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## The Role of Treatment Data in Studying the Epidemiology of Substance Use and Abuse

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### 1. INTRODUCTION

The most complete and informative data on substance abuse can be available from the population that has the most involvement with substance abuse. This population can be found most efficiently in the substance abusers treated. The data from treated substance abusers offers detailed information on the dysfunctional patterns of substance abuse and on the types of drugs creating the most problems. The major challenge in using information from treated populations is its application to the more global estimation of the nature of the substance abuse problem and trends in the patterns of substance abuse. This chapter has four sections. The first

provides a framework of how data from treated substance abusers can fit into an overall epidemiological framework. The second section will review the epidemiology of substance use within treatment populations followed by a discussion on how data from treated populations has been used in epidemiological estimation. Finally, recommendations are made as to how information on treated populations can be made more useful for general epidemiological perspectives.

## 2. A CONCEPTUAL FRAMEWORK

Information on individuals treated for substance abuse can provide the most detailed and comprehensive data on substance abuse patterns. The patterns of multiple substance use can be studied in combination with overall level of impairment. The critical question is how this information can be used in a general epidemiological model.

As described in other chapters the total epidemiology of substance abuse must encompass multiple but temporally separate domains of the population: households, institutions and those without a permanent residence. At any one time the treated population is more likely to be in the latter two domains. For example the 2002 national data on treatment admissions shows that 22.9 percent of the treated population were living in a supervised setting and 12.6 percent are identified as homeless (TEDS, 2002). Despite this fact, in a given year, a high proportion of the substance abusing population does reside in a household at some time, but most have been in institutions at some time in their lives.

The first study that attempted to delineate the overlap and independence of the multiple populations was the Washington D.C. Metropolitan Area Drug Study (Research Triangle Institute, 1994). The study populations for this research included arrestees, homeless, pregnant, school, and household populations in addition to a sample from treatment programs. Almost nine of every ten clients in methadone, residential, or inpatient treatment had been in an institution at some time in their lives and over half had been in institutions in the past year. About half of residential clients, a fifth of methadone clients, and a tenth of inpatient clients had been incarcerated in the past year. About one in ten clients reported being without a permanent residence in the past year. About 90 percent of women entering treatment had been pregnant and about 10 percent were pregnant in the past year. About 50 percent of methadone clients had dropped out of high school and a third of inpatient clients had dropped out of high school. Compared to the general household population the clinic populations in methadone tended to be more male (63 versus 48 percent), more African American (75 versus 27 percent), single (50 versus 33 percent), less likely to complete high school (42 versus 13 percent) and not to be employed full time (70 percent versus 35 percent). The inpatient population profile is somewhat closer to the household population in

age, employment and marital status, but more similar to the methadone population in gender and education level.

The results of this comparison suggest the need for careful consideration of the use of “treatment” samples in the inference of general epidemiological estimates or trends. Clearly there are major differences among the types of drug users entering different types of treatment programs and clear differences with the household and school populations used to develop estimates and trends. The following discussions will attempt to keep these important differences in mind and suggest how to take the complexity of the treatment population into account in a general epidemiological model.

### 3. TREATMENT POPULATIONS

Three main types of data show how treatment populations can be used to provide epidemiological data. The first is the rich database established in three major national research studies of treatment from the late sixties to the early nineties. The second is the national data base initially developed as the Client Oriented Data Acquisition Process (CODAP) which has been resurrected as the Treatment Episode Data Set (TEDS) in 1992. The final source is the set of monitoring systems being developed by States which were stimulated by the Center for Substance Abuse Treatment (CSAT) TOPPS grants in the mid 1990s.

The three research studies are the Drug Abuse Reporting Program (DARP) collecting over 44,000 admission records from 52 federally supported community agencies from 1969–1973, the Treatment Outcome Prospective Study (TOPS) conducted between 1979 and 1981 with 11,750 clients in 41 community treatment programs, and the Drug Abuse Treatment Outcome Study (DATOS) from 1991–1993 with 10,010 clients in 96 programs. The research attempted to maintain the comparability of questions and to the extent possible the same communities and programs. Comparisons among these data bases were examined by Craddock and colleagues (1997). The most striking result was the change in drug use pattern across all treatment modalities. In the late sixties, 28 percent of clients reported using heroin with few if any other drugs. In the late 1970s, use of multiple drugs with alcohol was the modal pattern, with only one in 50 clients reporting using heroin only. It is also important to note that less than one percent of clients in the late sixties or seventies reported using cocaine only and only about one fourth of clients reported cocaine use at least once a week. This pattern changed drastically by the early 1990s with the prominence of cocaine. Reports of weekly or more frequent use doubled from the late seventies while reports of heroin and multiple use patterns decreased. In the 1990s, clients tended to be older, better educated, less employed, and more dependent on public assistance. With the emergence of problems of infectious diseases, especially AIDS, the population appears to have

presented with more complexities requiring comprehensive treatment. To enable further investigation of many of these issues, the data from TOPS and DATOS has been made available on public use files.

From 1976 to 1981, the CODAP provided basic information on client demographics, prior treatment, drug use, and employment for all clients in programs receiving federal funding. The data for approximately 250,000 clients provided both state level data as well as trend data. One major use of the CODAP data was the comparison with data bases such as TOPS to determine the potential generalizability of research studies to the national population of clients. The comparison of TOPS and CODAP data revealed consistent patterns of demographic characteristics both across modalities as well as over time. The major discrepancies occurred in the identification of primary drugs of abuse and more complex patterns of use. CODAP was limited to the report of primary, secondary and tertiary drugs of abuse, while the description of complex patterns of multiple drug use in TOPS often involved a minimum of heroin, cocaine, marijuana and alcohol. A second issue involved the clinical assignment of a primary drug by a counselor in CODAP compared to the self-report of a problem by clients in TOPS. The rates of reported primary drug problem usually differed by less than 5 percent (81 percent heroin in methadone programs in CODAP compared to 77 percent in TOPS). A third issue was the self-report of having no problems with drugs by about one of every seven clients, particularly those referred from the criminal justice system. The value of the CODAP data was the opportunity to look at state differences and examine basic trends over time. Unfortunately, the system became voluntary in the early 1980s and the data became much less useful.

In the late 1980s the utility of complete and comprehensive data on treatment admissions received renewed support. The Treatment Episode Data Set (TEDS) was designed to again track admissions for all clients receiving federal funding. A data base was established in the Substance Abuse and Mental Health Data Archive (SAMHDA) at the University of Michigan <http://www.icpsr.umich.edu/SAMHDA>. Over 80 studies had used the data base through 2003 (The DASIS Report, May 30, 2003).

One report (The Treatment Episode Data Set April 1, 2002) examined trends on five issues; primary drug of abuse, co-abuse of alcohol and drugs, admission rates by state, demographic characteristics, and socioeconomic status. The results showed a decrease from 1992 to 2000 in reports of alcohol as the primary problem (59 percent in 1992 to 45 percent in 2000). Reports of primary opioid use increased from 12 percent in 1992 to 17 percent in 2000. This increase was accompanied by a corresponding decrease from 18 percent to 14 percent in reports of cocaine as the primary drug. Reports of marijuana as the primary drug increased by a factor of 2.5 from 6 percent in 1992 to 15 percent in 2000. While the report recognized the co-abuse of alcohol and other drugs by almost half the admissions (42 percent), the TEDS assessment of drug use is still limited to primary, secondary, and tertiary drugs used.

An extensive analysis of reports of primary drug use was also made available by state. Although states varied in the levels of reports of different primary drugs at admission, a number of interesting and consistent trends were noted across states. Declines in reports of alcohol as the primary drug of abuse were replicated across a number of states. Eighteen states reported increases of over 100 percent for admissions for heroin use. The decline in cocaine reports was also consistent across states. The reports of use of methamphetamine increased from 1992 to 2000 and showed a pattern of moving from west to east. While the data are interesting, a number of key questions are raised that might usefully be addressed. A multivariate trend analysis might indicate possible population or ecological characteristics that influence trends or levels of use. The extensive descriptive data reported begs for a more systematic, theory based analysis. The results of such analyses may enable epidemiologists and treatment administrators to better predict future trends and prepare to address new patterns of abuse or related problems.

Trends in demographic characteristics may provide a framework for more systematic analysis. The demographic trends showed stability in the proportion of males and in the racial/ethnic composition of the treatment population. A decline in the proportion of young adults aged 25–34 from 40 percent in 1992 to 27 percent in 2000 may suggest some hypotheses for the changes in reports of drugs used. The hypothesis would be that usage patterns differ by age group, therefore accounting for the trends. Other socioeconomic characteristics (employment and education) were interpreted as showing a much more disadvantaged population entering treatment compared to national averages. These levels of socioeconomic status did not change over time and state variations were not addressed.

Another report (The DASIS Report April 9, 2004) looked at the number of admissions with psychiatric disorders accompanying substance abuse. The data base was over 600,000 annual admissions in twenty states from 1995–2001. Reports of co-occurring disorders increased from 12 percent to 16 percent over the six years. The reports of co-occurring disorders were associated with alcohol as the primary drug (45 percent compared to 38 percent) and gender (44 percent for females compared to 30 percent for males). The reports of co-occurring disorders were also positively related to the residential/rehabilitative service setting and self-referral to treatment. Again the descriptive analysis raises more questions that need to be addressed by more detailed analyses over time and within and across states.

The brief overview of two major types of data bases, both in the public domain demonstrate that treatment data by itself offers interesting and important contributions to epidemiological investigation. There are clear differences across and within states and a number of important trends have been identified. The major gap is a comprehensive, theoretically based investigation of the epidemiology of treatment admissions, particularly in terms of patterns of drug abuse and key co-occurring disorders. In addition to providing scientific contributions to the field of epidemiology, the findings can also help to guide policy and practice to meet a constantly changing client population with many serious problems. To support

these analyses the data from state monitoring systems can be better incorporated into the design and analysis of epidemiological investigations. While most are based on the core TEDS items, many states have expanded their data base to include the Addiction Severity Index and other data elements.

#### **4. INTEGRATION WITH OTHER DATA SOURCES**

Treatment data have proven valuable in use with other data sources. Three main areas of exploration have utilized treatment data. The first is the use of treatment data as one of multiple sources of data used to assess drug use patterns across populations, geographic areas and over time. The second is the systematic inclusion of information about treatment in samples from more general populations to make prevalence estimates for the population. The third approach is to use treatment data in statistical models to predict usage patterns, trends and prevalence.

In 1974, a pioneering effort was launched to try to better understand the epidemiology of substance abuse with a unique perspective. Data was to be collected from multiple sources and reviewed periodically by experts from different disciplines knowledgeable about drug use in different communities (NIDA, 1998). This network became known as the Community Epidemiology Work Group. The group considered treatment information in combination with survey data, law enforcement data, hospital sources such as emergency room admissions, public health information including infectious diseases such as HIV/AIDS and hepatitis, school system data, vital statistics including alcohol and drug related deaths, and other community data sources. The utility of the other data sources is discussed elsewhere in this book. The unique role and the potential problems of using treatment data in this context are important to understand.

While providing very useful information on drug use patterns historically and ecologically, the relationship of treatment data to the other sources is not well understood. It is also likely that the relationship will differ across communities and over time. As Kozel and Sloboda point out (NIDA, 1998), treatment admissions do not represent the total population of users. Second, the pattern of use presented at the time of admission to treatment has likely taken significant time to develop and worsen. Thus, inferences for new users may be limited. Ecologically, the treatment system functions in a health care and criminal justice environment that is likely to change over time and differ across communities. Thus, the clients entering the treatment system may change depending on the priorities and practices of the larger community context. This final issue is an important focus for an emerging area of organizational research on treatment systems. The relationship of organizational change and the epidemiology of treatment admissions is still poorly understood.

Once the limitations of the data are understood, a more vexing problem is presented. In many cases the various data sources do not provide the same picture

either in terms of trends, population estimates, or ecological comparisons. The annual CEWG reports (National Institute on Drug Abuse, 1996; 1997) often provide and cite these differences. The challenge then is making sense of the multiple pictures and understanding how and why the data sources may reveal accurate, but fragmented pictures of the overall drug abuse problem. The unique contribution of the CEWG is the reasonable attempt to create a mosaic from the fragments to better inform science, policy, and practice.

The second major advance in the field is the attempt to capture cross population data in different types of studies. The first to attempt this was the previously mentioned District of Columbia Metropolitan Area Drug Study (DCMADS). Subsequent to that study which asked similar questions about treatment participation across various population samples, the approach was adopted for the National Survey on Drug Use and Health (NSDUH) formerly known up to 2001 as the National Household Survey on Drug Abuse (NHSDA). In all surveys, questions are asked on dependence and abuse. In addition, questions are asked on the need for treatment for alcohol and illicit drug problems as well as serious mental illness. For the first time it is now possible to obtain estimates of treatment need using a population-based model not only at the national, but also at the state level. The 2002 results (Office of Applied Studies, 2004) showed that in the past year approximately 8 percent of the population 12 and older had alcohol dependence or abuse and 3 percent had dependence or abuse of illicit drugs. The rates for alcohol abuse or dependence across states varied from 6 percent to 10 percent. The rates for drug abuse or dependence ranged from 2 percent to 4 percent. These percentages translate into almost 15 million persons abusing or dependent on alcohol, 4 million abusing or dependent on drugs only, and another 3 million abusing or dependent on both.

Unfortunately, even with the large scale of the study and the large numbers of persons estimated to have problems, the number of persons in the sample who report receiving treatment is too small to provide stable statistical estimates. The calculations that are based on acceptable data indicate that 7.3 percent of the household population over age 12 needed but did not receive treatment for alcohol problems and 2.7 percent of the household population needed but did not receive treatment for drug problems; estimates and numbers not much different than the rates of abuse and dependence. Using population data and a number of key covariates to support statistical modeling, it was possible to project the unmet treatment need for all states and the District of Columbia.

Similar approaches to statistical modeling have been used to estimate the numbers of different types of comparatively rare types of users, such as heroin addicts. Brodsky (1985) delineated these methods as mathematical models and dynamic simulation. The initial mathematical model is based on a technique known as capture-recapture. In this the application of this technique first by Greenwood (1971) and then by Woodward, Bonett and Brecht (1985), the admission and readmission to treatment is a key element. In their application, Woodward et al.,

used the previously mentioned CODAP data. While the level of statistical error was substantial, the authors did feel that acceptable inferences of trends could be made given sufficiently large samples.

A more general model attempting to estimate the number of users was the Persistent Poppy developed by Levin, Roberts and Hirsch (1975). Using a complex series of equations it is theoretically possible to develop estimates to simulate usage patterns as well as the need for treatment. Gardiner and Shreckengost (1985) applied similar technology to estimating the amount of heroin imports. Unfortunately, the robustness of the available data has not supported stable estimates from these models. Both models depend largely on the relationship of use to admission to treatment; a relationship we have not been able to understand or model to the level required for complex estimation techniques.

## 5. CONCLUSION

In this chapter a number of uses of treatment data to support epidemiological research, analysis, and interpretation were reviewed. It is clear that treatment data alone or integrated with other sources of information can provide important insights into the epidemiology of drug abuse. The major contributions appear to be in estimating trends and comparing these across geographic or demographic groups. The utility of treatment data to accurately estimate prevalence is limited by the proportionately few persons who enter treatment.

Despite these limitations, much more can and should be done to better utilize the rich information from treatment data bases. The first is to reach consensus on key questions on usage patterns, institutional contact (e.g. jails, social service, health care, etc), and treatment program admission that will enable cross study comparison and the potential aggregation of data. The second approach requires a systematic investigation of the influences on treatment admissions, particularly the substance abuse patterns and the ecology of treatment services. With the accumulation of data over the past decades such investigation should be feasible. Finally, we need strong theoretical models and heuristic hypotheses to guide future analyses and interpretations involving treatment data. The increased use of treatment data in a sound framework should advance not only our scientific knowledge about drug use epidemiology, but also help guide policy and practice to better address the needs of the millions suffering from drug abuse and dependence.

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