviations are random. Under the assumption that a hazard function is constant, it is possible to say that a higher HR suggests that clients in the "exposed" group stay in treatment a shorter time than the comparison group. Furthermore, an HR of less than one indicates a variable that may be protective of leaving treatment early.

The comprehensive model analyzed LOS as a function of predisposing, enabling, and organizational characteristics of interest, controlling for facility type of care; marital status at admission; having children at admission; type of presenting substance use disorder at admission; and treatment at facilities offering prenatal care, transportation, or combined substance abuse treatment and mental health services. Survival analyses were conducted using SUDAAN (Shah, Barnwell, Hunt, & LaVange, 1994) with Taylor series variance estimation. All estimates are weighted.

Results

The characteristics of the sample used in the analyses are presented in Table 6.1. Of the 1,239 adult female substance abuse treatment clients in the ADSS Phase II sample, 12 percent were aged 18 to 24 years, 41 percent were aged 25 to 34 years, and 35 percent were aged 35 to 44 years. Almost 56 percent were white, 31 percent were black, 6 percent were from other racial groups, and 8 percent were of unknown race. At admission, a majority of the sample had only a high school education or less. At admission, most women in the sample were not married, 63 percent had a child/children, 55 percent were unemployed, 28 percent worked full or part time, and 23 percent lived with a spouse/partner. Alcohol was the most common substance of choice specified at admission (33 percent).

**Table 6.1 Characteristics of Female Substance Abuse Treatment Clients Aged 18 or Older at Admission:
1997-1999**

Characteristic	*n*	*%*	Characteristic	*n*	*%*
Age at Admission (years)			**Race**		
18 to 24	146	11.8	White	687	55.5
25 to 34	506	40.8	Black	381	30.8
35 to 44	437	35.3	American Indian or Alaskan Native	16	1.3
45 to 54	116	9.4	Asian or Pacific Islander	14	1.1
55 or older	34	2.7	Other	38	3.1
			Unknown/not mentioned	103	8.3
Education at Admission			**Primary Source of Referral to Treatment**		
Less than 8 years	20	1.6	Self-referred/voluntary	367	29.6
8-11 years	301	24.3	Criminal justice system	336	27.1
Less than high school graduate, not otherwise specified	40	3.2	Welfare office or other social service agencies	139	11.2
High school graduate/GED	358	28.9	Other treatment facility	128	10.3
Some college	210	17.0	Health care or mental health providers	123	9.9
College graduate	41	3.3	Family or friend	66	5.4
Postgraduate	13	1.1	Other	18	1.4
Unknown/not mentioned	60	4.8	Unknown/not mentioned	62	5.0
Methadone clients (data not collected)	196	15.8			
Primary Source of Payment for Treatment			**Marital Status at Admission**		
Medicaid	323	26.1	Separated/divorced	319	25.8
Client self-payment	293	23.6	Never married	295	23.8
Private health insurance	147	11.9	Married/common law	218	17.6
No payment	67	5.4	Single	143	11.5
Criminal justice system	51	4.1	Other	30	2.5
Medicare	19	1.5	Unknown/not mentioned	38	3.1
Other	192	15.5	Methadone clients (data not collected)	196	15.8
Unknown/not mentioned	147	11.9			
Have Child/Children at Admission			**Employment at Admission**		
Yes	780	63.0	Unemployed	683	55.1
No	178	14.4	Full-time (35 hr/wk or more)	194	15.7
Unknown/not mentioned	85	6.9	Part-time (less than 35 hr/wk)	100	8.1
Methadone clients (data not collected)	196	15.8	Employed, not otherwise specified	51	4.1
			Keeping house, not otherwise employed	74	6.0
			Disabled	51	4.1
			Other	22	1.8
			Unknown/not mentioned	64	5.2

Table 6.1 Characteristics of Female Substance Abuse Treatment Clients Aged 18 or Older at Admission: 1997-1999 (continued)

Characteristic	*n*	*%*	Characteristic	*n*	*%*
Living Arrangement at Admission			**Substance of Choice Specified at Admission**		
With spouse/partner	280	22.6	Alcohol	411	33.2
With parent(s)	139	11.2	Crack (if unable to separate, combined with cocaine)	175	14.1
With other family	120	9.7	Cocaine	111	9.0
Alone	120	9.7	Marijuana, hashish, THC	61	4.9
With no other adult(s)/children only	90	7.3	Heroin	48	3.9
No stable arrangement (include homeless, shelters)	82	6.6	Amphetamines (speed, methamphetamine, meth, stimulants, crank)	37	3.0
With friends	52	4.2	Other or multiple	44	3.6
Correctional facility	9	0.7	No substance of choice	24	1.9
Other institution/closed facility	25	2.0	Substance(s) used not specified in record	132	10.7
Unknown/not mentioned	126	10.2	Methadone clients (data not collected)	196	15.8
Methadone clients (data not collected)	196	15.8			
Presenting Substance Use Disorder at Admission					
Alcohol and drug use	469	37.9			
Drug use only (excluding alcohol)	260	21.0			
Alcohol use only	259	20.9			
Other	6	0.5			
Unknown/not mentioned	49	4.0			
Methadone clients (data not collected)	196	15.8			

GED = general equivalence diploma; HMO = health maintenance organization; PPO = preferred provider organization; THC = tetrahydrocannabinol.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase II client data (1997-1999).

An estimated 14 percent of adult female substance abuse treatment clients received treatment at nonhospital residential facilities, 7 percent received treatment at outpatient methadone facilities, 49 percent received treatment at outpatient nonmethadone facilities, and 29 percent received treatment at combination facilities (Figure 6.1). The average LOS among adult female clients across types of care was 162 days. Among this population, the average LOS was 34 days at nonhospital residential facilities, 531 days at outpatient methadone facilities, 154 days at outpatient nonmethadone facilities, and 147 days at combination facilities (Figure 6.2).

Figure 6.1 Weighted Percentages of Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Facility Type of Care

Figure 6.2 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Facility Type of Care
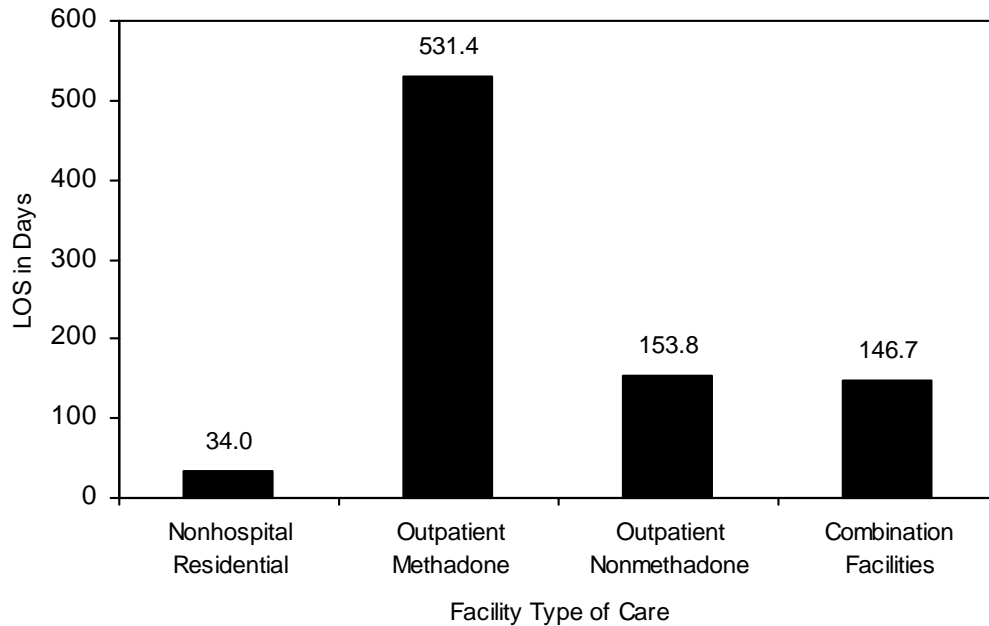
Retention, by Predisposing Characteristics

Age at admission. Among adult female clients at outpatient nonmethadone facilities, the average LOS differed by age group ($F = 10.76$, $df = 64$, $p < 0.001$) (Table 6.2). Student's *t* test showed that among adult female clients at outpatient nonmethadone facilities, LOS was shorter among those aged 55 to 64 (mean = 50 days) than among those aged 18 to 54 (mean = 139 to 177 days). Analyses of age groups of adult female clients at nonhospital residential or outpatient methadone facilities could not be conducted because of small sample size in one or more age groups, weights that were zero for all records, or variables that were zero or a linear combination of other variables.

Table 6.2 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Age at Admission and Facility Type of Care

Facility Type of Care/Age at Admission		Weighted *n*	Average LOS	*F*	*p*
	Total	504,177	161.7		
Nonhospital Residential					
18 to 24 years		9,360	32.6		
25 to 44 years		35,315	37.0		
35 to 44 years		22,981	28.2		
45 to 54 years		3,042	39.3		
55 to 64 years		*	*		
65 years or older		*	*		
	Subtotal	72,325	34.0	----	
Outpatient Methadone					
18 to 24 years		2,257	733.0		
25 to 44 years		14,713	702.6		
35 to 44 years		14,439	395.5		
45 to 54 years		4,759	296.9		
55 to 64 years		*	*		
65 years or older		0	n/a		
	Subtotal	36,269	531.4	----	
Outpatient Nonmethadone					
18 to 24 years		36,397	162.0		
25 to 44 years		100,032	164.3		
35 to 44 years		69,666	139.0		
45 to 54 years		30,167	177.0		
55 to 64 years		11,135	49.5		
65 years or older		*	*		
	Subtotal	247,607	153.8	10.8	<0.001
Combination Facilities					
18 to 24 years		16,782	52.6		
25 to 44 years		47,022	284.0		
35 to 44 years		54,567	120.3		
45 to 54 years		25,526	31.7		
55 to 64 years		*	*		
65 years or older		0	n/a		
	Subtotal	147,976	146.7	2.03	0.10

Note: Of the total 1,239 female client records among clients aged 18 or older, 1,238 (99.9 percent) contained information about LOS and age at admission.

Degrees of freedom: 64.

* Low precision; no estimate reported.

--- *F* value cannot be calculated due to small sample size in one or more age groups, weights that are zero for all records, or variables that are zero or a linear combination of other variables.

n/a = LOS cannot be calculated due to zero sample size in this age group.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Race. Among adult female clients at outpatient methadone facilities, the average LOS differed by race ($F = 4.85$, $df = 64$, $p = 0.004$) (Table 6.3). However, small sample sizes for American Indian or Alaskan Native adult female clients at outpatient methadone facilities prevented further comparisons between racial groups. The average LOS was similar among racial groups of adult female clients at nonhospital residential ($F = 2.06$, $df = 64$, $p = 0.11$) or outpatient nonmethadone facilities ($F = 0.71$, $df = 64$, $p = 0.59$). Analyses of LOS by race among adult female clients at combination facilities could not be conducted.

Table 6.3 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Race and Facility Type of Care

Facility Type of Care/Race		Weighted *n*	Average LOS	*F*	*p*
	Total	456,276	159.7		
Nonhospital Residential					
White		39,110	38.1		
Black		22,877	32.9		
American Indian or Alaskan Native		0	n/a		
Asian or Pacific Islander		*	*		
Other		2,909	35.1		
	Subtotal	65,887	35.7	2.06	0.11
Outpatient Methadone					
White		17,772	396.4		
Black		9,042	941.7		
American Indian or Alaskan Native		*	*		
Asian or Pacific Islander		0	n/a		
Other		4,356	552.5		
	Subtotal	31,981	563.0	4.85	0.004
Outpatient Nonmethadone					
White		160,620	157.7		
Black		54,995	145.1		
American Indian or Alaskan Native		3,581	135.1		
Asian or Pacific Islander		1,360	114.7		
Other		2,646	112.7		
	Subtotal	223,201	153.5	0.71	0.59
Combination Facilities					
White		93,533	68.1		
Black		43,537	328.5		
American Indian or Alaskan Native		*	*		
Asian or Pacific Islander		*	*		
Other		0	n/a		
	Subtotal	143,998	146.1	----	

Note: Of the total 1,239 female client records among clients aged 18 or older, 1,135 (91.6 percent) contained information about LOS and race.

Degrees of freedom: 64.

* Low precision; no estimate reported.

--- *F* value cannot be calculated due to small sample size in one or more racial groups, weights that are zero for all records, or variables that are zero or a linear combination of other variables.

n/a = LOS cannot be calculated due to zero sample size in this racial group.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Education at admission. Among adult female clients at outpatient nonmethadone ($F = 3.73$, $df = 56$, $p = 0.003$) or combination facilities ($F = 2.67$, $df = 56$, $p = 0.02$), the average LOS differed by education at admission (Table 6.4). Among adult female clients at outpatient nonmethadone facilities, the LOS was shorter among those with fewer than 8 years of education (mean = 68 days) than among those with higher levels of education (mean = 28 to 173 days). The LOS also was shorter among those with postgraduate education (mean = 85 days) than among those with between 8 and 11 years of education (mean = 154 days) or high school graduates (mean = 173 days). Among adult female clients at combination facilities, the LOS was shorter among college graduates than among those with 8 to 11 years of education or high school graduates (college graduates: 17 days vs. 8 to 11 years: 56 days, $t = 5.03$, $df = 56$, $p < 0.001$; college graduates: 17 days vs. high school graduates: 79 days, $t = 4.49$, $df = 56$, $p < 0.001$).

Table 6.4 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Education at Admission and Facility Type of Care

Facility Type of Care/Education at Admission	Weighted *n*	Average LOS	*F*	*p*
Total	430,548	110.7		
Nonhospital Residential				
Less than 8 years	*	*		
8-11 years	23,659	35.4		
Less than high school graduate not otherwise specified	0	n/a		
High school graduate/GED	29,610	35.7		
Some college	15,234	28.3		
College graduate	0	n/a		
Postgraduate	0	n/a		
Other				
Subtotal	68,751	34.1	0.12	0.95
Outpatient Nonmethadone				
Less than 8 years	2,819	67.5		
8-11 years	74,947	154.1		
Less than high school graduate not otherwise specified	8,250	132.2		
High school graduate/GED	89,535	173.0		
Some college	44,701	139.4		
College graduate	12,626	127.8		
Postgraduate	2,218	84.8		
Other	0	n/a		
Subtotal	235,096	154.6	3.73	0.003
Combination Facilities				
Less than 8 years	*	*		
8-11 years	35,168	56.1		
Less than high school graduate not otherwise specified	5,421	35.2		
High school graduate/GED	37,108	79.4		
Some college	33,948	106.3		
College graduate	4,455	16.7		
Postgraduate	*	*		
Other	0	n/a		
Subtotal	126,701	70.6	2.67	0.02

Note: Of the total 1,239 female client records among clients aged 18 or older, 196 female methadone client records were excluded; of the remaining 1,043 records, 982 (94.2 percent) contained information about LOS and education at admission.

Degrees of freedom: 56.

* Low precision; no estimate reported.

GED = general equivalence diploma; n/a = LOS cannot be calculated due to zero sample size in this education category.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Retention, by Enabling Characteristics

   Primary source of referral. Among adult female clients at nonhospital residential facilities, the average LOS differed by primary source of referral to treatment ($F = 2.53$, $df = 64$, $p = 0.047$) (Table 6.5). Among adult female clients at nonhospital residential facilities, the LOS was longer among women with a criminal justice system referral (mean = 75 days) than among those referred by other sources (mean = 23 to 31 days). The LOS was similar among adult female clients with different referral sources at outpatient nonmethadone ($F = 0.74$, $df = 64$, $p = 0.57$) or combination facilities ($F = 0.91$, $df = 64$, $p = 0.46$). Analyses of the LOS by referral source among adult female clients at outpatient methadone facilities could not be conducted.

Table 6.5 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Primary Source of Referral and Facility Type of Care

Facility Type of Care/Primary Source of Referral	Weighted *n*	Average LOS	*F*	*p*
Total	474,299	163.7		
Nonhospital Residential				
Other treatment facility	13,759	22.7		
Criminal justice system	9,742	74.5		
Self-referred/voluntary, welfare office or other social service agencies, family, friend, or employer	36,971	30.9		
Health care or mental health providers	9,022	24.2		
Other	0	n/a		
Subtotal	69,495	34.5	2.53	0.047
Outpatient Methadone				
Other treatment facility	4,259	628.6		
Criminal justice system	*	*		
Self-referred/voluntary, welfare office or other social service agencies, family, friend, or employer	27,790	535.8		
Health care or mental health providers	*	*		
Other	*	*		
Subtotal	33,505	539.4	---	
Outpatient Nonmethadone				
Other treatment facility	13,381	194.6		
Criminal justice system	106,740	148.8		
Self-referred/voluntary, welfare office or other social service agencies, family, friend, or employer	89,521	150.6		
Health care or mental health providers	23,913	193.9		
Other	*	*		
Subtotal	236,632	157.2	0.74	0.57
Combination Facilities				
Other treatment facility	23,562	71.0		
Criminal justice system	24,309	99.6		
Self-referred/voluntary, welfare office or other social service agencies, family, friend, or employer	79,243	195.1		
Health care or mental health providers	6,746	39.7		
Other	*	*		
Subtotal	134,666	148.1	0.91	0.46

Note: Of the total 1,239 female client records among clients aged 18 or older, 1,176 (94.9 percent) contained information about LOS and referral source.

Degrees of freedom: 64.

* Low precision; no estimate reported.

--- *F* value cannot be calculated due to small sample size in one or more categories, weights that are zero for all records, or variables that are zero or a linear combination of other variables.

n/a = LOS cannot be calculated due to zero sample size in this category.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Primary source of payment. Among adult female clients at outpatient nonmethadone ($F =$ 7.68, $df = 64$, $p < 0.001$) or combination facilities ($F = 3.35$, $df = 64$, $p = 0.01$), the LOS differed by primary source of payment for treatment (Table 6.6). Among adult female clients at outpatient nonmethadone facilities, the LOS was longer among those whose primary source of payment was no payment or client self-payment (mean = 139 days) or Medicare or Medicaid (mean = 227 days) than among those whose payment source was private health insurance (mean = 90 days). Among adult female clients at combination facilities, the LOS was longer among those whose payment source was Medicare or Medicaid (mean = 159 days) than among those whose payment source was private health insurance (mean = 27 days).

Table 6.6 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Primary Source of Payment for Treatment and Facility Type of Care

Facility Type of Care/Primary Source of Payment		Weighted *n*	Average LOS	*F*	*p*
	Total	415,513	169.0		
Nonhospital Residential					
No payment or client self-payment		18,797	34.9		
Private health insurance, fee-for-service, or HMO/PPO/managed care		*	*		
Criminal justice system		0	n/a		
Medicare or Medicaid		11,184	23.1		
Other		32,738	37.1		
	Subtotal	65,070	33.1	1.62	0.19
Outpatient Methadone					
No payment or client self-payment		9,912	921.2		
Private health insurance, fee-for-service, or HMO/PPO/managed care		2,339	315.6		
Criminal justice system		0	n/a		
Medicare or Medicaid		12,631	411.2		
Other		5,943	415.7		
	Subtotal	30,826	568.8	0.57	0.64
Outpatient Nonmethadone					
No payment or client self-payment		82,417	138.6		
Private health insurance, fee-for-service, or HMO/PPO/managed care		35,212	90.2		
Criminal justice system		26,647	118.8		
Medicare or Medicaid		41,234	227.0		
Other		18,924	267.3		
	Subtotal	204,435	157.4	7.68	< 0.001
Combination Facilities					
No payment or client self-payment		29,657	94.8		
Private health insurance, fee-for-service, or HMO/PPO/managed care		34,619	27.0		
Criminal justice system		*	*		
Medicare or Medicaid		26,712	159.0		
Other		19,819	510.3		
	Subtotal	115,183	159.3	3.35	0.01

Note: Of the total 1,239 female client records among clients aged 18 or older, 1,091 (88.1 percent) contained information about LOS and primary source of payment for treatment.

Degrees of freedom: 64.

* Low precision; no estimate reported.

HMO = health maintenance organization; PPO = preferred provider organization; n/a = LOS cannot be calculated due to zero sample size in this category.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Retention, by Organizational Characteristics

Facilities offering child care services. Among adult female clients at nonhospital residential facilities, the LOS was longer among those at facilities offering child care services than among those at facilities without such services (child care: mean = 97 days vs. no child care: mean = 33 days, $t = 4.77$, $df = 64$, $p < 0.01$) (Table 6.7).

Table 6.7 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Availability of Child Care Services and Facility Type of Care

| Facility Type of Care | Weighted *n* | | Average LOS | | | | |
	Child Care	No Child Care	Child Care	No Child Care	*t*	*p*	*df*
Nonhospital Residential	1,719	70,606	96.7	32.5	4.77	<0.01	64
Outpatient Methadone	3,731	32,538	386.8	548.0	-1.06	0.29	64
Outpatient Nonmethadone	76,348	171,259	168.4	147.3	0.55	0.58	64
Combination	41,069	106,906	353.0	67.5	1.29	0.20	64

Note: Of the 1,239 female client records among clients aged 18 or older, 1,238 (99.9 percent) contained information about LOS and availability of child care services and facility type.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Women-only facilities. Among adult female clients at nonhospital residential facilities, the LOS was longer among those at women-only facilities than among females at mixed-gender facilities (women-only: mean = 83 days vs. mixed-gender: mean = 22 days, $t = 3.90$, $df = 64$, $p < 0.01$) (Table 6.8). Among adult female clients at combination facilities, the LOS was shorter among those at women-only facilities than among those at mixed-gender facilities (women-only: mean = 52 days vs. mixed-gender: mean = 148 days, $t = -2.01$, $df = 64$, $p = 0.048$).

Table 6.8 Weighted Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission, by Client Composition of Facility and Facility Type of Care

| Facility Type of Care | Weighted *n* | | Average LOS | | | | |
	Women-Only	Mixed-Gender	Women-Only	Mixed-Gender	*t*	*p*	*df*
Nonhospital Residential	13,956	58,369	83.1	22.3	3.90	<0.01	64
Outpatient Nonmethadone	2,484	245,123	295.5	152.4	0.90	0.37	64
Combination	1,454	146,522	51.9	147.7	-2.01	0.048	64

Note: Of the 1,239 female client records among clients aged 18 or older, 1,238 (99.9 percent) contained information about LOS and facility clientele composition and facility type. Of these, 153 client records from outpatient methadone facilities were excluded.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

Multivariate Analysis

A multivariate analysis showed that several predisposing, enabling, and organizational characteristics were associated with LOS among adult female clients (Table 6.9). Adult females who did not complete high school (HR = 1.32; 95 percent CI = 1.07, 1.63; $p = 0.01$) or whose primary source of referral was not the criminal justice system (HR = 1.32; 95 percent CI = 1.02, 1.70; $p = 0.04$) were more likely to leave treatment earlier than high school graduates or those referred by the criminal justice system. Adult female clients whose primary source of payment

was other than private health insurance stayed in treatment longer than those whose primary source of payment was private health insurance. Adult females receiving treatment at facilities offering child care services (HR = 0.51; 95 percent CI = 0.36, 0.73; p = 0.0003) or at women-only facilities (HR = 0.34; 95 percent CI = 0.13, 0.89; p = 0.03) stayed in treatment longer than those at facilities without child care services or at mixed-gender facilities. These multivariate analysis results are similar to descriptive analysis findings, although multivariate analyses were conducted using a reduced sample (n = 962) because of missing data for one or more covariates. Age at admission and race were not associated with LOS among adult female clients in multivariate analyses. Some control variables also were significantly associated with LOS among women discharged from nonhospital residential, outpatient nonmethadone, or combination facilities. Women at nonhospital residential or combination facilities were more likely to leave treatment earlier than those at outpatient nonmethadone facilities. Adult female clients at facilities offering combined substance abuse treatment and mental health services stayed in treatment longer than those at facilities not offering these services. Contrary to expectations, receiving treatment at facilities offering prenatal care or transportation services was associated with leaving treatment earlier among women.

Discussion

This study examined the association between predisposing characteristics (age, race, and education), enabling characteristics (referral source and payment source), and organizational characteristics (availability of child care services and women-only facilities) and LOS among adult female substance abuse treatment clients. Consistent with findings from another study (Knight et al., 2001), adult females who did not complete high school were more likely to leave treatment earlier than high school graduates. Adult females referred by sources other than the criminal justice system were more likely to leave treatment earlier than those referred by the criminal justice system, which is similar to findings by Green et al. (2002). Adult female clients whose primary source of payment was private health insurance left treatment earlier than those with other payment sources. As noted in other studies (Hughes et al., 1995; Stevens et al., 1989; Wobie et al., 1997), women at facilities offering child care services stayed in treatment longer than women at facilities without such services. Adult females receiving treatment at women-only facilities were retained in treatment longer than those at mixed-gender facilities, which is consistent with the findings of other studies (Grella, 1999; Roberts & Nishimoto, 1996). In an unanticipated finding, age at admission and race were not associated with LOS among adult female clients, despite previous research that has linked these two client characteristics to LOS (Grella et al., 2000; McCaul et al., 2001; Mertens & Weisner, 2000; Strantz & Welch, 1995; Wickizer et al., 1994).

The results of the multivariate analysis support the positive effect of on-site child care and women-only treatment on LOS of women in substance abuse treatment. However, the results of the descriptive analysis suggest that this finding may only be relevant to women in nonhospital residential treatment. It is important to note that certain factors make it difficult to estimate the association between child care and LOS. For example, child care may be bundled with other services, such as relapse prevention groups and positive contingency awards for abstinence (Carroll, Chang, Behr, Clinton, & Kosten, 1995), or it may be associated with other

Table 6.9 Weighted Cox's Proportional Hazard Regression Analysis of Length of Stay (LOS) among Female Substance Abuse Treatment Clients Aged 18 or Older at Admission Discharged from Nonhospital Residential Facilities, Outpatient Nonmethadone Facilities, or Combination Facilities

Independent Variables	HR (95% CI)	df	Adj df	p
Age at Admission	1.00 (0.99, 1.01)	1	1.00	0.64
Race (compared with white)		2	1.68	
All other races	0.97 (0.71, 1.33)			0.86
Unknown/not mentioned	1.26 (0.89, 1.77)			0.19
Education at Admission (compared with high school graduate/GED or more)		2	1.81	
Less than high school graduate	1.32 (1.07, 1.63)			0.01
Unknown/not mentioned	0.95 (0.65, 1.39)			0.78
Primary Source of Referral for Treatment (compared with criminal justice system)		1	1.00	
Other sources	1.32 (1.02, 1.70)			0.04
Primary Source of Payment for Treatment (compared with private health insurance, fee-for-service or HMO/PPO/managed care)		4	3.78	
No payment or client self-payment	0.67 (0.46, 0.97)			0.03
Medicare/Medicaid	0.54 (0.38, 0.78)			0.001
Criminal justice system	0.51 (0.31, 0.83)			0.007
Other funding	0.74 (0.47, 1.17)			0.20
Child Care Services (compared with services not offered)		1	1.00	
Offered	0.51 (0.36, 0.73)			0.0003
Facility Clientele Composition (compared with mixed-gender)		1	1.00	
Women-only	0.34 (0.13, 0.89)			0.03
Marital Status at Admission (compared with never married, widowed, separated/divorced, or single)		1	1.00	
Married/common law	1.11 (0.87, 1.42)			0.40
Have Child/Children at Admission (compared with no child/children)		2	1.94	
Unknown/not mentioned	1.15 (0.74, 1.78)			0.52
Have child/children	0.83 (0.63, 1.09)			0.18
Presenting Substance Use Disorder at Admission (compared with alcohol abuse only)		3	2.03	
Drug abuse only	0.83 (0.65, 1.04)			0.10
Alcohol and drug abuse	0.77 (0.60, 1.00)			0.05
Substance not specified	0.51 (0.26, 0.98)			0.04
Facility Type of Care (compared with outpatient nonmethadone)		2	2.00	
Nonhospital residential	4.39 (2.62, 7.35)			<0.0001
Combination	2.65 (1.84, 3.82)			<0.0001
Prenatal Care Services (compared with services not offered)		1	1.00	
Offered	1.48 (1.09, 2.02)			0.01
Transportation Services (compared with services not offered)		1	1.00	
Offered	1.61 (1.11, 2.34)			0.01
Combined Substance Abuse Treatment and Mental Health Services (compared with services not offered)		1	1.00	
Offered	0.61 (0.47, 0.80)			0.0005

Number of observations used in the analysis: 962.

Weighted count: 417,592.

GED = general equivalence diploma; HMO = health maintenance organization; HR = hazard ratio; PPO = preferred provider organization.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study (ADSS), Phase I data (1996-1997) and Phase II data (1997-1999).

confounders, such as the availability of social workers, physicians, and nurse practitioners to clients. In addition, facilities offering child care services or women-only facilities may be more likely than other facilities to offer parenting and women's issues groups or to serve clients with different characteristics, and these factors may result in longer LOS. Furthermore, although receiving treatment in women-only facilities was associated with LOS in the multivariate analysis and among women in nonhospital residential facilities in the descriptive analysis, among women in combination facilities, LOS was shorter in women-only facilities compared with mixed-gender facilities. The cross-sectional design of this study does not allow for conclusions about the direct causal effects on LOS of such factors as availability of child care or women-only facilities because of "confounding by indication" (Walker, 1996); that is, the clients were not randomly assigned to facilities and therefore may have made their choice of facilities based on their different attitudes toward treatment or child care, different personality traits, or other factors.

The extent to which data were missing data was a major limitation of this study. The ADSS Phase II data were abstracted retroactively from client records, and limited data were collected about methadone clients. Missing data imposed limitations on conducting descriptive, inferential, and multivariate analyses. The survival analysis procedure eliminated all records in which any variable in the model included a missing value. The number of observations eliminated due to missing values progressively increased as the number of variables included in the model increased. It is possible that multicollinearity among some covariates may have affected our results. Although we tested for multicollinearity among organizational characteristics, we did not evaluate all covariates. These limitations may have reduced the statistical significance of some variables as correlates of LOS. In addition, many relevant variables could not be included in our multivariate analysis because of missing data, and not controlling for these factors may have caused some covariates to appear statistically significant that should not have.

In descriptive and inferential analyses, the lack of a statistically significant difference between two means may be misleading if extreme values in a small number of records skewed the means, resulting in larger standard errors. In addition, the potentially nonlinear relationship between age and LOS suggested by some descriptive analyses may explain why age was not correlated with LOS in the multivariate analysis.

This study explored the association between a set of single factors on retention. The multivariate analysis did not explicitly examine interactions between variables. However, addressing single separate factors was a necessary first step in exploring the relationships between study variables and LOS using a nationally representative sample of adult female substance abuse treatment clients.

The finding that adult female clients whose primary source of payment was private health insurance remained in treatment for shorter LOS than those with other payment sources suggests that insurance coverage for substance abuse treatment, which likely includes caps on coverage, has important implications for LOS. It is possible that women with insurance coverage do not leave treatment early of their own accord, but rather due to funding restrictions. However, we did not adjust for severity or "need" in our analyses because of data limitations. Also, it is possible that those who have private coverage are less severely impaired (possibly because they have

125

some attachment to the labor force) and did not require as long a stay as the average client. This issue requires further examination of the role that private health insurance plays in women's reasons for leaving treatment and the effects that leaving treatment has on outcomes.

Providing on-site child care appears to be beneficial to women in substance abuse treatment. This finding may have implications for treatment providers, as well as for child welfare policy and the courts making custody and permanency decisions. Child welfare agencies and juvenile dependency courts are challenged to address clients' substance use disorders in order to achieve positive outcomes for children and families. Prior research has shown that unless the parent with a substance use disorder has been engaged in a treatment program or is otherwise moving into recovery, the child's prognosis for long-term emotional, social, and physical well-being is poor. A mother seeking substance abuse treatment may need to utilize the child care services at a substance abuse treatment facility. This may make the difference as to whether she seeks treatment, stays in treatment, and completes treatment. Child care has specifically been identified as a service that is needed to support child welfare clients' participation in substance abuse treatment (Semidei, Radel, & Nolan, 2001). Furthermore, the Adoption and Safe Families Act (ASFA) of 1997 has shortened the timeline for parents with substance use disorders whose children have been removed for abuse or neglect to seek treatment and stabilize their lives before termination of parental rights occurs. Therefore, offering child care services at treatment facilities, because of its association with increased LOS and improved outcomes, may be essential if families are to be afforded real opportunities for recovery within ASFA timelines.

Future research using targeted data collection approaches and large samples may be able to shed more light on the role of gender in LOS. These studies could help to identify a profile of women with children who would benefit most from treatment in the facilities providing on-site child care, as well as factors influencing the LOS of these women in treatment. More studies are needed that focus on facility characteristics. Full consideration will need to be given to the specifics of the therapeutic programs and their objectives that foster longer stays in treatment. In addition, more detailed service utilization measures are needed, such as the number of individual therapy visits, group therapy visits, and family counseling visits. Overall, the findings of the current study suggest that addressing women's specialized substance abuse treatment needs through offering of child care services or providing women-only treatment may lead to longer LOS and better substance abuse treatment outcomes.

References

Aday, L. A., Begley, C. E., Lairson, D. R., Slater, C. H., Richard, A. J., & Montoya, I. D. (1999). A framework for assessing the effectiveness, efficiency, and equity of behavioral healthcare. *American Journal of Managed Care, 5 Special Number,* SP25-SP44.

Adoption and Safe Families Act, Pub. L. No. 105-89 (1997).

Allen, K. (1995). Barriers to treatment for addicted African-American women. *Journal of the National Medical Association, 87,* 751-756.

Arfken, C. L., Klein, C., di Menza, S., & Schuster, C. R. (2001). Gender differences in problem severity at assessment and treatment retention. *Journal of Substance Abuse Treatment, 20,* 53-57.

Ashley, O. S., Marsden, M. E., & Brady, T. M. (2003). Effectiveness of substance abuse treatment programming for women: A review. *American Journal of Drug and Alcohol Abuse, 29,* 19-53.

Baekeland, F., & Lundwall, L. (1975). Dropping out of treatment: A critical review. *Psychological Bulletin, 82,* 738-783.

Bartholomew, N. G., Rowan-Szal, G. A., Chatham, L. R., & Simpson, D. D. (1994). Effectiveness of a specialized intervention for women in a methadone program. *Journal of Psychoactive Drugs, 26,* 249-255.

Broome, K. M., Flynn, P. M., & Simpson, D. D. (1999). Psychiatric comorbidity measures as predictors of retention in drug abuse treatment programs. *Health Services Research, 34,* 791-806.

Carroll, K. M., Chang, G., Behr, H., Clinton, B., & Kosten, T. R. (1995). Improving treatment outcome in pregnant, methadone-maintained women: Results from a randomized clinical trial. *American Journal on Addictions, 4*(1), 56-59.

Clark, H. W. (2001). Residential substance abuse treatment for pregnant and postpartum women and their children: Treatment and policy implications. *Child Welfare, 80*(2), 179-198.

Coletti, S. D. (1998). Service providers and treatment access issues. In C. L. Wetherington & A. B. Roman (Eds.), *Drug addiction research and the health of women* (pp. 236-244, NIH Publication No. 98-4290). Rockville, MD: National Institute on Drug Abuse. [Available as a PDF at http://165.112.78.61/PDF/DARHW/237-244_Coletti.pdf]

Comfort, M., Loverro, J., & Kaltenbach, K. (2000). A search for strategies to engage women in substance abuse treatment. *Social Work in Health Care, 31*(4), 59-70.

Condelli, W. S. (1994). Domains of variables for understanding and improving retention in therapeutic communities. *International Journal of the Addictions, 29,* 593-607.

Copeland, J. (1997). A qualitative study of barriers to formal treatment among women who self-managed change in addictive behaviours. *Journal of Substance Abuse Treatment, 14,* 183-190.

Copeland, J., & Hall, W. (1992). A comparison of women seeking drug and alcohol treatment in a specialist women's and two traditional mixed-sex treatment services. *British Journal of Addiction, 87,* 1293-1302.

Copeland, J., Hall, W., Didcott, P., & Biggs, V. (1993). A comparison of a specialist women's alcohol and other drug treatment service with two traditional mixed-sex services: Client characteristics and treatment outcome. *Drug and Alcohol Dependence, 32,* 81-92.

De Leon, G., Melnick, G., & Kressel, D. (1997). Motivation and readiness for therapeutic community treatment among cocaine and other drug abusers. *American Journal of Drug and Alcohol Abuse, 23,* 169-189.

Egelko, S., Galanter, M., Dermatis, H., & DeMaio, C. (1998). Evaluation of a multisystems model for treating perinatal cocaine addiction. *Journal of Substance Abuse Treatment, 15,* 251-259.

Fishman, J., Reynolds, T., & Riedel, E. (1999). A retrospective investigation of an intensive outpatient substance abuse treatment program. *American Journal of Drug and Alcohol Abuse, 25,* 185-196.

Friedmann, P. D., Lemon, S. C., & Stein, M. D. (2001). Transportation and retention in outpatient drug abuse treatment programs. *Journal of Substance Abuse Treatment, 21,* 97-103.

Fullilove, M. T., Lown, E. A., & Fullilove, R. E. (1992). Crack 'hos and skeezers: Traumatic experiences of women crack users. *Journal of Sex Research, 29,* 275-287.

Gottheil, E., McLellan, A. T., & Druley, K. A. (1992). Length of stay, patient severity and treatment outcome: Sample data from the field of alcoholism. *Journal of Studies on Alcohol, 53,* 69-75.

Green, C. A., Polen, M. R., Dickinson, D. M., Lynch, F. L., & Bennett, M. D. (2002). Gender differences in predictors of initiation, retention, and completion in an HMO-based substance abuse treatment program. *Journal of Substance Abuse Treatment, 23,* 285-295.

Grella, C. E. (1997). Services for perinatal women with substance abuse and mental health disorders: The unmet need. *Journal of Psychoactive Drugs, 29,* 67-78.

Grella, C. E. (1999). Women in residential drug treatment: Differences by program type and pregnancy. *Journal of Health Care for the Poor and Underserved, 10,* 216-229.

Grella, C. E., Anglin, M. D., Wugalter, S. E., Rawson, R., & Hasson, A. (1994). Reasons for discharge from methadone maintenance for addicts at high risk of HIV infection or transmission. *Journal of Psychoactive Drugs, 26,* 223-232.

Grella, C. E., Joshi, V., & Hser, Y. I. (2000). Program variation in treatment outcomes among women in residential drug treatment. *Evaluation Review, 24,* 364-383.

Haller, D. L., Miles, D. R., & Dawson, K. S. (2002). Psychopathology influences treatment retention among drug-dependent women. *Journal of Substance Abuse Treatment, 23,* 431-436.

Hosmer, D. Jr., & Lemeshow, S. (1999). *Applied survival analysis: Regression modeling of time to event data.* New York: Wiley.

Hser, Y. I., Polinsky, M. L., Maglione, M., & Anglin, M. D. (1999). Matching clients' needs with drug treatment services. *Journal of Substance Abuse Treatment, 16,* 299-305.

Hubbard, R. L., Craddock, S. G., Flynn, P. M., Anderson, J., & Etheridge, R. M. (1997). Overview of 1-year follow-up outcomes in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11,* 261-278.

Hughes, P. H., Coletti, S. D., Neri, R. L., Urmann, C. F., Stahl, S., Sicilian, D. M., & Anthony, J. C. (1995). Retaining cocaine-abusing women in a therapeutic community: The effect of a child live-in program. *American Journal of Public Health, 85,* 1149-1152.

Joe, G. W., Simpson, D. D., & Broome, K. M. (1999). Retention and patient engagement models for different treatment modalities in DATOS. *Drug and Alcohol Dependence, 57,* 113-125.

Kelly, P. J., Blacksin, B., & Mason, E. (2001). Factors affecting substance abuse treatment completion for women. *Issues in Mental Health Nursing, 22,* 287-304.

Kingree, J. B. (1995). Understanding gender differences in psychosocial functioning and treatment retention. *American Journal of Drug and Alcohol Abuse, 21,* 267-281.

Knight, D. K., Logan, S. M., & Simpson, D. D. (2001). Predictors of program completion for women in residential substance abuse treatment. *American Journal of Drug and Alcohol Abuse, 27,* 1-18.

Lang, M. A., & Belenko, S. (2000). Predicting retention in a residential drug treatment alternative to prison program. *Journal of Substance Abuse Treatment, 19,* 145-160.

Luchansky, B., He, L., Krupski, A., & Stark, K. D. (2000). Predicting readmission to substance abuse treatment using state information systems: The impact of client and treatment characteristics. *Journal of Substance Abuse, 12,* 255-270.

Maglione, M., Chao, B., & Anglin, D. (2000). Residential treatment of methamphetamine users: Correlates of drop-out from the California Alcohol and Drug Data System (CADDS), 1994-1997. *Addiction Research, 8*(1), 65-79.

Mammo, A., & Weinbaum, D. F. (1993). Some factors that influence dropping out from outpatient alcoholism treatment facilities. *Journal of Studies on Alcohol, 54,* 92-101.

McCaul, M. E., Svikis, D. S., & Moore, R. D. (2001). Predictors of outpatient treatment retention: Patient versus substance use characteristics. *Drug and Alcohol Dependence, 62,* 9-17.

McComish, J. F., Greenberg, R., Kent-Bryant, J., Chruscial, H. L., Ager, J., Hines, F., & Ransom, S. B. (1999). Evaluation of a grief group for women in residential substance abuse treatment. *Substance Abuse: Official Publication of the Association for Medical Education and Research in Substance Abuse, 20*(1), 45-58.

McCusker, J., Bigelow, C., Luippold, R., Zorn, M., & Lewis, B. F. (1995). Outcomes of a 21-day drug detoxification program: Retention, transfer to further treatment, and HIV risk reduction. *American Journal of Drug and Alcohol Abuse, 21,* 1-16.

McKay, J. R., Alterman, A. I., McLellan, A. T., & Snider, E. C. (1994). Treatment goals, continuity of care, and outcome in a day hospital substance abuse rehabilitation program. *American Journal of Psychiatry, 151,* 254-259.

Mertens, J. R., & Weisner, C. M. (2000). Predictors of substance abuse treatment retention among women and men in an HMO. *Alcoholism: Clinical and Experimental Research, 24,* 1525-1533.

Moos, R. H., Brennan, P. L., & Mertens, J. R. (1994a). Diagnostic subgroups and predictors of one-year re-admission among late- middle-aged and older substance abuse patients. *Journal of Studies on Alcohol, 55,* 173-183.

Moos, R. H., Mertens, J. R., & Brennan, P. L. (1994b). Rates and predictors of four-year readmission among late-middle-aged and older substance abuse patients. *Journal of Studies on Alcohol, 55,* 561-570.

Nishimoto, R. H., & Roberts, A. C. (2001). Coercion and drug treatment for postpartum women. *American Journal of Drug and Alcohol Abuse, 27,* 161-181.

Office of Applied Studies. (2003). *Alcohol and Drug Services Study (ADSS): Methodology report: Phases I, II, and III.* Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available as a PDF at http://www.oas.samhsa.gov/adss.htm]

Parmar, M., & Machin, D. (1995*). Survival analysis: A practical approach.* New York: Wiley.

Pettinati, H. M., Belden, P. P., Evans, B. D., Ruetsch, C. R., Meyers, K., & Jensen, J. M. (1996). The natural history of outpatient alcohol and drug abuse treatment in a private healthcare setting. *Alcoholism: Clinical and Experimental Research, 20,* 847-852.

Pottieger, A. E., Inciardi, J. A., & Tressell, P. A. (1996, August). *Barriers to treatment entry for women crack users.* Paper presented at the 91st Annual Meeting of the American Sociological Association, New York.

Public Health Service Act, 42 U.S.C. § 241 (d) (1999).

Roberts, A. C., & Nishimoto, R. H. (1996). Predicting treatment retention of women dependent on cocaine. *American Journal of Drug and Alcohol Abuse, 22,* 313-333.

Rowan-Szal, G. A., Joe, G. W., & Simpson, D. D. (2000). Treatment retention of crack and cocaine users in a national sample of long term residential clients. *Addiction Research, 8*(1), 51-64.

Sayre, S. L., Schmitz, J. M., Stotts, A. L., Averill, P. M., Rhoades, H. M., & Grabowski, J. J. (2002). Determining predictors of attrition in an outpatient substance abuse program. *American Journal of Drug and Alcohol Abuse, 28,* 55-72.

Semidei, J., Radel, L. F., & Nolan, C. (2001). Substance abuse and child welfare: Clear linkages and promising responses. *Child Welfare, 80*(2), 109-128.

Shah, B. V., Barnwell, B. G., Hunt, P. N., & LaVange, L. M. (1994). *SUDAAN user's manual: Release 6.4.* Research Triangle Park, NC: Research Triangle Institute.

Sharfstein, S. S., Stoline, A. M., & Goldman, H. H. (1993). Psychiatric care and health insurance reform. *American Journal of Psychiatry, 150,* 7-18.

Simpson, D. D., Joe, G. W., & Broome, K. M. (2002). A national 5-year follow-up of treatment outcomes for cocaine dependence. *Archives of General Psychiatry, 59,* 538-544.

Simpson, D. D., Joe, G. W., Broome, K. M., Hiller, M. L., Knight, K., & Rowan-Szal, G. A. (1997a). Program diversity and treatment retention rates in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11,* 279-293.

Simpson, D. D., Joe, G. W., Fletcher, B. W., Hubbard, R. L., & Anglin, M. D. (1999). A national evaluation of treatment outcomes for cocaine dependence. *Archives of General Psychiatry, 56,* 507-514.

Simpson, D. D., Joe, G. W., & Rowan-Szal, G. A. (1997b). Drug abuse treatment retention and process effects on follow-up outcomes. *Drug and Alcohol Dependence, 47,* 227-235.

Smith, E. M., North, C. S., & Fox, L. W. (1995). Eighteen-month follow-up data on a treatment program for homeless substance abusing mothers. *Journal of Addictive Diseases, 14*(4), 57-72.

Stark, M. J. (1992). Dropping out of substance abuse treatment: A clinically oriented review. *Clinical Psychology Review, 12,* 93-116.

Stevens, S., Arbiter, N., & Glider, P. (1989). Women residents: Expanding their role to increase treatment effectiveness in substance abuse programs. *International Journal of the Addictions, 24,* 425-434.

Strantz, I. H., & Welch, S. P. (1995). Postpartum women in outpatient drug abuse treatment: Correlates of retention/completion. *Journal of Psychoactive Drugs, 27,* 357-373.

Veach, L. J., Remley, T. P. Jr., Kippers, S. M., & Sorg, J. D. (2000). Retention predictors related to intensive outpatient programs for substance use disorders. *American Journal of Drug and Alcohol Abuse, 26,* 417-428.

Walker, A. M. (1996). Confounding by indication. *Epidemiology, 7,* 335-336. Comment in *Epidemiology, 8,* 110-111, 219-220, 335. Comment in *Epidemiology, 7,* 434-436.

Wechsberg, W. M., Craddock, S. G., & Hubbard, R. L. (1998). How are women who enter substance abuse treatment different than men? A gender comparison from the Drug Abuse Treatment Outcome Study (DATOS). *Drugs & Society, 13*(1/2), 97-115.

Westat, Inc. (2000). *WesVar™ 4.0 user's guide*. Rockville, MD: Author. [Also see http://www.westat.com/wesvar/]

Westreich, L., Heitner, C., Cooper, M., Galanter, M., & Guedj, P. (1997). Perceived social support and treatment retention on an inpatient addiction treatment unit. *American Journal on Addictions, 6,* 144-149.

Wickizer, T., Maynard, C., Atherly, A., Frederick, M., Koepsell, T., Krupski, A., & Stark, K. (1994). Completion rates of clients discharged from drug and alcohol treatment programs in Washington State. *American Journal of Public Health, 84,* 215-221.

Williams, M. T., & Roberts, C. S. (1991). Predicting length of stay in long-term treatment for chemically dependent females. *International Journal of the Addictions, 26,* 605-613.

Wobie, K., Eyler, F. D., Conlon, M., Clarke, L., & Behnke, M. (1997). Women and children in residential treatment: Outcomes for mothers and their infants. *Journal of Drug Issues, 27,* 585-606.

Zarkin, G. A., & Dunlap, L. J. (1999). Implications of managed care for methadone treatment: Findings from five case studies in New York State. *Journal of Substance Abuse Treatment, 17,* 25-35.

Chapter 7. A Hybrid Cost Function for Outpatient Nonmethadone Substance Abuse Treatment Facilities

Sarah Q. Duffy, Ph.D.
Laura J. Dunlap, M.A.
Moshe Feder, D.Sc.
Gary A. Zarkin, Ph.D.

Introduction

A substantial literature provides estimates of the average cost of an episode of substance abuse treatment (e.g., see Anderson, Bowland, Cartwright, & Bassin, 1998; McGeary, French, Sacks, McKendrick, & De Leon, 2000), and various methods of estimating these costs have been used in benefit-cost analyses (see Cartwright, 2000, for a review). However, little work has been done to examine the cost structure of the substance abuse treatment industry. Extant work has focused on the association between cost and a measure of size based on point-prevalence client counts of residential treatment programs, a small and declining segment of the industry (Harwood, Kallinis, & Liu, 2001), or client counts and revenue in a convenience sample of outpatient substance abuse treatment facilities (Mark et al., 2000). Neither study employed economic methods commonly used to study cost structures in other health care industries. This chapter expands our understanding of the substance abuse treatment industry by using methods informed by economic theory to examine the cost structure of a national sample of substance abuse rehabilitation facilities that offer outpatient nonmethadone treatment. In 1999, such facilities accounted for approximately 82 percent of all substance abuse treatment facilities nationwide (Office of Applied Studies [OAS], 2001).

This chapter offers empirical evidence on the extent to which economies of scale exist in the outpatient nonmethadone substance abuse treatment industry, holding constant for client characteristics. If there are scale economies, and other studies find outcomes are no better in small programs than in large ones, State substance abuse treatment agencies and other payers may be able to encourage, through their licensing and payment policies, the formation of larger, more efficient programs, as long as the desired level of client access can be maintained. In addition, this research provides national estimates of costs for outpatient substance abuse treatment facilities, and how they vary with different mixes of clients and other characteristics, which could inform benefit-cost analyses. Most existing benefit-cost and cost-effectiveness analyses rely on a simple average cost obtained from data on a small number of purposively sampled facilities (Cartwright, 2000) or from revenue data from a national survey of substance abuse treatment facilities (Harwood, Hubbard, Collins, & Rachal, 1995). Incorporating findings based on nationally representative treatment cost data would improve the generalizability of findings from these studies. Finally, the research presented here includes measures of the characteristics of each facility's clients as a way to examine whether client characteristics are an important factor in facility costs. Such information may be important to policy makers who may wish to compare on the basis of costs programs that serve different types of clients.

Cost Function Specification

Economists often estimate cost functions to determine whether or not economies of scale can be realized in a particular industry. An industry is said to exhibit economies of scale if the average cost of producing a unit of output declines as more output is produced. If scale economies exist, the industry would be more efficient if it consisted of a few large firms rather than many small firms, other things being equal and given other constraints. In the case of substance abuse treatment, such a constraint might be ensuring adequate access. Economists also use cost functions to estimate the effect on costs of firm characteristics, such as the effect of teaching programs on hospital costs. In the substance abuse treatment industry, policy makers may wish to examine, for example, whether for-profit substance abuse treatment facilities have higher costs than nonprofit facilities, or the effect on costs of offering a variety of special programs. The purpose of this study is to explore these issues by specifying and estimating a cost function for a nationally representative sample of outpatient nonmethadone substance abuse treatment facilities.

Although, to our knowledge, no one has estimated an economic cost function for substance abuse treatment facilities, economists have estimated cost functions for other health care facilities, such as hospitals, nursing homes, and physician practices.[1] These studies usually have used a functional form that is less restrictive than the standard textbook economic cost function. The standard textbook cost function, which is derived from the economic theory of the firm, models cost as a function of the volume of output and input prices only (e.g., see Silberberg, 1978, pp. 173-213). For an industry with N outputs (Y) and K input prices (w), the cost function would be

$$C \ = \ C\ (Y_1, Y_2, Y_3, \ldots Y_N;\ w_1, w_2, w_3, \ldots, w_K), \tag{1}$$

where C is the cost of production. To obtain unbiased and efficient parameter estimates from a textbook cost function requires, among other things, that all firms in an industry use identical inputs and produce identical outputs, and that data on the quantity of all outputs produced and the prices of all inputs used by each firm are entered into the model. Economists use textbook cost functions to determine the economic properties of an industry's cost function, such as economies of scale and scope and the degree of input substitutability.[2] When using data on industries that conform to the required assumptions, coefficient restrictions implied by the economic theory of the firm can be imposed on the estimation to improve statistical efficiency.

Economists estimating cost functions for health care facilities rarely use the textbook cost function for a variety of reasons, many of which apply to the outpatient drug-free substance

---

[1] Examples include the following: Anderson and Lave (1986); Bilodeau, Crémieux, and Ouellette (2000); Carey (1997); Cowing and Holtman (1983); Custer and Wilke (1991); Dor, Duffy, and Wong (1997); Duffy, Ruseski, and Cavanaugh (2000); Escarce and Pauly (1998); Evans (1971); Gaskin and Hadley (1997); Grannemann, Brown, and Pauly (1986); Hadley (1983); Hadley and Swartz (1989); Hornbrook and Monheit (1985); Lave and Lave (1970); Li and Rosenman (2001); McKay (1988); Rogowski and Newhouse (1992); Salkever, Steinwachs, and Rupp (1986); Sloan, Feldman, and Steinwald (1983); Sloan and Steinwald (1980); Thorpe (1988); Troyer (2002); Vitaliano (1987); Welch (1987); and Zuckerman, Hadley, and Iezzoni (1994).

[2] Economies of scope are reductions in per unit costs that can be achieved when more than one product is produced. Input substitutability refers to the ease with which one input can be substituted for another in the production process.

abuse treatment industry. First, and perhaps most important, health care firms within an industry generally are not identical in terms of their inputs or outputs. Second, complete data outputs or input prices are rarely available. Finally, the focus of these studies often is the effect on costs of facility characteristics beyond output and input prices, such as whether for-profit providers have higher costs than nonprofit providers, or rural providers have lower costs than urban providers.

Instead, health economists often estimate what has been called a "hybrid" cost function (Rosko & Broyles, 1988). A hybrid cost function models costs as a function of measurable outputs and input prices, as well as other facility characteristics that may affect costs. We have

$$C = C(Y, w, X, F, A), \tag{2}$$

where, as before, Y is a vector of outputs and w is a vector of input prices. To these standard cost function variables we add a vector of measures of the case mix or severity of the facility's clients (X), a vector of facility characteristics (F), such as the number of services it offers, and a vector of characteristics describing the facility's location (A). In this chapter, we estimate a model similar to equation (2). The one difference is that because we have only one output, Y will be a scalar rather than a vector.

To estimate a cost function, the model must be written as a specific functional form that allows for the possibility for economies of scale. A linear function does not allow for economies of scale because it constrains the relationship between cost and the quantity of output to be the same over the entire output range, rather than allowing it to decline, as would be the case under economies of scale, or increase, as in the case of diseconomies of scale. We follow Vitaliano (1987) who used the following logarithmic estimating equation derived from a theoretical model proposed by Nerlove:

$$\ln C = \alpha_0 + \alpha_y \ln Y + \sum_{k=1}^{K} \beta_k \ln w_k + \sum_{l=1}^{L} \delta_l X_l + \sum_{m=1}^{M} \mu_m F_m + \sum_{r=1}^{R} \lambda_r A_r + \varepsilon, \tag{3}$$

where C, Y, w, X, F, and A are as defined before; α, β, δ, μ, and λ are coefficients to be estimated; and ε is a random, normally, and identically distributed error term. Like Vitaliano (1987), we used Ramsey's Regression Specification Error Test (RESET) to test the suitability of this functional form, as well as other popular functional forms, including the quadradic and translog specifications. Our testing revealed that the logarithmic model was the only functional form for which the null hypothesis of no specification error could not be rejected at conventional levels of significance.

Data

We used data from the Alcohol and Drug Services Study (ADSS) on 222 outpatient nonmethadone treatment facilities. ADSS was conducted under the auspices of the Office of Applied Studies (OAS) at the Substance Abuse and Mental Health Services Administration (SAMHSA) (OAS, 2000a). Among the objectives of ADSS was the collection of detailed information on the characteristics of a random, nationally representative sample of substance abuse treatment facilities and of clients discharged from those facilities. Such data allow development of better estimates of the costs of treatment than had been available using

previously existing datasets. The study consisted of three phases, two of which we draw from for this analysis.

Phase I of ADSS was a telephone interview with a nationally representative, stratified probability proportionate to size (pps) sample of 2,395 substance abuse treatment facilities, representing a 91.4 percent response rate from the 2,621 eligible facilities. Facility administrators were asked about the characteristics of the facility and its clients. Phase I missing data were imputed according to standard statistical procedures (OAS, 2000b). Final facility weights included a nonresponse adjustment, and methods used to impute missing values included logical imputation, imputation from external sources, regression, and random within-class hot-deck procedures.

Phase II facilities were selected from among Phase I facilities located in 1 of 62 primary sampling units (PSUs) again according to a stratified pps design. Excluded from Phase II were hospital inpatient facilities and facilities that treated only those with alcohol use disorders. These facilities were considered out-of-scope. Phase II data were initially collected during a site visit to 280 facilities. These 280 facilities included 234 of the 294 eligible facilities that agreed to be surveyed, as well as 46 shadow[3] facilities for the 60 that chose not to participate. Thus, the overall response rate for cost study facilities was approximately 86 percent. The site visit consisted of an in-person interview with the facility director or administrator to collect data on the facility's characteristics, including expense and revenue information; compilation of a sampling frame and selection of a representative sample of client records; and collection of client-level data from the sample of client records at each facility (OAS, 2000a). In addition to the variables that were imputed on the final Phase II facility file, we used the same methods to impute additional missing variables that we needed for our analysis (Krenzke & Mohadjer, 2002). The variables and the number of observations we imputed are noted below.

Phase II administrator data were used as the basis for the ADSS cost study, the main source of data for this chapter. Data on facilities' expenses, revenues, and client volumes were entered into a data audit spreadsheet developed by Capital Consulting Corporation (CCC) to check for accuracy (OAS, 2003). CCC had developed this audit instrument after intensive study of some 400 substance abuse treatment facilities using their Cost Allocation Methodology (CCC, 1998; CCC, The Lewin Group, & Caliber Associates, 1998). In that study, CCC sent professional accountants to facilities to collect cost data. From this information, CCC developed data reliability and validation procedures to test the accuracy of other provider-supplied data. Those procedures are at the heart of the data audit spreadsheet used in the ADSS cost study. The facilities' original responses were entered into the audit instrument, and key financial ratios were examined. Facilities with anomalous results on their Phase II cost, client volume, or personnel variables were contacted and given the opportunity to change their responses. Some 96 percent of the facilities required a callback for at least one variable. Of those, most were able to either verify the originally reported data or provide new information, much of it documented with information from the facility's financial information system. Some facilities either could not be contacted or could not provide more information on their expenses. For those facilities, which amounted to about 26 percent of the outpatient nonmethadone facilities studied here, data were

---

[3] A shadow unit is a unit that was not part of the original sample, but was identified as a possible replacement if the originally sampled unit declined to participate in the study.

imputed. In most cases, almost 22 percent of all outpatient nonmethadone facilities, missing expense data were imputed using the facility's own volume information and the data audit instrument, or the facility's Phase I response to the expense question. In 4.5 percent of the facilities, expenses were imputed using information from other facilities (OAS, 2003). The cost study data file includes final Phase II facility weights, which were adjusted for facility nonresponse using a raking procedure (OAS, 2000a). In addition to using the ADSS data, we used some supplementary data, as described below.

The variables included in the analysis are described in the following paragraphs.

Costs: Our measure of costs, the dependent variable, was the natural logarithm of the total substance abuse treatment costs in the facility, as reported by the administrator in the Phase II administrator interview and verified or edited as described above.

Output: We estimated a single output model, where we considered a unit of output as a treatment episode for a given client within a given type of care within a given facility. However, due to the characteristics of the substance abuse treatment industry and its clients, and the measures available in the data, we estimated the models using two different measures to determine whether they exhibited different relationships with costs. The number of annual admissions was the first measure of output we considered. Many substance abuse treatment facilities have to keep track of admissions because they are required to report them to their State substance abuse treatment agencies (OAS, 2000c). However, the number of admissions may overstate the annual output of a treatment center because a large number of clients who are admitted do not finish treatment. In the ADSS Phase I sample, for example, administrators reported that, on average, more than 40 percent of the clients in outpatient nonmethadone facilities failed to complete their planned treatment. In our study, we entered the facility's completion rate as an explanatory variable to partially control for that issue. We also considered using discharges, an output measure commonly used in hospital studies. However, that measure also has its limitations. As mentioned earlier, a large number of clients leave programs without finishing their treatment plan. Their discharge often is not documented until some time period elapses, usually 30 days, during which they have received no treatment. Furthermore, some facilities do not formally discharge anyone, due to the relapsing nature of the substance use disorder. In these facilities, clients are not discharged and are allowed to return for more care if needed. Therefore, discharge numbers may underestimate treatment output. In this study, we estimated two models—one with admissions as the measure of output and one with discharges. Because the results were virtually identical, we report only the results of the admissions regressions here. Given that many facilities must report these routinely to State substance abuse treatment authorities, we believe they may be more accurately reported than are discharges.

Input Prices: The inputs for which we had prices were various categories of labor and office space. To measure wages, the input price of labor, we used the Metropolitan and Balance of State Area Occupational Employment and Wage Estimates for selected occupations, collected by the Bureau of Labor Statistics (2003b) as part of their Occupational Employment Statistics Survey (OESS). The three occupations we included were (a) Substance Abuse Counselors, (b) Senior Administrative (includes five job categories: administrative services manager, general managers and other top executives, all other managers, and financial managers), and (c) Administrative Clerical Workers (includes seven job categories: file clerks, general office clerks,

payroll and timekeeping clerks, and secretaries [excluding legal and medical]). Although the latter two occupation categories are not specific to substance abuse treatment facilities, we believe the average wages across administrative workers in all industries should serve as a good proxy for administrative wages in substance abuse treatment facilities. Even though the ADSS cost study collected facility-specific wage information, we used the OESS estimates of the market wage rates to overcome two possible problems in estimation. The first was the problem of missing observations. Not all facilities employ all types of workers, so we would not have wage information for all possible types of employees for all facilities, which is required for estimating a cost function. The second potential problem was endogeneity. If we were to use a weighted average of each facility's wages as its wage variable, to overcome the missing values problem, we would no longer just be measuring the effect of exogenous factors, such as location in a high cost or highly unionized area, on the facility's cost function. Rather, we would be measuring both the prevailing wage rate and the facility's choice of inputs, which is endogenous. For example, a facility's higher costs may be attributed to its being in a higher wage area, when, in reality, its costs are higher because it has an inefficient staffing mix. To account for this possibility, economists often use local area wage rates (e.g., see Custer & Wilke, 1991; Salkever et al., 1986; Zuckerman et al., 1994), as was our plan here. Because the OESS does not collect data on all occupations for each location each year, for some variables we used data from later years, deflated using the average Consumer Price Index (CPI) representing changes in the prices of all goods and services purchased for consumption by urban households (Bureau of Labor Statistics, 2003a).

We also included a variable measuring the cost of office space in the facility's area, again turning to an external source, this time because the variable was not collected in ADSS. However, it too is potentially endogenous. Unfortunately, to our knowledge, no data exist on commercial real estate rental rates throughout the Nation. So, instead, we used the four-bedroom Section 8 Fair Market Rent as defined by the U.S. Department of Housing and Urban Development's Office of Policy Development and Research (1995) as a proxy for commercial rents. This is the variable that is used in SAMHSA's Substance Abuse Prevention and Treatment (SAPT) block grant formula to measure the rental component of the cost of doing business in each State (U.S. Department of Health and Human Services [DHHS], 1996).

Case Mix Adjustment for Substance Abuse Treatment Facilities

Adjusting for case mix in analyses of substance abuse treatment facilities has become more common in the past few years as governments and other payers demand accountability from service providers. One way to determine whether a provider is accountable is to compare that provider's performance with that of other providers. For the comparison to be fair and meaningful, however, it must account for differences across providers in the mix of clients they treat. Several recent studies of substance abuse treatment providers have used the same basic method of case mix adjustment to study outcomes of substance abuse treatment (Koenig, Fields, Dall, Ameen, & Harwood, 2000; Moos, Moos, & Andrassy, 1999; Phibbs, Swindle, & Recine, 1997; Phillips et al., 1995), access to substance abuse treatment (Deck, McFarland, Titus, Laws, & Gabriel, 2000), and participation in self-help groups among those in treatment (Ouimette et al., 2001). Although the results from these studies are informative and useful in outcome studies, they unfortunately provide little guidance on how to measure case mix complexity as it relates to the cost of treatment at a given facility.

The study conducted by Moos et al. (1999) is illustrative. These researchers analyzed outcomes of four treatment approaches (therapeutic community, psychosocial rehabilitation, 12-step, and undifferentiated) in 88 residential programs. The outcomes they investigated were posttreatment abstinence, substance use disorders, distress, mental disorder symptoms, arrests, and employment. They presented results from separate regressions run with each outcome as the dependent variable and the client as the unit of analysis. Each regression included variables describing clients and the programs in which they had been treated. Client characteristics included age, marital status, prior mental disorder episode, mental disorder diagnosis, and the value of the outcome variable at intake. With the exception of the outcome variable measured at intake, no variable was significant in all regressions. Only one, prior mental disorder episode, had the same effect on all the outcomes for which it was significant.

This lack of consistency in results holds across the other studies cited as well. No variable had a similar effect on all outcomes in all of the studies in which it was included. In state-of-the-art studies of substance abuse treatment, case mix adjustment methods vary by the purpose of the analysis and the outcome and population being studied. To our knowledge, no one has attempted to adjust for the costliness of a provider's client population when comparing substance abuse treatment providers on the basis of costs.

This is in contrast to cost studies of the hospital industry in which case mix adjustment, based on data routinely collected by hospitals from patients' discharge abstracts, has been used for more than 20 years. Information on the clients' medical diagnoses, procedures, length of stay, age, and gender is abstracted from each patient's record, then standardized and combined with information on the amount the patient was charged for the stay to create an electronic discharge abstract record. Electronic databases containing these records then are forwarded to some 40 States across the country that require hospitals to submit these data, many of which make it available for researchers. Using such data, researchers create a case mix index that describes the costliness of treating each hospital's patients. The case mix index usually takes the following form:

CMI_h = hospital h's case mix index;

$weight_j$ = a resource use weight, such as the total charge or the length of stay, assigned to homogeneous patient group j;

$group_{hj}$ = proportion of hospital h's patients in group j; and

$group_j$ = average proportion of patients in group j.

A hospital with a CMI greater than 1 has a case mix that is more costly to treat than the average hospital's; a hospital with values less than 1 has a case mix that is less costly to treat than the average hospital's.

When examining hospital costs, researchers often use groupings and weights created by the U.S. Government as part of Medicare's hospital inpatient prospective payment system. The groups, called diagnosis related groups (DRGs), are groupings of patients that, according to analysis of discharge abstract data, cost a similar amount to treat. The weights are the average costs incurred in treating cases in that DRG, relative to the average costs incurred in treating all DRGs. Each hospital discharge can be classified into a DRG based on the principal diagnosis, up

to eight additional diagnoses, and up to six procedures performed during the stay, as well as age, gender, and discharge status of the patient. There are more than 500 DRGs, and their weights are reviewed each year and updated as necessary (Centers for Medicare & Medicaid Services [CMS], 2001).

Unfortunately, the data required to create a grouping system that could be used to construct weights for substance abuse treatment client groups cannot easily be obtained. Although States routinely require substance abuse treatment providers to submit data on individual clients, these are usually admissions data, which do not include any information on the costs of the client's treatment or the client's disposition at discharge. Sometimes these data elements are collected in special studies, as was done in ADSS. However, an examination of the ADSS Phase II client discharge abstract data reveals that the data are missing from a large number of clients. Total charge was missing or invalid for some 35 percent of the outpatient nonmethadone clients in ADSS, it was zero for another 12 percent, and it was on a sliding scale or otherwise reduced for another 17 percent. Without complete charge or cost information for each client, it is difficult to create groups of clients based on resource use. Although length of stay could conceivably be used, as it was in the early work on DRGs (Fetter, Shin, Freeman, Averill, & Thompson, 1980), the problems noted above about how discharges are documented and handled make using length of stay to measure resource use questionable.

For these reasons, we did not control for case mix among substance abuse treatment facilities using a single case mix index. Instead, we used a method that was employed in hospital studies before case mix indices were widely adopted. We included several summary measures of characteristics that we believe may make clients more costly to treat.

To determine which summary measures to use, we reviewed the substance abuse treatment literature relating treatment costs to client characteristics. Unfortunately, there appears to be a dearth of literature on this subject as well, and most of what is available is based on analyses of claims data, usually for specific time periods rather than by treatment episode at a given facility (Ettner, Frank, McGuire, Newhouse, & Notman, 1998; Goodman, Holder, Nishiura, & Hankin, 1992; Goodman, Nishiura, & Hankin, 1998; Goodman, Nishiura, Hankin, Holder, & Tilford, 1996; Holder & Blose, 1991; Huskamp, 1999; Salomé, French, Scott, Foss, & Dennis, 2003; Westermeyer, Eames, & Nugent, 1998).

Thus, we chose the following summary measures of client severity based on data availability and characteristics that we expected to affect the cost of treatment. Some clients have more complex substance use disorders and therefore require more resources to treat. These may include those who, at admission, used both drugs and alcohol, injected drugs (imputed for nine facilities), or who received supplemental security income (SSI) or social security disability insurance (SSDI) (imputed for two facilities). We included in our models measures representing the percentage of each facility's admissions with each of these characteristics. This information comes from the discharge abstracts, when available, or from the Phase I ADSS administrator survey (OAS, 2000a).

Other clients may be more costly to treat for other reasons. Those who are referred by the criminal justice system, for example, may be less compliant and ready for treatment and therefore require more resources to treat compared with those referred in some other way, so we

included the percentage of clients who were referred by the criminal justice system in the model (imputed for one facility). Minority clients may be more costly to treat if they require more services due to their social and economic disadvantages (D'Aunno & Vaughn, 1995). To capture this, we entered four variables from the Phase I administrator survey: the administrator's estimate of the percentage of each facility's clients who were Hispanic, non-Hispanic black, other race, or unknown race on the point-prevalence date (October 1, 1996), with non-Hispanic white as the reference category (imputed for one facility). Ten facilities reported that the race of all of their clients was "unknown," an allowable response to the survey. It is unclear if these facilities truly did not know the race of all their clients, or chose not to respond to the question. If they truly did not know or ask, it could be that race/ethnicity plays no part in their treatment decisions and therefore resources required to treat these clients. Because this was unclear, we ran the model both including and excluding these 10 facilities and found that the results did not differ significantly. We report the results including all of the facilities and include "unknown" race as a category.

We ran versions of our model with other client mix variables we thought might affect facility costs, but they were not significant, and removing them from the model did not affect any of the coefficients on the remaining variables. The variables we considered but excluded were the percentage of clients who were homeless, unemployed, or had co-occurring substance use and mental disorders at admission, and the percentage who completed treatment.

Facility Characteristics

We included several facility characteristics in the model. We entered dummy variables to measure the extent of urbanization of the facility's location. These dummy variables indicated whether the facility was in a small- or medium-sized metropolitan area or a nonmetropolitan area, with large metropolitan area comprising the reference cell. Metropolitan area classifications were based on the Beale urbanicity codes, which were assigned based on the facility's zip code (Butler & Beale, 1994). Nonmetropolitan facilities are located in nonmetropolitan counties. Small and medium-sized metropolitan area facilities are located in metropolitan areas with fewer than 1 million people. Large metropolitan area facilities are located in metropolitan areas with more than 1 million people. We expected facilities in large urban areas to have higher costs than other facilities for input prices we did not measure (e.g., security). In addition, we entered a dummy variable indicating whether or not the facility was owned by a private for-profit entity. Government-owned and nonprofit facilities comprised the reference group. According to economic theory, in a competitive market, the profit motive forces firms to minimize the costs of doing business. Private nonprofit and government-owned facilities face no profit incentive, so they may be less likely to be cost minimizers.[4] Previous research suggested that such differences may exist in the substance abuse treatment industry (Wheeler, Fadel, & D'Aunno, 1992). However, it also should be noted that, if our client characteristic variables did not adequately account for case mix, we also might have expected a profit/nonprofit differential—private for-profit facilities may admit less severely ill clients compared with private nonprofit and government-owned facilities, which may be more severely ill clients' last resort.

---

[4] We also ran the model including a dummy variable for private, nonprofit ownership to test the hypothesis that government-owned facilities, because they must function under larger bureaucracies, may have higher costs. The results did not indicate a difference between private nonprofit and government-owned facilities, so we collapsed the two categories to conserve degrees of freedom.

Another difference among facilities is the number of services and the number of special programs for specific populations they offer. A substantial number of those with substance use disorders also have other problems, such as homelessness, unemployment, or physical or mental illnesses that must be addressed for treatment to be successful (D'Aunno & Vaughn, 1995). Because, again, we could find no direction in the literature as to which services were most likely to affect costs, we included a variable that measured the number of the following services offered by the facility, based on the administrator's response to the Phase I ADSS survey: comprehensive assessment/diagnosis, transportation, individual therapy, relapse prevention, family counseling, employment counseling, academic education, HIV/AIDS education/counseling/support, combined substance abuse treatment and mental health services, tuberculosis (TB) screening, prenatal care, smoking cessation, acupuncture, aftercare, outcome follow-up, urine screens, alcohol and other drug tests, medical detox, mental health services, and medical treatment.

Finally, the diversity of a facility's clients may affect its cost due to the importance of offering culturally competent care. For example, facilities that serve clients who speak many different languages may need to hire a greater variety of counselors or counselors with special skills. To measure this, we computed a race/ethnicity index similar to the Herfindahl index commonly used in the industrial organization literature to measure market structure. The race/ethnicity index for facility t, R_t, is

$$R_t = \sum_{i=1}^{N} S_{tj}^2,$$

where S_{tj} is the share of the ith racial/ethnic group in facility t. We included the five groups identified earlier: non-Hispanic white, non-Hispanic black, Hispanic, other, and unknown. R_t is bounded by 0 and 1 and is inversely related to diversity. The greater R_t is, the less diverse is the facility; facilities with only one racial/ethnic group have $R_t = 1$. R_t declines as the number of racial/ethnic groups at the facility increases. It increases with rising inequality among any given number of racial/ethnic groups. We hypothesized that R_t is negatively related to costs.

Several other facility characteristics also may affect costs. One such characteristic is whether or not the facility is part of a larger organization. Although facilities were encouraged to report total costs, including dollar values of items supplied by a parent company, some facilities may have had trouble doing so. Furthermore, being part of a larger entity may allow the facility to obtain inputs at lower prices, or take part in other efficiencies, which may lower its costs. Therefore, we hypothesized that facilities that were part of a larger organization may have had lower costs. Because many substance abuse treatment facilities are nonprofit, they may received in-kind donations of goods or services, such as space, furniture, or volunteer help. Facilities that received in-kind donations should have had lower expenses, so we included a dummy variable from the ADSS Phase II survey that indicated that the facility received such donations (imputed for one facility).

We suspected other facility characteristics might have affected cost, such as the number of special programs offered by the facility (intensive outpatient treatment and special programs for women, pregnant women, adolescents, DWI/DUI clients, AIDS/HIV positive, and co-occurring disorder clients), the age of the facility, and a variable indicating that the facility was a multimodality facility. However, we excluded these variables from the final model because the

estimated parameters were not significantly different from zero, and excluding these variables did not affect the other results.

Estimation

We estimated the cost function parameters using design-weighted least squares regression techniques. Because the ADSS data were collected according to a complex survey design, including stratification, unequal probabilities of inclusion and clustering, as well as nonresponse adjustment, we used methods appropriate for the design to compute the point estimates, standard errors, and statistical tests. ADSS was designed to be used with a jackknife replicate variance estimation method. However, comparing the jackknife variance estimates with those computed using the Taylor linearization method revealed great differences between these estimates (with the jackknife standard errors between 22 and 242 percent greater than the Taylor linearization ones). Bell and McCaffrey (2002) and McCaffrey, Bell, and Botts (2001) demonstrated that, under certain conditions, the jackknife method overestimates the variance, although the Taylor linearization method underestimates it. These authors offered methods for estimating an unbiased variance using data from unstratified designs, both weighted and unweighted. However, the extension of these methods to stratified designs is not straightforward. Further, the assumptions made regarding the population model may be hard to justify in our case. Therefore, we developed, using simulations, a new method to estimate standard errors from stratified data.

We started with the observation that the Taylor linearization and the jackknife methods normally yield closer estimates when the number of clusters in the sample is large and the number of estimated parameters is not very large. However, when this is not the case, the biases of these methods may be significant. This appears to be the case with our use of the ADSS cost study data because the estimates obtained by the jackknife method were much larger than those obtained by the Taylor series method, and our model contains a relatively large number of parameters. We estimated the standard error using the Taylor linearization method, then adjusted the result upward by a factor. This method was motivated by the known result that the full maximum likelihood estimate of the variance in a linear regression model with independently and identically distributed (IID) data is negatively biased on the order of p/n, where p is the number of covariates and n is the sample size. This bias arises from overfitting, as was also suggested by Bell and McCaffrey (2002) and validated by our simulations. We showed that, in the case of complex data, the bias of the variance estimated using Taylor linearization is still approximately p/n where now n, the effective sample size, is a function of the number of strata, clusters, and units within a cluster, and the intracluster correlations. We used a simulation approach to determine this effective sample size. Our simulations used a sample design similar to that of the ADSS sample, with a similar mix of continuous and dichotomous covariates. These simulations showed that the Taylor linearization bias was approximately $-p/46$. Thus, we used an effective sample size of 46 for correction of the bias of the Taylor linearization variance estimation. Accordingly, we multiplied the Taylor series standard error estimates by the square root of $[n/(n-p)]$, or 1.356.

Results

Table 7.1 displays the weighted mean estimates of the variables included in our analysis for our sample of outpatient nonmethadone substance abuse treatment facilities. After incorporating the final facility weights, the total population size represented was 9,166 facilities ($N = 222$, unweighted sample).

The mean of the log of total costs was approximately 12.13 in 1997, which translates into $185,350. The mean of the log of annual admissions was approximately 4.94, or 140 admissions, yielding a cost per admission of $1,324. Of the three different mean hourly wages included as input prices, the senior administrative wage was the highest ($24.29), followed by the substance abuse counselor wage ($12.55), and the clerical administrative wage ($9.97). The average of our proxy for office space costs was approximately $916 per month.

The average facility treated a client population that was somewhat racially diverse. Most clients in the facilities were non-Hispanic white, with the mean across facilities of 63 percent of clients. The second largest racial/ethnic group in most facilities was non-Hispanic black, with the mean across facilities of 22 percent of clients. Hispanics accounted for, on average, about 9 percent of a facility's client population. Clients of other races comprised about 2 percent of total clients, and those with an unknown race or ethnicity, approximately 4 percent. The derived race/ethnicity index had a weighted mean estimate of 0.7 across facilities, indicating at least some diversity in the average facility.

Almost half of the clients in the facilities were referred by the criminal justice system, with the mean across facilities of 42 percent. A majority of clients in the facilities received treatment for both alcohol and drug use disorders, with the mean across facilities of 54 percent. The average proportion of those who inject drugs within a facility was low (10 percent), and few clients reported receiving SSI or SSDI (mean across facilities of 8 percent of clients).

Most of the facilities in the sample were private nonprofit (59 percent). An estimated 27 percent were private for-profit, and 14 percent were government-owned. On average, each facility offered approximately 10 services. Finally, most facilities were located in a large-sized metropolitan area (55 percent), with 35 percent located in a small to medium-sized metropolitan area and 11 percent in a nonmetropolitan area.

Cost Function Results

As mentioned earlier, estimating standard errors using these data was not straightforward. In Table 7.2, we present the coefficient estimates, along with three estimates of the standard errors. As Table 7.2 shows, the standard errors estimated using the Taylor series method are much smaller than those estimated using the Jackknife method. Because we believe there is bias in both estimates—Taylor standard errors are biased downward and Jackknife estimates are biased upward—we adjusted the Taylor standard errors to create an adjusted standard error that falls between the two. We present this adjusted standard error as well and its p value. These are the results we discuss below.

Table 7.1 Means and Standard Errors of Analysis Variables, Outpatient Nonmethadone Substance Abuse Treatment Facilities, ADSS Phase II Administrator and Cost Studies, 1997 (N = 222; Weighted N = 9,166)

Variable	Mean	Standard Error
Log of Costs ($185,350 total costs)	12.13	0.09
Log of Admissions ($1,324 per admission, 140 admissions)	4.94	0.12
Log of Substance Abuse Counselor Wage ($12.55 per hour)	2.53	0.03
Log of Clerical Administrative Wage ($9.97 per hour)	2.30	0.02
Log of Senior Administrative Wage ($24.29 per hour)	3.19	0.03
Log of Office Space Cost ($916 per month)	6.82	0.04
% of Clients Who Are White	0.63	0.04
% of Clients Who Are Black	0.22	0.03
% of Clients Who Are Hispanic	0.09	0.02
% of Clients Who Are Another Race	0.02	0.01
% of Clients Whose Race Is Unknown	0.04	0.02
Herfindahl Index	0.70	0.03
% of Clients Referred by Criminal Justice System	0.42	0.05
% of Clients with Drug and Alcohol Use Disorders	0.54	0.05
% of Clients Who Injected Drugs	0.10	0.02
% of Clients Who Received SSI or SSDI	0.08	0.02
Private For-Profit Facility	0.27	0.07
Private Nonprofit Facility	0.59	0.07
Government Facility	0.14	0.04
Sum of Special Services	10.38	0.33
Part of a Larger Organization	0.57	0.07
Facility Receives In-Kind Goods or Services	0.45	0.08
Facility Located in a Large Metro Area	0.55	0.08
Facility Located in a Medium or Small Metro Area	0.35	0.08
Facility Located in a Nonmetro Area	0.11	0.06

SSI = supplemental security income.

SSDI = social security disability income.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study, Phase II administrator data, 1997 to 1999, and ADSS cost study, 1997.

Our results suggest that there are substantial economies of scale in the outpatient nonmethadone substance abuse treatment industry. We found that a 10 percent increase in the total number of admissions was associated with only a 6.7 percent increase in total costs ($p <$ 0.0001). Because the estimate also was statistically different from 1 at the 0.01 percent level, the results suggest that the outpatient nonmethadone substance abuse treatment industry experiences economies of scale. Larger facilities were less costly on a per admission basis than smaller ones.

With one exception, the facility characteristics were insignificant. The only client mix variable that was significant was the percentage of clients with SSI or SSDI. Facilities with a larger percentage of clients on SSI or SSDI had higher costs (p = 0.0418).

Table 7.2 Cost Function Results, Outpatient Nonmethadone Substance Abuse Treatment Facilities, ADSS Phase II Administrator and Cost Studies, 1997

Variable	Coefficient	Taylor Series Standard Error	Jackknife Replicate Standard Error	Adjusted Standard Error	Adjusted *T* Statistic	Adjusted *p* Value
Intercept	6.71	1.41	2.25	1.91	3.51	0.0009
Log of Admissions	0.67	0.04	0.06	0.05	12.36	<0.0001
Log of Substance Abuse Counselor Wage	-0.20	0.42	0.67	0.57	-0.36	0.7201
Log of Clerical Administrative Wage	-1.09	1.06	1.84	1.44	-0.76	0.4502
Log of Senior Administrative Wage	0.92	0.58	0.91	0.79	1.17	0.2466
Log of Office Space Cost	0.23	0.41	0.61	0.56	0.41	0.6833
% of Clients Who Are Black	0.17	0.19	0.26	0.26	0.66	0.5118
% of Clients Who Are Hispanic	0.00	0.24	0.39	0.33	-0.01	0.9921
% of Clients Who Are Another Race	-1.66	0.84	2.88	1.14	-1.46	0.1495
% of Clients Whose Race Is Unknown	0.23	0.29	0.54	0.39	0.57	0.5708
Herfindahl Index	0.50	0.29	0.50	0.39	1.27	0.2090
% of Clients Referred by Criminal Justice System	-0.12	0.20	0.31	0.27	-0.44	0.6614
% of Clients with Drug and Alcohol Use Disorders	-0.12	0.15	0.24	0.20	-0.60	0.5508
% of Clients Who Injected Drugs	0.28	0.32	0.39	0.43	0.64	0.5246
% of Clients Who Received SSI or SSDI	0.65	0.23	0.35	0.31	2.08	0.0418
Private For-Profit Facility	-0.15	0.14	0.20	0.19	-0.80	0.4269
Sum of Special Services	0.04	0.02	0.03	0.03	1.52	0.1338
Part of a Larger Organization	-0.09	0.10	0.15	0.14	-0.67	0.5054
Facility Receives In-Kind Goods or Services	0.23	0.11	0.15	0.15	1.53	0.1313
Facility Located in a Medium or Small Metro Area	-0.21	0.12	0.18	0.16	-1.26	0.2126
Facility Located in a Nonmetro Area	-0.40	0.21	0.43	0.28	-1.40	0.1666

SSI = supplemental security income.

SSDI = social security disability income.

Source: SAMHSA, Office of Applied Studies, Alcohol and Drug Services Study, Phase II administrator data, 1997 to 1999, and ADSS cost study, 1997.

Discussion

Our results reveal that economies of scale exist throughout the output range in outpatient nonmethadone substance abuse treatment facilities. This suggests that larger facilities may be able to provide care at a lower price than smaller facilities. If other studies conclude that larger facilities provide care that is at least as good as smaller facilities, and client access can be maintained, then State governments and other payers may wish to consider promoting the formation of larger programs through their payment and licensing policies. For example, they could consider setting payments at a rate at which smaller facilities cannot survive.[5] Other things being equal, such policies may free resources that can be used to treat more individuals with these disorders.

With one exception, we find that the mix of clients, at least to the extent we can measure it, does not appear to explain variations in the cost of running a substance abuse treatment facility. That one exception was clients who were on SSDI or SSI. These clients appear to be more costly to treat. No other facility characteristics were significant.

The presence of economies of scale calls into question the practice of using costs estimated from a small number of nonrandomly selected facilities in benefit-cost and cost-effectiveness analyses of the substance abuse treatment industry. If the facilities included in those studies have costs that are sufficiently higher than the average facility because they are much smaller than the average facility, a promising addition to treatment may fail to be implemented because the additional benefits do not appear to justify the costs. However, the costs may be justified at a more efficient facility. The opposite may hold for results from studies that are conducted at larger facilities. Treatments that are cost-effective in larger facilities may not be in smaller ones.

Some limitations must be noted. First, further research is needed to overcome at least one limitation of this study. Although we attempted to control for case mix using the data and methods currently available, these methods are not as advanced as those used to examine other health care facilities, and it is likely that they are not entirely sufficient. Better controls for case mix that are based on detailed analyses of data on the costs associated with treating clients with different kinds of disorders and treatment needs have to be developed to promote a fairer and more accurate comparison of treatment facility performance. Second, there are some limitations to the data used in this study. Especially noteworthy is that a relatively high percentage of the expense data could not be used as originally submitted and had to be revised or imputed using the methods described earlier. Also as described earlier, we used proxies for some of the input prices because exact measures were unavailable. Improved data collection would lead to more accurate results.

---

[5] At least one State, New Jersey, has implemented what it calls an "economies of scale" adjustment. According to a recent report, New Jersey pays 10 percent less per slot to facilities that exceed 40 residential, 150 methadone, or 75 outpatient slots (New Jersey Substance Abuse Prevention and Treatment Advisory Task Force, 2001). However, this type of adjustment does not promote larger facilities. If anything, it promotes the establishment of smaller facilities, which New Jersey may have intended for other reasons.

References

Anderson, D. W., Bowland, B. J., Cartwright, W. S., & Bassin, G. (1998). Service-level costing of drug abuse treatment. *Journal of Substance Abuse Treatment, 15*, 201-211.

Anderson, G. F., & Lave, J. R. (1986). Financing graduate medical education using multiple regression to set payment rates. *Inquiry, 23*, 191-199.

Bell, R. M., & McCaffrey, D. F. (2002). Bias reduction in standard errors for linear regression with multi-stage samples. *Survey Methodology, 28*(2), 169-181.

Bilodeau, D., Crémieux, P.-Y., & Ouellette, P. (2000). Hospital cost function in a non-market health care system. *Review of Economics & Statistics, 82*, 489-498.

Bureau of Labor Statistics, U.S. Department of Labor. (2003a). *Home page of the Bureau of Labor Statistics.* Retrieved November 5, 2003, from http://www.bls.gov/home.htm

Bureau of Labor Statistics, U.S. Department of Labor. (2003b). *Home page of Occupational Employment Statistics (OES) program.* Retrieved November 5, 2003, from http://www.bls.gov/oes/home.htm

Butler, M. A., & Beale, C. L. (1994). *Rural–urban continuum codes for metro and non-metro counties, 1993* (Staff Report No. AGES 9425). Washington, DC: U.S. Department of Agriculture, Economic Research Service. [Codes available at http://ers.usda.gov/Briefing/Rurality/ruralurbcon/]

Capital Consulting Corporation. (1998, June 30). *Uniform system of accounting and cost reporting for substance abuse treatment providers* (Contract No. SAMHSA 270-97-7001). Fairfax, VA: Author. [Available as a PDF at http://www.icpsr.umich.edu/SAMHDA/SATCAAT/system-accounting.pdf]

Capital Consulting Corporation, The Lewin Group, & Caliber Associates. (1998). *Measuring the cost of substance abuse treatment services: An overview*. Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment.

Carey, K. (1987). A panel data design for estimation of hospital cost functions. *Review of Economics & Statistics, 79*, 443-453.

Cartwright, W. S. (2000). Cost-benefit analysis of drug treatment services: Review of the literature. *Journal of Mental Health Policy and Economics, 3*(1), 11-26.

Centers for Medicare & Medicaid Services [formerly HCFA, Health Care Financing Administration]. (2001, May 4). Changes to the hospital inpatient prospective payment systems and fiscal year 2002 rates: Proposed rule (HCFA-1158-P). *Federal Register, 66*(87), 22646-22891. [Available as a PDF at http://www.gpoaccess.gov/fr/index.html]

Cowing, T. G., & Holtman, A. G. (1983). Multiproduct short-run hospital cost functions: Empirical evidence and policy implications from cross-section data. *Southern Economic Journal, 49*, 637-653.

Custer, W. S., & Willke, R. J. (1991). Teaching hospital costs: The effects of medical staff characteristics. *Health Services Research, 25*, 831-857.

D'Aunno, T., & Vaughn, T. E. (1995). An organizational analysis of service patterns in outpatient drug abuse treatment units. *Journal of Substance Abuse, 7*, 27-42.

Deck, D. D., McFarland, B. H., Titus, J. M., Laws, K. E., & Gabriel, R. M. (2000). Access to substance abuse treatment services under the Oregon Health Plan. *Journal of the American Medical Association, 284*, 2093-2099.

Dor, A., Duffy, S., & Wong, H. (1997). Expense preference behavior and contract-management: Evidence from U. S. hospitals. *Southern Economic Journal, 64*, 542-554.

Duffy, S. Q., Ruseski, J. E., & Cavanaugh, S. (2000). Graduate medical education costs in nonacademic health center teaching hospitals: Evidence from Maryland. *Medical Care Research and Review, 57*(1), 3-23. Discussion in *57*(1), 24-28.

Escarce, J. J., & Pauly, M. V. (1998). Physician opportunity costs in physician practice cost functions. *Journal of Health Economics, 17*, 129-151.

Ettner, S. L., Frank, R. G., McGuire, T. G., Newhouse, J. P., & Notman, E. H. (1998). Risk adjustment of mental health and substance abuse payments. *Inquiry, 35*, 223-239.

Evans, R. G. (1971). 'Behavioral' cost functions for hospitals. *Canadian Journal of Economics, 4*, 198-215.

Fetter, R. B., Shin, Y., Freeman, J. L., Averill, R. F., & Thompson, J. D. (1980). Case mix definition by diagnosis-related groups. *Medical Care, 18*(2 Supplement), iii, 1-53.

Gaskin, D. J., & Hadley, J. (1997). The impact of HMO penetration on the rate of hospital cost inflation, 1985-1993. *Inquiry, 34*, 205-216.

Goodman, A. C., Holder, H. D., Nishiura, E., & Hankin, J. R. (1992). An analysis of short-term alcoholism treatment cost functions. *Medical Care, 30*, 795-810.

Goodman, A. C., Nishiura, E., & Hankin, J. R. (1998). Short term drug abuse treatment costs and utilization: A multi-employer analysis. *Medical Care, 36*, 1214-1227.

Goodman, A. C., Nishiura, E., Hankin, J. R., Holder, H. D., & Tilford, J. M. (1996). Long-term alcoholism treatment costs. *Medical Care Research and Review, 53*, 441-464.

Grannemann, T. W., Brown, R. S., & Pauly, M. V. (1986). Estimating hospital costs: A multiple-output analysis. *Journal of Health Economics, 5*, 107-127.

Hadley, J. (1983). Teaching and hospital costs. *Journal of Health Economics, 2*, 75-79.

Hadley, J., & Swartz, K. (1989). The impacts on hospital costs between 1980 and 1984 of hospital rate regulation, competition, and changes in health insurance coverage. *Inquiry, 26*, 35-47.

Harwood, H. J., Hubbard, R. L., Collins, J. J., & Rachal, J. V. (1995). A cost benefit analyses [sic] of drug abuse treatment. *Research in Law and Policy Studies, 3*, 191-214.

Harwood, H. J., Kallinis, S., & Liu, C. (2001, July). *Do larger residential service delivery units have lower costs?* (National Evaluation Data Services [NEDS] technical report). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment. [Available as a PDF at http://www.icpsr.umich.edu/SAMHDA/SATCAAT/NEDS_Size_and_Cost.pdf]

Holder, H. D., & Blose, J. O. (1991). Typical patterns and cost of alcoholism treatment across a variety of populations and providers. *Alcoholism, Clinical and Experimental Research, 15*, 190-195.

Hornbrook, M. C., & Monheit, A. C. (1985). The contribution of case-mix severity to the hospital cost-output relation. *Inquiry, 22*, 259-271.

Huskamp, H. A. (1999). Episodes of mental health and substance abuse treatment under a managed behavioral health care carve-out. *Inquiry, 36*, 147-161.

Koenig, L., Fields, E. L., Dall, T. M., Ameen, A. Z., & Harwood, H. J. (2000, March). *Using case-mix adjustment methods to measure the effectiveness of substance abuse treatment: Three examples using client employment outcomes* (National Evaluation Data Services [NEDS] technical report). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment. [Available as a PDF at http://www.icpsr.umich.edu/SAMHDA/NTIES/NTIES-PDF/REPORTS/Case-Mix_3.pdf]

Krenzke, T., & Mohajder, L. (2002, August). *Alcohol and Drug Services Study: Cost study imputation final report* (Contract No. 4-44U-7652-000). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Lave, J. R., & Lave, L. B. (1970). Hospital cost functions. *American Economic Review, 60*, 379-395.

Li, T., & Rosenman, R. (2001). Estimating hospital costs with a generalized Leontief function. *Health Economics, 10*, 523-538.

Mark, T. L., Coffey, R. M., King, E., Harwood, H., McKusick, D., Genuardi, J., & Das, M. (2000). *National estimates of expenditures for mental health and substance abuse treatment, 1997: Volume II technical report appendices* (Contract No. 270-96-0007). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment and Center for Mental Health Services.

McCaffrey, D., Bell, R. M., & Botts, C. H. (2001, August 5-9). *Generalizations of biased reduced linearization*. Paper presented at the Annual Meeting of the American Statistical Association, Atlanta, GA.

McGeary, K. A., French, M. T., Sacks, S., McKendrick, K., & De Leon, G. (2000). Service use and cost by mentally ill chemical abusers: Differences by retention in a therapeutic community. *Journal of Substance Abuse, 11*, 265-279.

McKay, N. L. (1988). An econometric analysis of costs and scale economies in the nursing home industry. *Journal of Human Resources, 23*(1), 57-75.

Moos, R. H., Moos, B. S., & Andrassy, J. M. (1999). Outcomes of four treatment approaches in community residential programs for patients with substance use disorders. *Psychiatric Services, 50*, 1577-1583.

New Jersey Substance Abuse Prevention and Treatment Advisory Task Force. (2001). *Improving substance abuse treatment in New Jersey*. Trenton, NJ: New Jersey Department of Health and Senior Services. [Available as a PDF download at http://www.ncaddnj.org/publicAffairs/taskforce.htm]

Office of Applied Studies. (2000a). *User manual for the ADSS Phase II data files*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Office of Applied Studies. (2000b). *Data file user's manual for the ADSS Phase I facility interview file*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Office of Applied Studies. (2000c). *Treatment Episode Data Set (TEDS): 1993-1998: National admissions to substance abuse treatment services* (DHHS Publication No. SMA 00-3465, Drug and Alcohol Services Information System Series S-11). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#teds2]

Office of Applied Studies. (2001). *Uniform Facility Data Set (UFDS): 1999 data on substance abuse treatment facilities* (DHHS Publication No. SMA 01-3516, Drug and Alcohol Services Information System Series S-13). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#nssats2]

Office of Applied Studies. (2003, July). *Alcohol and Drug Services Study (ADSS) cost study: Costs of substance abuse treatment in the specialty sector* (DHHS Publication No. SMA 03-3762, Analytic Series A-20). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available as a PDF at http://www.oas.samhsa.gov/adss.htm]

Ouimette, P., Humphreys, K., Moos, R. H., Finney, J. W., Cronkite, R., & Federman, B. (2001). Self-help group participation among substance use disorder patients with posttraumatic stress disorder. *Journal of Substance Abuse Treatment, 20*, 25-32.

Phibbs, C. S., Swindle, R. W., & Recine, B. (1997). Does case mix matter for substance abuse treatment? A comparison of observed and case mix-adjusted readmission rates for inpatient substance abuse treatment in the Department of Veterans Affairs. *Health Services Research, 31*, 755-771.

Phillips, C. D., Hubbard, R. L., Dunteman, G., Fountain, D. L., Czechowicz, D., & Cooper, J. R. (1995). Measuring program performance in methadone treatment using in-treatment outcomes: An illustration. *Journal of Mental Health Administration, 22*, 214-225.

Rogowski, J. A., & Newhouse, J. P. (1992). Estimating the indirect costs of teaching. *Journal of Health Economics, 11*, 153-171.

Rosko, M. D., & Broyles, R. W. (1988). *The economics of health care: A reference handbook*. New York: Greenwood Press.

Salkever, D. S., Steinwachs, D. M., & Rupp, A. (1986). Hospital cost and efficiency under per service and per case payment in Maryland: A tale of the carrot and the stick. *Inquiry, 23*, 56-66.

Salomé, H. J., French, M. T., Scott, C., Foss, M., & Dennis, M. (2003). Investigating variation in the costs and benefits of addiction treatment: Econometric analysis of the Chicago Target Cities Project. *Evaluation and Program Planning, 26*, 325-338.

Silberberg, E. (1978). *The structure of economics: A mathematical analysis*. New York: McGraw-Hill.

Sloan, F. A., Feldman, R. D., & Steinwald, A. B. (1983). Effects of teaching on hospital costs. *Journal of Health Economics, 2,* 1-28.

Sloan, F. A., & Steinwald, B. (1980). Effects of regulation on hospital costs and input use. *Journal of Law & Economics, 23*(1), 81-109.

Thorpe, K. E. (1988). The use of regression analysis to determine hospital payment: The case of Medicare's indirect teaching adjustment. *Inquiry, 25,* 219-231.

Troyer, J. L. (2002). Cross-subsidization in nursing homes: Explaining rate differentials among payer types. *Southern Economic Journal, 68*, 750-773.

U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration. (1996, June 17). Block grant allocation processes. *Federal Register, 61*(117), 30625-30632. [Available at http://www.gpoaccess.gov/fr/retrieve.html]

U.S. Department of Housing and Urban Development, Office of Policy Development and Research. (1995, October). *Fair market rents for the Section 8 Housing Assistance Payments Program (revised).* Retrieved November 5, 2003, from http://www.huduser.org/datasets/fmr.html

Vitaliano, D. F. (1987). On the estimation of hospital cost functions. *Journal of Health Economics, 6,* 305-318.

Welch, W. P. (1987). Do all teaching hospitals deserve an add-on payment under the prospective payment system? *Inquiry, 24,* 221-232.

Westermeyer, J., Eames, S. L., & Nugent, S. (1998). Comorbid dysthymia and substance disorder: Treatment history and cost. *American Journal of Psychiatry, 155,* 1556-1560.

Wheeler, J. R., Fadel, H., & D'Aunno, T. A. (1992). Ownership and performance of outpatient substance abuse treatment centers. *American Journal of Public Health, 82,* 711-718.

Zuckerman, S., Hadley, J., & Iezzoni, L. (1994). Measuring hospital efficiency with frontier cost functions. *Journal of Health Economics, 13,* 255-280. Comments in *13*, 317-334. Discussion in *13*, 335-340.

Chapter 8. Effects of Reporting Requirements on Estimates from the Treatment Episode Data Set (TEDS)

Sarah Q. Duffy, Ph.D.

Introduction

The Treatment Episode Data Set (TEDS) is a compilation of admissions data that State substance abuse treatment agencies collect from substance abuse treatment providers. States use these data to monitor their treatment systems. The Substance Abuse and Mental Health Services Administration (SAMHSA), which administers the Federal Government's Substance Abuse Prevention and Treatment (SAPT) block grant program, requests that States send a minimum dataset consisting of commonly defined variables on all clients admitted to treatment facilities that accept public funds earmarked for substance abuse treatment, including funds from the SAPT block grant.

Each State, however, sets its own requirements on the types of providers that must report. Some States' requirements exactly match what SAMHSA requests. Other States provide information only on admissions that are paid with public funds. Still other States require data from all licensed providers, whether for-profit or nonprofit, and whether or not they accept public funds earmarked for substance abuse treatment. Other States' requirements fall between those extremes. In some States, providers that are not required to report do so voluntarily. States typically send all of the records they collect to SAMHSA, which compiles them into TEDS.

Because admission to facilities that do or do not accept earmarked funds is unlikely to be random, results from analyses of admissions data solely from such facilities may be subject to selection bias. This chapter presents the results of an investigation into whether or not estimates from TEDS data appear to be subject to selection bias. If selection bias occurs, it may be important for States to collect data on all clients from all facilities, not just those that receive earmarked funds, to fully understand the publicly funded treatment system. If such selection bias does not occur, SAMHSA and the States can have greater confidence in analytic results using TEDS data as they are currently collected.

Substance Abuse Treatment: A Two-Tiered System

The substance abuse treatment system has been characterized as having two tiers (Institute of Medicine [IOM], 1990; Pauly, 1991; Wheeler & Nahra, 2000). One tier serves clients who are wealthy or insured and consists of privately run and, in many cases, for-profit firms. Providers in this tier tend to be more likely to provide care in inpatient settings, not to accept earmarked funds, and to have excess capacity. Providers in the other tier serve those who have no insurance coverage for these disorders, as well as those who cannot pay the full cost of their care, if they can pay anything at all. This tier consists of publicly or privately owned, largely nonprofit providers that accept earmarked funds and that tend to have excess demand for care.

Studies that compare or describe substance abuse treatment clients by the characteristics of the facilities to which they have been admitted, however, typically have focused on differences in facility ownership status, whether the provider is for-profit, private nonprofit, or government-owned, rather than on funding sources (Hays, Farabee, & Patel, 1999; Wheeler, Fadel, & D'Aunno, 1992; Wheeler & Nahra, 2000). Dayhoff, Pope, and Huber (1993) noted that although ownership and financing are related, they are not identical. Some private, for-profit substance abuse treatment facilities accept earmarked funds, and some government-run facilities accept private insurance. Still, findings from these studies provide evidence that there are real differences in clients based on facility ownership status, which may translate to differences based on program funding sources. Most recently, Wheeler and Nahra (2000) reported differences in variables, such as primary substance of abuse, expected source of payment, and whether or not clients pay a reduced fee.

Based on these findings of differences in clients by facility ownership status, there is reason to believe that clients in facilities receiving earmarked funding may differ in important ways from clients in facilities that do not. This raises two questions about the applicability of the inferences drawn from data from only facilities that receive earmarked funding. First, if a State only requires facilities that receive earmarked funding to report data, can the State use those data to get a good picture of the clients in treatment in that State? Second, is there a selection effect that biases coefficients estimated using data only on facilities that receive earmarked funding, so the results do not even apply to that population? To examine these issues, we first present a simple model of how selection bias may occur in analyses using data from TEDS. Then we analyze TEDS data from two States that collect sufficient data from both types of facilities to explore the effects on inferences and predictions based on data from only those who are admitted to facilities that receive earmarked funds. To focus the discussion on the estimation issues, we do not identify by name the two States whose data we use in the analysis.

Selection Bias in Studies of Substance Abuse Treatment Facilities

Selection bias can appear in coefficients estimated using data from nonrandomly selected samples, such as the samples from the States that require reporting only by facilities that receive earmarked funds. In the substance abuse treatment field, such effects have been found, for example, in estimates of the effectiveness of Alcoholics Anonymous (AA), either as a stand-alone treatment (Humphreys, Phibbs, & Moos, 1996) or aftercare (Fortney, Booth, Zhang, Humphrey, & Weisman, 1998). As an example of how this might occur in admissions data, consider the following model along the lines of one described by O'Higgins (1994).

Suppose we are interested in estimating the effect of various client characteristics on the probability of admission to an inpatient substance abuse treatment setting, such as a hospital or long- or short-term residential facility, to explore whether treatment resources are being used according to current thinking on appropriate treatment setting. Suppose further that we begin with a single equation (univariate) probit model. Assume that the variables in the model include a dummy variable (y) indicating whether or not the admission was to a facility that accepted earmarked funds. This would lead to the following model:

$$e^* = X\beta + \gamma y + \varepsilon, \tag{1}$$

where

> e^* =   a latent variable that represents the individual's demand for treatment intensity (if it is positive, the individual chooses inpatient treatment; otherwise, the individual chooses outpatient treatment);
>
> y =   a dummy variable set equal to 1 when the client is admitted to a treatment facility that accepts earmarked funds and 0 otherwise;
>
> X =   a vector of individual characteristics;
>
> β, γ =   parameters to be estimated; and
>
> ε =   a normally distributed error term with variance normalized (without loss of generality) to 1.

The probability that an individual is admitted to inpatient substance abuse treatment, then, is

$$Pr(e=1) = \Phi(X\beta + \gamma y) = \int_{-\infty}^{X\beta+\gamma y} (2\pi)^{-\frac{1}{2}} \exp\left\{-\frac{\varepsilon^2}{2}\right\} d\varepsilon, \tag{2}$$

where e = an observed dummy variable that equals 1 if the client was admitted to an inpatient facility ($e^* > 0$) and 0 otherwise. This leads to the probit likelihood function,

$$\Pi\left[\Phi\left(X\beta + \gamma y\right)\right]^{e}\left[\Phi\left(-X\beta - \gamma y\right)^{1-e}\right], \tag{3}$$

where Φ is the normal distribution function.

But suppose that admission to facilities across funding sources is not random. Suppose that individuals admitted to facilities that receive earmarked funds differ from individuals admitted to other facilities on some uncollected variable that affects both the facility and treatment choices. An example might be treatment readiness. Suppose that clients who enter facilities that accept earmarked funds are, on average, more "ready" for treatment than those who enter programs that do not. Then those in a facility that accepts earmarked funds might have been less likely to be admitted to inpatient treatment, according to the American Society of Addiction Medicine's Patient Placement Criteria (ASAM, 1991), even if they had not chosen a facility that accepted earmarked funds. A bias exists, in this example, because the parameter (γ), which is the estimated effect of having sought treatment in a facility that accepts earmarked funds on the probability of being admitted to inpatient treatment, will include the unobserved factors influencing the choice of treatment based both on funding type and treatment intensity.

The more general problem, of which the above example is one possible cause, is that ε may be correlated with the variables on the right-hand side of the equation. To illustrate, assume that y and ε in equation (2) are correlated. Assume that the choice of entering a facility that accepts earmarked funds may itself be thought of as a latent variable. We can model this as

$$y^* = Z\alpha + \nu, \tag{4}$$

where

> y^* = an underlying continuous variable measuring some characteristic of the client's perception of treatment facilities, such as quality, convenience, location, or types of clients, that is related to program financing;

> Z = a vector of client characteristics determining y^*; and

> ν = an error term that is distributed normally with a variance normalized to 1.

Let y be a dummy variable that equals 1 if $y^* > 0$ and 0 otherwise. The probability that the individual would choose a facility that accepts public funding would be

$$Pr(y = 1) = \Phi(Z\alpha). \tag{5}$$

If ε and ν are correlated, meaning their correlation, ρ, does not equal 0, then ε and y are correlated [$E(\varepsilon \mid y) \neq 0$]. The estimate of γ in equation (3) will be biased. To obtain unbiased estimates, alternative methods would have to be employed.

Bivariate Probit Model

If the correlated error terms are individually normally distributed, then the model can be estimated consistently using a bivariate probit technique. The joint probability that the individual chooses a facility that receives public funding and is admitted to inpatient treatment is

$$Pr(e = 1, y = 1) = \int_{-Z\alpha}^{\infty} \int_{-X\beta-\gamma}^{\infty} \phi(\varepsilon, \nu; \rho) d\varepsilon d\nu \tag{6}$$

$$= \Phi(X\beta + \gamma, Z\alpha; \rho),$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ are the standardized bivariate normal density and distribution functions, respectively. The bivariate probit estimates the effect of client characteristics on the joint determination of admission to facilities that accept earmarked funds and inpatient treatment.

The conditional probability that the individual is admitted to inpatient treatment, given that he or she is admitted to a facility that accepts earmarked funds, then, is

$$Pr(e = 1 \mid y = 1) = \frac{Pr(e = 1, y = 1)}{Pr(y = 1)} \tag{7}$$

$$= \frac{\int\limits_{-Z\alpha}^{\infty} \phi(v) \int\limits_{-X\beta-\gamma}^{\infty} \phi\left[\frac{(\varepsilon+\rho v)}{\sqrt{1-\rho^2}}\right] d\varepsilon dv}{\Phi(Z\alpha)}$$

$$= \frac{\int\limits_{-Z\alpha}^{\infty} \phi(v)\Phi\left(\frac{X\beta+\gamma-\rho v}{\sqrt{1-\rho^2}}\right) dv}{\Phi(Z\alpha)}.$$

The model is identified (i.e., the estimates it provides will be unique) as long as *Z*, the vector of explanatory variables in the earmarked funding equation, contains at least one independent variable not in *X*, the vector in the inpatient/outpatient (IP/OP) equation (O'Higgins, 1994).

Estimation Strategy

We first conducted preliminary analyses to provide evidence as to whether or not selectivity may be a problem in the TEDS data. There are two econometric issues. The first is the stability of coefficient estimates between the models run on clients from facilities with different funding sources. To address this issue, we ran separate IP/OP probits on the samples from facilities that received earmarked funds and those in facilities that did not. We used standard likelihood ratio (LR) tests to determine whether the differences in the coefficients were significant at conventional levels (Greene, 2000).[1] The second econometric issue is the correlation between the unobservable factors affecting the IP/OP decision and the unobservable factors affecting the facility choice. To address this second issue, we estimated a variant of the bivariate probit model called the "seemingly unrelated probit" (Stata Corporation, 2001). In this model, both the facility and the IP/OP decisions depend on the same set of independent variables, and the correlation between the two error terms is estimated as an auxiliary parameter. By modeling the correlation between the two decisions, we provide evidence on the significance and direction of the correlation between the two decisions. The advantage of the seemingly unrelated probit over the bivariate probit described above is that the seemingly unrelated probit is identified by distributional assumptions alone. We can investigate whether or not the correlation, ρ, is significantly different from zero, without making a priori identifying restrictions, as would be preferable when using the standard bivariate probit (Powell, Czart Ciecierski, Chaloupka, & Wechsler, 2002). We report the results of these preliminary investigations and of our final models in the following section.

Data and Model Specifications

We used data from the 1996 TEDS, which is maintained by SAMHSA's Office of Applied Studies (OAS, 1998; also see Chapter 4 in the present compendium). We used data on

---

[1] We conducted the test by first estimating the equation separately on the sample of clients from facilities with public funding and on the sample of clients from facilities with no public funding to obtain the LRs. Then, summing these LRs, we got the unrestricted LR. Next, we estimated the equation on the pooled sample of clients from all facilities in our dataset to obtain the restricted LR. Finally, by subtracting the restricted and unrestricted LRs and multiplying by 2, we derived the LR statistic.

adult males with alcohol as a primary substance of abuse from two States that collect data both from both types of facilities. We refer to these States as "State A" and "State B."

We used two methods to determine which facilities received earmarked funding. First, we identified facilities in the TEDS file that reported to another OAS data file, the Uniform Facility Data Set (UFDS). UFDS data come from a survey of facility administrators that collects information on a variety of facility characteristics, including information on ownership and funding sources, such as whether they accept earmarked funds (OAS, 1997). Using this method, we were able to identify funding status for 88 percent of the facilities and 93 percent of the admissions in State A and 74 percent of both the facilities and admissions in State B. Second, for those facilities that did not report funding information to UFDS, we used expected payer information from the TEDS files to identify which facilities received earmarked funds and which did not. Unfortunately, this latter method is not exact, as the field in which earmarked funding is reported, "other government funds," also includes funding from other government sources, such as the Department of Veterans Affairs (VA) and CHAMPUS.[2] However, we expect the proportions of those payment sources to be small enough not to affect the findings materially.

Seemingly Unrelated Probit Specification

As mentioned earlier, the seemingly unrelated probit model does not require exclusion restrictions to provide meaningful estimates, particularly of ρ. Based on the model developed in earlier work (see Chapter 4), we include several variables in both the IP/OP and earmarked funding equations measuring client characteristics at the time of admission to explain these decisions. Measures of client severity include a set of dummy variables indicating (a) frequency of use (daily use, use three to six times in the past week, use one to two times in the past week, and use one to three times in the past month, with no use in the past month as the reference category), (b) intoxication before age 15, (c) secondary substance use (marijuana/hashish, cocaine, and other, with no secondary substance use as the reference category), (d) one or two prior treatments (with no prior treatment as the reference category), (e) co-occurring mental disorders, and (f) homelessness.

We also include socioeconomic characteristics in the form of dummy variables indicating (a) part-time or full-time employment (not employed as the reference cell), (b) the client's race/ethnicity (Hispanic, non-Hispanic white, and non-Hispanic black, with "other" as the reference category), (c) marital status, and (d) education status (no high school, which equals 1 if the client did not complete high school and 0 otherwise, and high school, which equals 1 if the client completed high school, with some college as the reference category). We include season of admission variables (summer, fall, winter, with spring as the reference cell) to capture differences among seasons, due to such things as the weather or the client's obligations, in a client's probability of entering inpatient treatment. We include indicator variables for referral source (self, alcohol or drug abuse services provider, other health care provider, other sector provider, with criminal justice system as the reference cell) and expected payer (self-pay, Medicare, Medicaid, private, other [e.g., worker's compensation], and other government

---

[2] CHAMPUS stands for the Civilian Health and Medical Program for the Uniform Services. It provides health care in private facilities for dependents of military personnel on active duty or retired for reasons other than disability.

funding/no charge as the reference category) to control for any differences that might be caused by these factors. Government funding and no charge are combined in the reference category because no charge is a relatively small category, especially in State A, and because we believe clients who are not charged likely are more similar to those who receive government funding for their care than those who have insurance coverage that pays for care.

Bivariate Probit

Although it also is technically acceptable to rely on functional form to identify the bivariate probit (Greene, 2000), we follow Powell et al. (2002) in choosing to impose exclusion restrictions to increase our confidence in the model. Our bivariate probit model is identical to our seemingly unrelated probit model except that, in addition to including a dummy variable in the IP/OP equation identifying whether or not the admission was to a facility that received earmarked funding, we exclude the education variables from the IP/OP equation. This specification passed standard overidentification and instrument validity tests applied to a two-stage least squares version of the model (Davidson & MacKinnon, 1993), following Powell et al. (2002). However, although the education variables were highly significant in the earmarked funding equation for State B, they were not significant in the earmarked funding equation for State A. Because the excluded variables should be correlated with the dependent variable in the earmarked funding equation to ensure consistent estimates, and given that we had no other good candidates for exclusion, we present the bivariate probit results only for State B.

Results

Descriptive Statistics

Table 8.1 shows that, in these two States, there were several differences between clients who entered facilities that accepted earmarked funds compared with those who entered other facilities, and that, for some variables, the differences varied by State. For example, in State A, clients admitted to facilities that accepted earmarked funds were significantly less likely to be admitted to inpatient treatment, while in State B they were significantly more likely to be admitted to inpatient treatment. In State B, clients admitted to facilities that accepted earmarked funds were more likely to use alcohol daily at admission than were those in other facilities, while in State A, the opposite was true. In State B, clients in programs that accepted earmarked funds were more likely to have first used alcohol prior to age 15, while in State A the difference between clients admitted to different types of facilities was insignificant. However, in both States, clients admitted to facilities that received earmarked funds were more likely to have a secondary substance of abuse, less likely to have co-occurring mental disorders, and more likely to have had two or more prior treatment episodes than were clients admitted to facilities that did not accept earmarked funds.

Differences across facility funding source in demographic and socioeconomic variables were more similar between the two States. In both States, clients admitted to facilities that received earmarked funds were younger, less likely to be employed, less likely to be married, less likely to have any postsecondary education, and less likely to have had private insurance pay for their substance abuse treatment. The only major difference between the two States in socioeconomic variables was in the race/ethnicity variable. In State B, clients in facilities that

161

Table 8.1 Descriptive Statistics, by Facility Funding Source

	State A		State B	
	Earmarked Funds	**No Earmarked Funds**	**Earmarked Funds**	**No Earmarked Funds**
Variable	(*n* = 15,317)	(*n* = 2,274)	(*n* = 7,560)	(*n* = 2,854)
Percent Inpatient*	0.12	0.19	0.23	0.18
Referral Source*				
Self	0.16	0.27	0.19	0.19
Alcohol/drug treatment provider	0.07	0.11	0.21	0.06
Other health care provider	0.06	0.12	0.10	0.11
Other sector	0.04	0.12	0.08	0.06
Criminal justice	0.67	0.38	0.52	0.58
Frequency of Use*				
None	0.41	0.26	0.23	0.19
1-3 times in past month	0.24	0.14	0.11	0.14
1-2 times in past week	0.12	0.14	0.17	0.24
3-6 times in past week	0.10	0.17	0.14	0.14
Daily	0.13	0.30	0.35	0.29
Used Alcohol Prior to Age 15*	0.34	0.36	0.35	0.31
Secondary Substance*				
None	0.58	0.66	0.56	0.65
Marijuana	0.31	0.23	0.18	0.15
Cocaine/crack	0.03	0.05	0.20	0.15
Other	0.07	0.06	0.06	0.05
Prior Treatment Episode*				
None	0.41	0.44	0.50	0.52
One	0.29	0.30	0.25	0.26
Two or more	0.30	0.26	0.26	0.22
Mental Disorder*	0.15	0.21	0.07	0.13
Homeless	0.01	0.02	0.05	0.05
Age*	33.84	37.32	35.87	36.89
Employed*	0.64	0.70	0.53	0.64
Married*	0.33	0.40	0.25	0.27
Education*				
No high school	0.21	0.17	0.28	0.23
High school	0.57	0.55	0.51	0.49
Postsecondary	0.22	0.28	0.21	0.29
Race/Ethnicity*				
Non-Hispanic white	0.90	0.91	0.67	0.74
Non-Hispanic black	0.04	0.05	0.20	0.17
Hispanic	0.04	0.03	0.12	0.07
Other	0.12	0.14	0.01	0.02
Season of Admission***				
Winter	0.30	0.29	0.26	0.25
Spring	0.32	0.28	0.26	0.27
Summer	0.19	0.21	0.25	0.26
Fall	0.19	0.22	0.23	0.22
Payment Source*				
Self	0.06	0.09	0.29	0.41
Private insurance	0.11	0.49	0.17	0.23
Medicare	0.01	0.06	0.03	0.04
Medicaid	0.05	0.05	0.03	0.06
Other government and no charge	0.76	0.30	0.44	0.24
Other	0.00	0.02	0.05	0.03

*Differences by funding source significant at better than the 5 percent level for both States.

**Differences in distributions significant at better than the 5 percent level for both States.

***Difference significant at better than the 5 percent level for State B only.

****Difference significant at better than the 5 percent level for State A only.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

received earmarked funds were less likely to be white than those in other facilities, while in State A the proportions were approximately the same.

Multivariate Analyses

Table 8.2 displays, for each State, the marginal effects[3] and standard errors for three equations: Model 1, univariate probit IP/OP model estimated on observations from programs that received earmarked funds; Model 2, a univariate probit IP/OP model estimated on observations from programs that did not receive earmarked funds; and Model 3, a seemingly unrelated (SUR) probit of the IP/OP and earmarked funding equations. In addition, Table 8.2 displays results from the bivariate probit model (Model 4) for State B.

Comparing Models 1 and 2 in Table 8.2 shows that, for both States, there are many differences in magnitude and significance levels of the effects of client characteristics on the probability of inpatient admission across facility funding type. Consider, for example, the referral source variables. In State A, self-referred clients in the earmarked funding sample were more likely to be admitted to inpatient treatment than those in the reference cell (those referred by the criminal justice system). In contrast, self-referred individuals in the non-earmarked funding sample were no more or less likely to be admitted to inpatient treatment than those referred by the criminal justice system. In State B, although self-referred clients were significantly more likely to be admitted to inpatient treatment than those referred by the criminal justice system, the marginal effect in the earmarked funding sample was more than twice as large as that in the other sample. In both States, those referred by alcohol or drug abuse treatment providers were more likely to be admitted to inpatient treatment in both samples, but the magnitude of the marginal effect differed. In State A, the effect was larger among those admitted to facilities that did not receive earmarked funds, while in State B, the effect was larger among those who were admitted to facilities that did not receive earmarked funds.

As another example, consider the effect of having a co-occurring mental disorder. In State A, having a co-occurring mental disorder had a very small, only marginally significant effect on inpatient admission in facilities that received earmarked funds. It had a much larger and more strongly significant effect among those in facilities that received no earmarked funds. In State B, having a mental disorder was positively associated with inpatient admission in both types of facilities, but the effect was almost 3 times as large in facilities that receive earmarked funds compared with those that did not. The likelihood ratio test provided support for what is apparent from casual observation: The relationship between the covariates and the IP/OP decision is influenced by the facility choice decision.[4] Therefore, a single model run on the pooled sample would not be appropriate.

Table 8.2 also displays the seemingly unrelated results (SUR) for both States. As suspected, the ρ's in both equations were statistically significantly different from zero. However, they were of opposite signs. The negative estimated value of ρ in State A suggests that the

---

[3] Marginal effects are the derivative of the estimated equation as a function of the independent variable of interest. They represent the change in the probability of inpatient admission due to a small change in the independent variable. In a standard linear ordinary least squares regression, the derivative is simply the estimated coefficient. In nonlinear models, such as the bivariate probit, the derivative is more complicated. See Greene (2000, p. 852).

[4] The statistic was 174.02 for State A and 355.65 for State B, significant at better than the $p = 0.001$ level.

Table 8.2 Marginal Effects on the Probability of Inpatient Treatment, for Selected Models, 1996

	State A			State B			
	Model 1 Univariate Probit IP/OP Model Obs. from Facilities w/Earmarked Funds (standard error)	**Model 2** Univariate Probit IP/OP Model Obs. from Facilities w/o Earmarked Funds (standard error)	**Model 3** SUR Probit IP/OP and Earmarked Funds, Full Sample (standard error)	**Model 1** Univariate Probit IP/OP Model Obs. from Facilities w/Earmarked Funds (standard error)	**Model 2** Univariate Probit IP/OP Model Obs. from Facilities w/o Earmarked Funds (standard error)	**Model 3** SUR Probit IP/OP and Earmarked Funds, Full Sample (standard error)	**Model 4** Bivariate Probit, Full Sample (standard error)
Number of Observations	**15,317**	**2,274**	**17,591**	**7,560**	**2,854**	**10,414**	**10,414**
Referral Status							
Self-referred	0.017***	0.011	-0.016***	0.121***	0.056***	0.133***	0.178***
	(0.006)	(0.021)	(0.005)	(0.012)	(0.011)	(0.010)	(0.014)
Alcohol/drug abuse treatment provider	0.107***	0.151***	0.116***	0.213***	0.026***	0.176***	0.300***
	(0.007)	(0.025)	(0.007)	(0.014)	(0.009)	(0.012)	(0.020)
Other health care provider	0.033***	0.055**	0.037***	0.121***	0.039***	0.114***	0.161***
	(0.008)	(0.025)	(0.007)	(0.015)	(0.009)	(0.012)	(0.018)
School, employer, and other community	-0.035***	-0.035	-0.035***	0.037**	0.010	0.03**	0.076***
	(0.013)	(0.029)	(0.006)	(0.017)	(0.009)	(0.013)	(0.019)
Drug Use in the Month Prior to Admission							
1-3 times in the past month	0.018***	0.210***	0.033***	-0.077***	0.035**	-0.055***	-0.050***
	(0.006)	(0.027)	(0.006)	(0.022)	(0.014)	(0.019)	(0.017)
1-2 times in the past week	0.064***	0.163***	0.071***	-0.035**	0.035***	-0.022	-0.042***
	(0.007)	(0.030)	(0.007)	(0.018)	(0.013)	(0.019)	(0.015)
3-6 times in the past week	0.121***	0.230***	0.128***	0.086***	0.044***	0.073***	0.075***
	(0.007)	(0.028)	(0.002)	(0.015)	(0.013)	(0.013)	(0.017)
Daily use	0.179***	0.298***	0.187***	0.159***	0.083***	0.164***	0.181***
	(0.007)	(0.025)	(0.006)	(0.013)	(0.017)	(0.012)	(0.015)
Used Alcohol Prior to Age 15	0.016***	-0.026	0.010**	0.005	-0.003	0.318	0.003
	(0.004)	(0.016)	(0.004)	(0.009)	(0.004)	(0.074)	(0.008)
Secondary Drug of Abuse							
Marijuana	-0.020***	-0.011	-0.020***	-0.018	0.002	-0.014	-0.002
	(0.005)	(0.020)	(0.005)	(0.013)	(0.006)	(0.011)	(0.012)
Cocaine	0.028***	0.043	0.040***	0.061***	0.008	0.048***	0.059***
	(0.010)	(0.031)	(0.009)	(0.011)	(0.006)	(0.009)	(0.012)
Other substance	0.006	0.070**	0.012	0.076***	0.019**	0.064***	0.082***
	(0.008)	(0.031)	(0.008)	(0.016)	(0.009)	(0.013)	(0.019)
Prior Number of Treatment Episodes							
One prior treatment episode	0.018***	0.005	0.017***	0.021*	0.014**	0.023**	0.019*
	(0.005)	(0.019)	(0.005)	(0.011)	(0.006)	(0.009)	(0.010)
2 or more prior treatment episodes	0.030***	0.047**	0.032***	0.000	0.009*	0.009	0.021**
	(0.005)	(0.019)	(0.005)	(0.011)	(0.006)	(0.009)	(0.011)

Table 8.2 Marginal Effects on the Probability of Inpatient Treatment, for Selected Models, 1996 (Continued)

	State A			State B			
	Model 1 Univariate Probit IP/OP Model Obs. from Facilities w/Earmarked Funds (standard error)	**Model 2** Univariate Probit IP/OP Model Obs. from Facilities w/o Earmarked Funds (standard error)	**Model 3** SUR Probit IP/OP and Earmarked Funds, Full Sample (standard error)	**Model 1** Univariate Probit IP/OP Model Obs. from Facilities w/Earmarked Funds (standard error)	**Model 2** Univariate Probit IP/OP Model Obs. from Facilities w/o Earmarked Funds (standard error)	**Model 3** SUR Probit IP/OP and Earmarked Funds, Full Sample (standard error)	**Model 4** Bivariate Probit, Full Sample (standard error)
Age							
Age of respondent	0.003**	0.007**	0.003***	-0.003	0.000	-0.003	-0.003
	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
Age-squared	0.000***	0.000**	0.000***	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education/Employment							
Non-high school graduate	0.016**	0.040*	0.018***	0.028**	-0.002	0.023**	
	(0.007)	(0.024)	(0.006)	(0.013)	(0.006)	(0.011)	
High school graduate	0.006	0.013	0.009	0.002	0.001	0.005	
	(0.005)	(0.018)	(0.005)	(0.012)	(0.005)	(0.009)	
Employed prior to	-0.075***	-0.067***	-0.076***	-0.116***	-0.017***	-0.101***	-0.129***
admission	(0.004)	(0.018)	(0.005)	(0.010)	(0.006)	(0.009)	(0.010)
Race/Other Demographics							
Non-Hispanic white	-0.054***	-0.150***	-0.064***	-0.038	0.003	-0.028	-0.009
	(0.012)	(0.054)	(0.013)	(0.039)	(0.021)	(0.033)	(0.036)
Non-Hispanic black	-0.034**	-0.185***	-0.048***	-0.083**	0.002	-0.065*	-0.039
	(0.015)	(0.063)	(0.015)	(0.040)	(0.021)	(0.033)	(0.033)
Hispanic	-0.057***	-0.122*	-0.062***	-0.035	0.003	-0.024	0.026
	(0.017)	(0.071)	(0.017)	(0.041)	(0.023)	(0.035)	(0.040)
Homeless at Time of Admission	0.120***	0.285***	0.143***	0.182***	0.101***	0.200***	0.126***
	(0.015)	(0.049)	(0.014)	(0.020)	(0.023)	(0.017)	(0.022)
Existing Mental Disorder	0.009*	0.061***	-0.015***	0.147***	0.048***	0.158***	0.101***
	(0.005)	(0.018)	(0.005)	(0.015)	(0.011)	(0.012)	(0.016)
Married	-0.031***	-0.051***	-0.033**	-0.009	-0.010*	0.014	-0.012
	(0.005)	(0.016)	(0.004)	(0.011)	(0.005)	(0.009)	(0.010)
Time of Admission							
Summer	0.017***	-0.002	0.015***	0.028**	-0.009*	0.012	0.016
	(0.006)	(0.021)	(0.006)	(0.012)	(0.006)	(0.010)	(0.011)
Fall	0.011*	-0.038*	0.006	0.039***	-0.030***	0.006	0.015
	(0.006)	(0.022)	(0.006)	(0.013)	(0.009)	(0.011)	(0.012)
Winter	0.019***	0.007	0.019***	0.028**	-0.012**	0.003	0.008
	(0.005)	(0.020)	(0.005)	(0.012)	(0.006)	(0.011)	(0.011)

Table 8.2 Marginal Effects on the Probability of Inpatient Treatment, for Selected Models, 1996 (Continued)

	State A			State B			
	Model 1 Univariate Probit IP/OP Model Obs. from Facilities w/Earmarked Funds (standard error)	**Model 2** Univariate Probit IP/OP Model Obs. from Facilities w/o Earmarked Funds (standard error)	**Model 3** SUR Probit IP/OP and Earmarked Funds, Full Sample (standard error)	**Model 1** Univariate Probit IP/OP Model Obs. from Facilities w/Earmarked Funds, (standard error)	**Model 2** Univariate Probit IP/OP Model Obs. from Facilities w/o Earmarked Funds (standard error)	**Model 3** SUR Probit IP/OP and Earmarked Funds, Full Sample (standard error)	**Model 4** Bivariate Probit, Full Sample (standard error)
Expected Form of Payment							
Self-pay	0.026***	-0.153***	0.014	-0.137***	-0.040***	-0.138***	-0.172***
	(0.008)	(0.032)	(0.008)	(0.013)	(0.009)	(0.011)	(0.009)
BCBS or other health	0.014**	-0.154***	-0.011	-0.038***	0.022***	-0.009	-0.071***
insurance co-pay	(0.007)	(0.021)	(0.006)	(0.014)	(0.008)	(0.001)	(0.011)
Medicare	0.011	-0.061*	0.001	-0.121***	0.035***	-0.034*	-0.103***
	(0.016)	(0.033)	(0.013)	(0.027)	(0.012)	(0.021)	(0.013)
Medicaid	-0.028***	-0.057	-0.027***	-0.254***	0.017**	-0.106***	-0.152***
	(0.009)	(0.035)	(0.008)	(0.033)	(0.009)	(0.021)	(0.009)
Other payment or	0.007	-0.170**	-0.027	0.005	-0.009	-0.003	-0.009
worker's compensation	(0.047)	(0.070)	(0.028)	(0.018)	(0.012)	(0.015)	(0.017)
Publicly Funded Treatment							-0.494***
							(0.019)
Constant	-0.223***	-0.298***	-0.234***	-0.178***	-0.134***	-0.196***	
	(0.024)	(0.093)	(0.024)	(0.061)	(0.039)	(0.051)	
ρ			-0.082***			0.10***	0.920***
			(0.023)			(0.03)	(0.015)

***Significant at the 0.01 level. ** Significant at the 0.05 level. *Significant at the 0.10 level.

BCBS = Blue Cross/Blue Shield.

IP/OP = inpatient/outpatient.

Obs. = observation.

SUR = seemingly unrelated.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

unobserved characteristics that led to entry into a facility that received earmarked funds made it less likely that an individual would be admitted to inpatient treatment. In State B, the positive estimated value of ρ suggests that the unobserved characteristics that led to entry into a facility that received earmarked funds made it more likely that the individual would be admitted to inpatient treatment. The results from these preliminary analyses suggest that a bivariate probit analysis jointly estimating the facility and treatment location choices would be appropriate.

Bivariate Probit Results Compared with Univariate Probit Results

As mentioned earlier, we could specify the bivariate probit model only for State B because we could not satisfy the exclusion restriction in the State A equations. Table 8.2 reveals that in State B the bivariate probit estimate of ρ suggests that the unobservables in the IP/OP equation were positively associated with those in the facility choice equation, as did the SUR probit equation, although the magnitude of the effect (0.92) was much larger.

For most variables, the bivariate probit (Model 4) estimates were similar in sign and level of significance to the univariate probit model estimates run on the sample of clients admitted to facilities with earmarked funds (Model 1), which is not surprising given the relative sizes of the earmarked-funding and no earmarked-funding samples. The magnitude of some of the marginal effects, however, did differ substantially across specifications. For example, although both specifications revealed that referral status was associated with inpatient treatment, those associations estimated using the bivariate probit model were much larger, ranging from 1.33 times for the other health care provider category to 2.05 times for the school, employer, and other community category than those estimated using the SUR probit. The marginal effect of homelessness at the time of admission, again positive and significant in both equations, was only 70 percent as large in the bivariate probit equation as in the univariate probit equation. Similarly, the presence of a co-occurring mental disorder was positive in both equations, but only 70 percent as large in the bivariate probit equation as it was in the univariate probit equation.

For other variables, substantive differences existed in the level of significance of the estimated coefficient. For example, having had two or more prior treatments increased the probability of inpatient admission in the bivariate probit model, but was insignificant in the univariate probit model. Conversely, non-Hispanic blacks were significantly less likely than those in the reference cell, other race, to be admitted to inpatient treatment according to the univariate probit, but were no more or less likely in the bivariate probit model. Finally, the effects of season of admission were significant in the univariate probit equation, but insignificant in the bivariate probit equation. The bivariate probit model also revealed that individuals admitted to facilities that received earmarked funding were less likely to be admitted to inpatient treatment, holding other factors constant.

Policy Simulations

Aside from providing substantively different marginal effects estimates, potentially leading to invalid inferences, these different specifications can affect the resulting predictions about the effect of changes in client characteristics on the probability of admission to inpatient treatment in facilities in the earmarked funding sector. To illustrate, we simulated the effects on

the number of inpatient admissions to facilities that received earmarked funds of the following changes in client characteristics:

- 10 percent increase in the proportion of clients with cocaine as a secondary drug,

- 10 percent increase in the number of clients who were unemployed,

- 10 percent decrease in the number of clients who were homeless,

- 10 percent increase in the number of clients with a co-occurring mental disorder, and

- 10 percent increase in the number of clients who paid for their own care.

Table 8.3 displays the simulation results for Models 1 and 3 for State A, and Table 8.4 displays those from Models 1, 3, and 4 for State B.

Table 8.3 Simulation of the Effects of Changes in Client Characteristics on the Probability of Inpatient Admission to a Facility That Receives Earmarked Funds: State A

Change	Model 1 Univariate Probit, Earmarked Funding Sample	Model 3 SUR Probit, Full Sample
10 percent increase in secondary cocaine	No change	0.22%
10 percent increase in unemployment	2.15%	1.5%
10 percent decrease in homelessness	-1.00%	-3.23%
10 percent increase in co-occurring mental disorders	0.57%	No change
10 percent increase in the number who paid for their own care	0.29%	No change

SUR = seemingly unrelated.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

In State A, Models 1 and 3 yielded several dissimilar predictions about the magnitudes of the effects of the changes. For example, Model 1, the univariate probit model based on only the sample of clients entering programs that received earmarked funds, suggested that a 10 percent decrease in the number of homeless clients would lead to a 1 percent decrease in the number of individuals entering inpatient treatment in the sector that received earmarked funds. The SUR probit (Model 3), however, which was estimated on all clients in the sample and allowed for a correlation among the IP/OP and facility choice equations, revealed that there would be a 3.2 percent decrease in the number of clients admitted to inpatient treatment in facilities that accepted earmarked funds. Similarly, according to the univariate probit model, a 10 percent increase in the number of clients that had cocaine as a secondary substance would result in no change in the number admitted to inpatient treatment. The SUR probit suggested that there would be a small increase of 0.22 percent. Increases in the number with a co-occurring mental disorder or those who would pay for their own care would appear to increase the number of clients admitted to inpatient treatment in facilities that received earmarked funds according to the univariate probit, but not according to the SUR probit model.

There were differences in the findings among the three State B models as well, as Table 8.4 reveals. For example, while all three models revealed that an increase in unemployment

168

would increase the number of clients admitted to inpatient treatment in facilities that received earmarked funds, the increase estimated by the bivariate probit model, 2.52 percent, was substantially larger than the increase estimated by the univariate probit model and almost twice that estimated by the SUR probit model. Likewise, the effect of a 10 percent increase in the number of clients who paid for their own care was substantially larger in the bivariate probit model than in the other two models. A 10 percent increase in the number of clients with a co-occurring mental disorder, in contrast, had a much smaller estimated effect in the bivariate probit than in the other two models.

Table 8.4 Simulation of the Effects of Changes in Client Characteristics on the Probability of Inpatient Admission to a Facility That Receives Earmarked Funds: State B

Change	Model 1 Univariate Probit, Earmarked Funding Sample	Model 3 SUR Probit, Full Sample	Model 4 Bivariate Probit, Full Sample
10 percent increase in secondary cocaine	0.59%	1.09%	0.42%
10 percent increase in unemployment	1.51%	1.33%	2.52%
10 percent decrease in homelessness	-0.59%	-1.33%	-0.58%
10 percent increase in co-occurring mental disorders	0.75%	1.25%	0.31%
10 percent increase in the number who paid for their own care	-2.76%	-1.88%	-3.31%

SUR = seemingly unrelated.

Source: SAMHSA, Office of Applied Studies, Treatment Episode Data Set, 1996.

Discussion

This analysis suggests that the IP/OP choice and the choice of facility are not independent, at least in the two States studied here, and that selectivity bias is a problem that should be dealt with in analyses of admissions data. If this finding extends to other States, it suggests that estimates based on data from only those facilities that receive earmarked funds may not always lead to an accurate understanding of the substance abuse treatment problem that the State faces. Use of these data may result in a misunderstanding of the influences of various characteristics on treatment setting choice, as well inaccuracy in predictions for clients the States are trying to monitor—those in facilities that receive earmarked funding. Reliance on the univariate probit model in State B, for example, would lead one to believe that having two or more prior treatments was not associated with the probability of inpatient treatment in the sector that accepts earmarked funds, while the bivariate probit model suggested that it would increase that probability. Also in State B, the effect of unemployment on the probability of inpatient treatment was much smaller in the univariate probit model than in the bivariate probit model.

These findings provide an example of the value that States may derive from collecting data on all of the facilities that clients can attend, not just those that receive earmarked funding. Some States collect these data already. New York, for example, requires reporting of client data

to the State as a condition of licensure, whether or not the facility accepts earmarked funds.[5] Second, when conducting analyses, States may want to consider allowing for complicated relationships among the many factors that lead clients into substance abuse treatment. These steps would improve each State's understanding of their treatment systems and their ability to monitor their treatment systems effectively.

---

[5] We did not include New York in this analysis because their data do not contain "expected source of payment," which is an important control variable in the model.

References

American Society of Addiction Medicine. (1991). *ASAM patient placement criteria for the treatment of psychoactive substance use disorders*. Chevy Chase, MD: Author.

Davidson, R., & MacKinnon, J. G. (1993). *Estimation and inference in econometrics*. New York: Oxford University Press. [Corrections and updates available at http://qed.econ.queensu.ca/pub/dm-book/]

Dayhoff, D. A., Pope, G. C., & Huber, J. H. (1994). State variations in public and private alcoholism treatment at specialty substance abuse treatment facilities. *Journal of Studies on Alcohol*, *55*, 549-560.

Fortney, J., Booth, B., Zhang, M., Humphrey, J., & Wiseman, E. (1998). Controlling for selection bias in the evaluation of Alcoholics Anonymous as aftercare treatment. *Journal of Studies on Alcohol*, *59*, 690-697.

Greene, W. H. (2000). *Econometric analysis* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Hays, L. R., Farabee, D., & Patel, P. (1999). Characteristics of cocaine users in a private inpatient treatment setting. *Journal of Drug Education*, *29*, 157-164.

Humphreys, K., Phibbs, C. S., & Moos, R. H. (1996). Addressing self-selection effects in evaluations of mutual help groups and professional mental health services: An introduction to two-stage sample selection models. *Evaluation and Program Planning*, *19,* 301-308.

Institute of Medicine. (1990). Two tiers: Public and private supply. In D. R. Gerstein & H. J. Harwood (Eds.), *Treating drug problems: Volume 1. A study of the evolution, effectiveness, and financing of public and private drug treatment systems* (pp. 200-219). Washington, DC: National Academy Press. [Available at http://books.nap.edu/catalog/1551.html]

Office of Applied Studies. (1997). *Uniform Facility Data Set (UFDS): Data for 1996 and 1980-1996* (DHHS Publication No. SMA 98-3176, Drug and Alcohol Services Information System S-3). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Office of Applied Studies. (1998). *National admissions to substance abuse treatment services: The Treatment Episode Data Set (TEDS) 1992-1996* (DHHS Publication No. SMA 98-3244, Drug and Alcohol Services Information System Series S-5). Rockville, MD: Substance Abuse and Mental Health Services Administration. [Available at http://www.oas.samhsa.gov/dasis.htm#teds2]

O'Higgins, N. (1994). YTS, employment, and sample selection bias. *Oxford Economic Papers*, *46,* 605-628.

Pauly, M. V. (1991). Financing treatment for substance abuse. In W. S. Cartwright & J. M. Kaple (Eds.), *Economic costs, cost-effectiveness, financing, and community-based drug treatment* (pp. 165-174, DHHS Publication No. 91-1823, NIDA Research Monograph 113). Rockville, MD: National Institute on Drug Abuse. [Available as a PDF at http://165.112.78.61/pdf/monographs/download113.html]

Powell, L. M., Czart Ciecierski, C. U., Chaloupka, F. J., & Wechsler, H. (2002). *Binge drinking and violence among college students: Sensitivity to correlation in the unobservables* (ImpacTEEN: Research Paper Series, No. 20; Bridging the Gap Initiative: Research Informing Practice for Healthy Youth Behavior, supported by Robert Wood Johnson Foundation). Chicago, IL: University of Illinois. [Available as a PDF at http://www.impacteen.org/generalarea_PDFs/bingeviolence_powellfinal.pdf]

Stata Corporation. (2001). *Stata reference manual: Release 7, Volume 1 A-G*. College Station, TX: Stata Press.

Wheeler, J. R., Fadel, H., & D'Aunno, T. A. (1992). Ownership and performance of outpatient substance abuse treatment centers. *American Journal of Public Health, 82*, 711-718.

Wheeler, J. R., & Nahra, T. A. (2000). Private and public ownership in outpatient substance abuse treatment: Do we have a two-tiered system? *Administration and Policy in Mental Health, 27*, 197-209.

Chapter 9. Conclusions and Implications

Carol L. Council, M.S.P.H.
Jeremy W. Bray, Ph.D.

Introduction

Over the past two decades, the behavioral health care delivery system in the United States has experienced rapid change in terms of clients served, as well as organizational and financial structures. New patterns of substance use, the changing demographics of affected populations, the availability of pharmacotherapies, and the growing presence of managed care have challenged the system and its study. These changes are the result of competing demands to contain costs, maintain the quality of care, make care available to all who need treatment, and focus resources on those forms of care that offer the best hope of successful outcomes. Building upon such disciplines as epidemiology, biostatistics, and health economics, as well as the impressive body of health services research findings, the field of behavioral health research has been called on increasingly to analyze these changes and their effects.

The chapters in this compendium extend our knowledge by providing information on factors that may facilitate or inhibit the delivery of behavioral health services for those persons with substance use or mental disorders. Valuable new information is provided on accessibility, utilization, quality, cost, cost-effectiveness, and outcomes. The findings describe the relationship between demographic characteristics and how, when, where, and if a person will seek care, as well as what types of care are chosen and what happens during the delivery of care. Finally, the findings presented in this compendium also reveal potential biases that may occur when using many of the large datasets currently available for conducting research in the behavioral health sciences.

This chapter explores the implications of these findings in key areas for policymakers, the treatment community, and researchers and suggests directions for future research.

Access, Financing, and Costs of Substance Abuse Treatment and Mental Health Services

Several of the chapters in this compendium explored the issue of access to care and underscored the role of managed care in bringing financing and cost issues to the forefront as a potential barrier to client access to needed services. Dr. Woodward in his Chapter 2 literature review, identified access as a critical first step to getting clients needed treatment. Although it is generally accepted that people with substance use and mental disorders may be affected severely by access problems, individuals with more serious behavioral illnesses may encounter additional barriers to access because successful treatment may be more expensive, because redundant and bureaucratic procedures may pose insurmountable obstacles, because needed services may not be available, and because the private-payer managed care system may benefit financially from placing barriers to treatment on such people. On the positive side, reports indicate that a few State-sponsored programs have been able to increase access for high-risk populations.

In Chapter 4, Dr. Duffy and colleagues examined the factors influencing admission to treatment and reported that in most States examined, the criminal justice system was the most

common source of treatment referral for adult males, with alcohol as the primary substance of abuse. They also showed that referral by an alcohol or drug treatment provider generally increased the likelihood of inpatient admission. Clients who were employed were less likely to have an inpatient admission, and clients who were expected to pay for their own care had a lower likelihood of entering inpatient treatment. In many of the States examined, co-occurring mental disorders did not consistently increase the odds of inpatient admission as would be expected given the accepted clinical placement criteria at the time.

In Chapter 7, Dr. Duffy and colleagues estimated cost functions for substance abuse treatment programs as a function of size. Findings indicated that the average cost per admission declined as facilities became larger, which suggests that larger facilities may be able to provide care at a lower price than smaller facilities. These economies may suggest policies that encourage the use of large facilities.

Implications for Access for High-Risk Populations

The research presented suggests that the effects of benefit and financing factors on access to care may be different for behavioral health care clients than for medical care clients. Policymakers may wish to consider this when weighing the adoption of financing and delivery mechanisms used to finance care. Rather than preventing unnecessary use of resources (i.e., moral hazard), aggressive cost sharing and case management policies may deter medically necessary and potentially cost-beneficial substance abuse treatment and mental health services. In fact, such policies may force providers to avoid providing care to expensive high-risk populations, such as homeless persons or those with co-occurring disorders, by creating administrative barriers that effectively exclude those with the greatest need.

Variability in client level of need and service provision across programs affects client outcomes. Reports of effective programs providing limited treatment services should be reviewed by policymakers with care to be certain that clients served in those programs have levels of need similar to those in other programs. Although it may be tempting to provide fewer costlier services, treatment research suggests that optimal length of stay should be determined on a case-by-case basis, using all available clinical information rather than dictated by a universal policy. Although a shorter length of stay may contain short-term costs, it may not contain long-term costs; thus, clients may end up costing both society and the health care system much more in the long run. At a minimum, treatment-funding systems may be required to provide costlier services to populations on SSI or SSDI because these populations, in general, manifest more severe problems related to their substance use. As discussed in Chapter 7, facilities with a greater proportion of clients who received supplemental security income (SSI) or social security disability insurance (SSDI) had higher costs.

Implications for Service Delivery

Several of the large national evaluations discussed earlier in this volume reported shifts from inpatient to outpatient care and suggested that the quantity and intensity of services to clients are decreasing. Further, there is some suggestion that programs are being eliminated or are merging into organized networks of behavioral care that are able to provide a wider continuum of services. These shifts may be very beneficial in terms of providing access to a

larger pool of clients in need of treatment. Indeed, Dr. Duffy and colleagues in Chapter 7 reported that the average cost per admission declined as facilities became larger, suggesting that larger facilities may be able to provide care at a lower price than smaller facilities. On the other hand, pressure to reduce costs may result in substantial reductions in the quantity and quality of treatment services, especially in those systems that manage resources through a defined level of service benefit.

Although such approaches may help to extend the reach of treatment services to more individuals, in-depth study is needed to explore whether high-risk clients with more severe substance use disorder-related problems are getting the intensity of care they need. Clearly, better information about both severity and actual service parameters provided to all treatment clients is necessary to understand the impact of these changes on treatment access, retention, and outcomes. In addition, research is needed to determine whether client outcomes vary with facility size (particularly outcomes for high-risk populations). Research also needs to determine whether higher costs are unavoidable with certain populations, or whether alternative treatment technologies or administrative arrangements could reduce costs without negatively affecting outcomes.

Implications for Treatment Outcomes

At the provider level, if provider organizations grow larger and more centralized to capture economies of scale, what impact will this have on treatment access in rural areas? Further, what impact will streamlining of providers' treatment regimes have on their ability and willingness to try new approaches for treating clients and/or participate in research? Just as a host of research in the late 1980s and early 1990s examined the effect of hospital mergers and acquisitions on medical outcomes (Finklestein, et al., in press; Hoerger, 1991), behavioral health services researchers might now explore the effects of treatment program scale and scope on substance use and mental disorder outcomes, such as treatment retention, relapse rates, and social functioning.

Implications for Public- and Private-Sector Care

The impact of changes in private-sector financing strategies on the public sector needs to be better understood. When the Federal Government made the decision to shift funding of behavioral health care to the States, it was implied that States would provide services for the neediest and most fragile portions of their populations. During the past decade, private health insurance coverage for behavioral health problems declined at the same time that an increasing number of Americans had no health insurance at all. This has placed an added burden on public behavioral health care systems. Thus, a larger and more diverse array of clients may present to public treatment programs. Moreover, as Dr. Woodward discussed in Chapter 2, treatment facilities that depend on public funding may not have sufficient capacity to provide services to all individuals demanding treatment services, let alone those who have not yet sought service. More information is needed regarding the level of funding required to provide services to uninsured persons and ways of making such funding cost-effective. Clearly, in order to study this issue, we need detailed information on the types of services provided to specific types of clients in both the public and private sectors, and we need information on clients who have exhausted their private-payer benefit for substance abuse treatment and mental health services.

Community Hospitalizations of Those with Substance Use and/or Mental Disorders

Dr. Duffy in Chapter 3 discussed in detail the impact of access and financing with regard to community hospitalizations of those with behavioral health problems. As Dr. Duffy reported, managed care and behavioral health care carve-outs usually result in reductions in inpatient mental health services and inpatient substance abuse treatment. She reported that, contrary to expectations, the discharge rate for individuals with substance use and mental disorders in community hospitals increased over the period from 1990 to 1995, with increases being greater for patients with co-occurring disorders and those aged 35 to 45. Even though the patients who were admitted had more complex disorders, their lengths of stay decreased. Patients with substance use and mental disorder diagnoses were more likely to receive uncompensated care or to have Medicaid coverage than other community hospital patients.

Implications for the Public Sector

The Federal Government's role in paying for the care of substance use and mental disorder patients in community hospitals increased in the early 1990s, with Medicare and Medicaid paying for the treatment of more than half of discharges with such diagnoses. If the Federal Government is paying for a large portion of this care, it may be in a position to develop incentives to ensure that high-risk patients receive adequate treatment support when returning to the community. At a minimum, research is needed to clarify the impact of system changes in substance abuse treatment and mental health services on access to care for the most fragile populations and perhaps to explore the possible need for less expensive residential care options for those patients requiring longer periods of care.

Implications for Community Hospitals and Providers

Many inpatient treatment facilities, such as mental health hospitals and residential substance abuse treatment facilities, closed during the 1990s. The increased number of substance use and mental disorder admissions to community hospitals during the early 1990s suggests that patients with more severe disorders formerly served by other types of inpatient treatment facilities may now be presenting to community hospitals. In turn, community hospitals with resources depleted by reductions in standard lengths of stay for traditional patients may have provided lifesaving services, such as detoxification and stabilization to substance use and mental disorder patients and discharged them back to the community as soon as possible. Community hospitals may not be in a position to provide longer-term residential treatment to such patients. To enhance the likelihood that they will not be readmitted, community hospitals might consider developing strong links with providers of community-based substance abuse treatment and mental health services. This might ensure that high-risk patients transitioning back to the community are engaged in appropriate aftercare programs.

The use of community hospitals as a substitute for State-supported detoxification services and patient stabilization may be financially beneficial if realistic procedures are in place for shifting the management of care at discharge to community-based providers. At a minimum, to determine the level of case management support that such patients need when they return to the community, providers need information on the level of functioning of discharged community hospital patients, as well as the specific services the patients received while in the community

hospital. In addition, it would be beneficial to understand whether the patients served were those who were unable to access needed care earlier in a community setting.

Treatment Retention

In Chapter 6, Dr. Ashley and colleagues examined the role of women-only treatment programs in retaining women in substance abuse treatment. They found that substance abuse treatment for women at facilities offering child care services and treatment at women-only facilities were associated with longer stays. However, lower educational levels among female clients were associated with shorter stays.

Implications for Treatment of Specific Populations

Based on these findings, policymakers may want to develop financing systems to encourage the development of gender-appropriate treatment programs. Tailoring treatment programs to meet special needs of certain population groups not only makes treatment more attractive to those who need it, but it also helps to address many of the logistical and pragmatic barriers to treatment faced by special populations.

It is understandable that behavioral health sciences research has focused largely on the neediest and most fragile portions of the substance use and mental disorder population. Given the prevalence of substance use and mental disorders across all population groups, it may be appropriate to focus on the impact of shifts in financing and access on access for other population groups as well. In Chapters 4 and 7, Dr. Duffy and colleagues reported that employed persons are less apt to receive inpatient treatment. Furthermore, lengths of stay in treatment are shorter for employed women (Chapter 6), suggesting that other segments of the population may be affected by managed care practices. Although it may be hypothesized that employed persons in treatment may have less severe disorders, more information about these groups is needed, including what factors influence treatment-seeking behaviors, their level of functioning, and their support environment. More information is needed about the stigma of having a behavioral health disorder and the extent to which it prevents people from seeking needed treatment or from completing their treatment plan.

Treatment Choice

In Chapter 4, Dr. Duffy and colleagues used the 1996 Treatment Episode Data Set (TEDS) to explore factors related to treatment admission for adult males, with alcohol as the primary substance of abuse. They found that greater substance use disorder severity increased the likelihood of inpatient admission, but in many of the States examined, co-occurring mental disorders did not consistently increase the odds of an admission. Also notable was the fact that referral by an alcohol or drug treatment provider generally increased the odds of inpatient admission. This may reflect changes to the treatment system in which treatment providers serve as gatekeepers to higher levels of care.

Further, Dr. Duffy and colleagues in Chapter 5 examined treatment choice in two States from among five types of treatment (standard outpatient, intensive outpatient, long-term residential, short-term residential, and inpatient hospital) instead of the standard two (inpatient and outpatient). They reported that those admitted to standard outpatient treatment appeared to

have less severe alcohol disorders and were more likely to be employed than those admitted to any other treatment setting. Furthermore, they reported that analyses that allowed for only two choices, inpatient and outpatient, obscured the relationships between client characteristics and treatment-setting choice.

Implications for States

In general, it appears that the States are following best practice recommendations with regard to client placement. In many of the States examined, however, co-occurring mental disorders did not consistently increase the odds of inpatient admission as might have been expected given current clinical guidelines regarding placement criteria. This may not be a function of States' not adhering to best practices, but rather may be the result of client choice.

We do not understand fully the differences between States' substance use and mental disorder treatment programs, nor how those differences might affect the organization of treatment at the State level (i.e., where the responsibility for substance abuse treatment and mental health services falls in State government), and the effect that the differences have on access to care for the sickest clients as well as on treatment choice. Many State substance abuse treatment programs are part of State mental health departments, others are part of State health departments, and still others are individual, stand-alone State agencies. In addition, some States have developed mechanisms for sharing data on client populations served by several State agencies. Closer examination of the effect that administrative and organizational factors may have on access to care may reveal those factors that may contribute to better access for high-risk populations. Similarly, differences exist in the extent to which State funding resources are utilized to support substance abuse treatment and mental health services. In order to understand access to care, more information is needed about State and local funding levels for substance abuse treatment and mental health services and their impact on access and treatment.

Implications for Characterization of Treatment Options

To understand treatment choices, researchers need to expand their concept of treatment modality beyond outpatient and inpatient in order to recognize better the full range of treatment modalities now available. More client-level service data that include the full range of treatment options utilized are needed by policymakers so they may account for more complex treatment choices when developing cost-sharing and financing policies.

Data Issues in Behavioral Health Care Research

As reported throughout this compendium, much of the research reported upon in the literature relies on analyses of small, selected, nonrepresentative samples, often with very low response rates and many missing observations. At best, this leads to difficulty in comparing studies and synthesizing findings reported in the literature. At worst, it can lead to the generation of misleading, even false, information. Large-scale data collection efforts, including those at the Federal and State levels (some of which have been used in the chapters of this compendium), have made strides in improving the data available to researchers. However, these data pose challenges as well.

Most State-level substance abuse treatment authorities provide treatment episode data to the Federal Government. However, variations exist at the State level with regard to which facilities must report treatment episode data. In Chapter 8, Dr. Duffy looked at selection biases in data reporting systems between States that require the reporting of substance abuse treatment and mental health services for all clients and those that require the reporting of such data only from facilities receiving public funding earmarked for substance abuse treatment. She found variations across States between clients who entered facilities that accepted earmarked funds and those who entered facilities that did not accept earmarked funds. Clients admitted to facilities receiving earmarked funds generally were younger, less likely to be employed, less likely to be married, less likely to have postsecondary education, and less likely to have private insurance pay for their treatment than those entering other facilities.

Dr. Duffy concluded that analyses of data collected by States only from facilities that receive public funds earmarked for substance abuse treatment may be biased and cautioned that selection effects may bias estimates of the impact that client demographics have on the probability of inpatient admission to publicly funded treatment facilities.

The lack of client-level data on the level of need and care provided during an episode of treatment was mentioned by several authors. The costs per unit of service and per episode of care are frequently unavailable. The absence of this information hampers cost-benefit analysis, as well as outcomes research.

Implications for Federal and State Data Systems

Because not all treatment facilities report data, policymakers may have an incomplete understanding of the potential effects of policy changes. States may want to consider the required reporting of client data by all facilities, regardless of their funding status. If this is not politically feasible, the Federal Government may choose to use synthetic estimation to adjust for State reporting differences in federally maintained databases.

Because performance-based programming is a priority at both the national and State levels, many States will need more detailed cost and service information. The use of uniform client assessment procedures, as well as the development of management information systems that will provide client-level treatment episode data, will enhance performance monitoring.

Conclusions

Recent changes in the organizational and financial structures of the behavioral health care delivery system in the United States have had a large effect on the structure of the behavioral health treatment system and on behavioral health service delivery. These changes have not been adequately studied. This compendium has presented new research that helps to fill this gap. It gives policymakers and service providers at the Federal, State, and local levels a better understanding of how these changes are affecting access to needed care, the quality and effectiveness of care, the utilization of services, cost of treatment services, and the outcomes of treatment for people with acute and chronic substance use and mental disorders.

Several overarching conclusions emerge from the findings presented. Much can be learned by studying the findings of general health services research. Both the behavioral health

and the general health systems have been greatly influenced by managed care, and not all the influences have been negative. Managed care entities often use the results of research to guide clinical treatment. In the behavioral health area, research indicating that inpatient care did not provide better outcomes for most clients than outpatient care was used to modify clinical guidelines and resulted in the shift to decreased use of inpatient care.

On the other hand, important differences exist between the behavioral health care system and the general health system. The behavioral health care system has in large part not suffered from overutilization of services. In fact, State systems have been criticized because they have not been able to close the treatment gap by engaging more of the population in need. This compendium underscores the need for better information on the impact that changes in the behavioral health care system have had on access to both fragile high-risk populations and persons needing services in the general population.

Fragile populations (such as individuals who are homeless and displaced youths) may need more intense and longer-term support. As reported for the RAND Insurance Experiment (Newhouse & Insurance Experiment Group, 1994), one such fragile population is affected negatively by managed care approaches to treatment. Populations with substance use and mental disorders frequently experience economic, social, and health problems that may detract from their ability to access and remain in treatment. Providing treatment services to fragile populations presents a difficult challenge to behavioral health care treatment providers because they often require more intensive, lengthy treatment.

As in the health services field in general, nationally based, representative datasets are available for additional study. The existence of large national datasets provide policymakers and researchers with an important base from which to study both the populations manifesting substance use disorders and the systems providing services to these populations. Data collection and management systems, including Web-based systems, have been developed that enable the collection of much richer data on a much broader population of clients and providers. Another key implication of this compendium is that to support effective policy, more information is needed on service need, types of services available, the cost of an entire episode of treatment, and State and local differences in treatment policies. In this age of Web-based reporting, increased opportunities exist to provide this information. In addition, improved data analysis techniques permit the synthesis of information from varied sources.

As an additional step to improving the quality of data collected, clear definitions are needed for assessing clients, and for defining the types of services they receive. Two remaining problems affect the analyses of available data. First, the datasets themselves have biases that should be fully understood before drawing conclusions from them. Second, the information in these systems could be substantially improved. In the past, the field has had to depend on small well-funded studies of service providers that may or may not have represented typical service provision. Although many of these studies yielded compelling data on outcomes, these findings were very difficult to use as the basis for policy because they were narrow and potentially nonrepresentative. Improvements in the quality and quantity of service and client information have been made, but more is needed. In particular, guidance is needed on potential approaches to developing more detailed service and cost information.

Managed care for substance abuse treatment and mental health services has shifted treatment from inpatient to outpatient settings and has shifted the financial risk to providers, thus constraining provider treatment options. Although the shift from inpatient to outpatient settings may be appropriate for many clients, the most severely troubled clients may be in danger of being routed to less effective and less cost-effective care. In addition, the shifting of risk to providers may deter the use of more expensive and intensive therapies that are more cost-effective from a societal standpoint but pose a greater financial risk to providers. Similarly, providers may be unwilling to adopt best practices because of the financial costs of so doing. In a truly capitated treatment system with a stable population of plan enrollees, long-term outcomes have greater value. In managed care plans, such as Medicaid, where clients are constantly switching health care insurance plans, the plans have more incentive to manage short-term costs because long-term costs may be borne by another managed care entity. Research is needed to explore the sharing of risk between the public and private sectors. Health economics research is needed to develop a system that enables the sharing of financial risk among all payers while providing financial support for the adoption of best practices.

This compendium provides additional examples of how health services research in the behavioral health care sector can inform policy and have clear implications for researchers, policymakers, providers, and clients. Although more work is needed in critical areas, such as the role of client characteristics in the treatment system, determining the most cost-effective care modalities, and identifying the minimal set of data reporting programs and characteristics necessary, this compendium clearly shows that health services research can and does play a critical role in the formation of effective policy. It is hoped that the research presented here will help to inspire both new and more effective policies and also new research that will continue to improve the lives of individuals with substance use or mental disorders.

References

Finkelstein, E. A., Bray, J. W., Larson, M. J., Miller, K., Tompkins, C., Keme, A., & Manderscheid, R. (in press). Prevalence of and payments for mental health and substance abuse conditions in public and private sector health plans. In R. W. Manderscheid & M. J. Henderson (Eds.), *Mental health, United States, 2002*. Rockville, MD: U.S. Department of Health and Human Services, Center for Mental Health Services.

Hoerger, T. J. (1991). "Profit" variability in for-profit and not-for-profit hospitals. *Journal of Health Economics, 10*, 259-289.

Newhouse, J. P., & Insurance Experiment Group. (1994). *Free for all? Lessons from the RAND Health Insurance Experiment*. Cambridge, MA: Harvard University Press.

About the Authors

Olivia Silber Ashley, Dr.P.H., a public health researcher at RTI International (a trade name of Research Triangle Institute), has 15 years of professional experience in prevention and etiology research, program management, and direct services related to a variety of issues, including substance abuse, parenting, and family influences on behavior. She is currently editing a monograph on women in substance abuse treatment for the Office of Applied Studies (OAS), Substance Abuse and Mental Health Services Administration (SAMHSA), and she has published peer-reviewed research on this topic. Prior to joining RTI, she worked as a program manager for the North Carolina Division of Maternal and Child Health, as a child protective services social worker, and as a substance abuse counselor.

Thomas M. Brady, Ph.D., is with SAMHSA's OAS. Dr. Brady's research interests include women's health, co-occurring mental disorders, and substance abuse treatment utilization. He completed his doctoral training at the University of Illinois, School of Public Health, in Chicago where his research was supported by the National Institute of Mental Health and the University of Illinois, Department of Psychiatry. He also has received degrees from Emory University in Atlanta, Georgia, and the University of Wisconsin at Madison. He is a native of Philadelphia, Pennsylvania.

Jeremy Bray, Ph.D., is a health economist at RTI. His research focuses on two primary areas of interest: the economics of substance use and mental disorders, and the cost-effectiveness of substance abuse treatment and prevention. In his work on the economics of substance use and mental disorders, he has examined the labor market effects of substance use, abuse, and dependence. Currently, his research focuses on the impact of alcohol use and abuse on educational attainment. In his research on the cost-effectiveness of substance abuse treatment and prevention, he has estimated the costs and effectiveness of enhanced employee assistance program (EAP) services designed to increase employee utilization of the EAP. In addition, he serves as the cross-site economic analysis task leader on the Center for Substance Abuse Prevention's Workplace Managed Care initiative and on the Robert Wood Johnson's Cutting Back™ project to determine the cost-effectiveness of screening and brief intervention for risky drinking. At RTI, he directs SAMHSA's "Medicare, Medicaid, and Managed Care Analysis" project that is examining the prevalence and costs of publicly funded mental health services and substance abuse treatment, and he leads the analysis of SAMHSA's "Integrated Database" project through a subcontract with The MEDSTAT Group. His research findings have been published in peer-reviewed journals, including the *Journal of Health Economics*, *Labour Economics*, *Public Health Reports*, *Health Economics*, and *Employee Assistance Quarterly*.

Carol L. Council, M.S.P.H., is a senior research associate at RTI. Prior to assuming her position at RTI, she was director of research and planning for substance abuse treatment to the State of North Carolina. Earlier, she worked as a research associate in the Department of Epidemiology at the University of North Carolina's School of Public Health as well as their Highway Safety Research Center. She has 30 years' experience in designing and conducting research and evaluation on a variety of subjects, including community mental disorder studies, community hypertension and diabetes studies, evaluations of the effectiveness of family nurse

practitioners, highway safety studies with particular emphasis on drinking and driving research, and the development of performance outcomes measures for publicly funded substance abuse treatment programs. Ms. Council was codirector of North Carolina's Practice and Research Consortium, which focuses on enhancing the collaboration between policymakers, researchers, and practitioners. She served as Secretary of the International Council on Alcohol Drugs and Traffic Safety. She has directed grants and contracts funded by a variety of sources, including the National Highway Traffic Safety Administration, the Center for Substance Abuse Treatment, and the Center for Substance Abuse Prevention.

Laura J. Dunlap, M.A., a research economist at RTI, has participated in several studies involving the estimation of the costs of drug treatment programs. She has evaluated the effect of the treatment process on the costs of providing treatment services and the effect of treatment services on economic outcomes. Recently, she has been involved in estimating the costs and cost-effectiveness of human immunodeficiency virus (HIV) health interventions aimed at low-income, drug-using women. Her primary research interests include studying factors that affect the demand for substance abuse treatment and influence treatment-seeking decisions, examining program and client characteristics that affect the costs and cost-effectiveness of treatment programs, and health service delivery for special populations.

Sarah Q. Duffy, Ph.D., is with the SAMHSA's OAS, where she conducts economic and health services research. Prior to SAMHSA, she held research positions at the Maryland Health Services Cost Review Commission and the Agency for Health Research and Quality, and she taught health economics at Eastern Michigan University. She has a Ph.D. in economics from the University of North Carolina, Chapel Hill, and a B.A. in economics from Smith College. She has published in economics and health services research.

Moshe Feder, D.Sc., is a senior research statistician at RTI. His interests include survey sampling, time series analysis of cross-sectional survey data, longitudinal analysis of panel survey data, and other data analyses. He holds a doctorate in mathematics from the Israel Institute of Technology and a master's degree in statistics from Carleton University, Ottawa, Canada. Prior to coming to RTI in 2000, he worked on statistics research projects and taught statistics and statistical computing at the University of Southampton, United Kingdom, and at Statistics Canada.

Lev S. Sverdlov, M.D., Ph.D., Doct. of Med. Sci., is a senior health researcher for Synectics for Management Decisions, Inc. In this capacity, he is involved in substance abuse research for the National Analytical Center sponsored by SAMHSA's OAS. Prior to joining Synectics in 2001, he held a number of academic and research positions and also worked as an independent contractor with government agencies, including SAMHSA, the National Institute on Drug Abuse, and Travis Air Force Base in California. He has conducted and managed a number of research projects and managed clinical and training programs. He has developed a curriculum for training special education teachers in child and adolescent mental health; participated in the development of a curriculum for training primary care providers in substance abuse treatment and prevention sponsored by SAMHSA; and designed, developed, and implemented research-based cost-effective prevention/disease management programs for a military managed care organization. Prior to coming to the United States in 1991 as a distinguished visiting professor at

Florida International University, he was a director of the Department of Outpatient Psychiatry and Prevention of Mental Disorders of the Bekhterev Research Psychoneurological Institute, St. Petersburg, Russia. He authored over 100 books, chapters, and articles on a broad spectrum of issues related to substance use and mental disorders, including clinical and outcomes research, clinical psychopharmacotherapy, clinical psychology, anthropology, epidemiology, health economics, and research methodology.

Albert Woodward, Ph.D., is with SAMHSA's OAS, where he works on health economic and financing analysis. He served on the President's Task Force on Health Care Reform. Prior to his Federal service, he worked for several organizations in the health care area, including the Appalachian Regional Commission, Blue Cross-Blue Shield, Coopers & Lybrand, and Arthur Young. He has a Ph.D. in economics (with distinction in mathematical economics) from American University, an M.B.A. from the Wharton School, and a B.A. from Haverford College. He has published on access to health care, health insurance, and the economics and financing of substance use and mental disorders.

Gary A. Zarkin, Ph.D., is director of RTI's Center for Interdisciplinary Substance Abuse Research and the Behavioral Health Economics Program. He has led or participated in several projects involving the economic analysis of drug treatment, prevention, and studies of workplace substance abuse. He has published several papers on cost, cost-effectiveness, and the benefit-cost of substance abuse interventions. He recently led the development of a new method to estimate the cost of services for methadone treatment. He was previously an assistant professor of economics at Duke University and a research associate professor in Duke University's Institute of Statistics and Decision Sciences. He has published extensively in economic, substance abuse, and health service journals, including the *American Journal of Public Health*, *Evaluation and Program Planning*, *Health Services Research*, *Inquiry*, *Journal of Health Economics*, *Journal of Labor Economics*, and *Journal of Substance Abuse Treatment*.