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Episode Profiles for Substance Abusers:

What Do Episodes Look Like?

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Brief Title: Episode Profiles for Substance Abusers

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Abstract

Objective: To characterize health care treatment episodes by the treatment event that initiates them, with particular focus on alcohol, drug or mental health treatment episodes.

Data Source: The study population came from a large health insurance claims database of 36 self-insured employers, for all treatment events starting January 1, 1989, and ending December 31, 1991. This provides over 150,000 episodes, for over 34,000 individuals who had either an alcohol or a drug abuse diagnosis.

Study Design: We categorize episodes by inpatient or outpatient location and by broad treatment type (alcohol, drug, psychiatric, surgery, or medical – a category for all other types of care). We provide summary analyses and descriptive profiles of the 10 episode types. As an example of potential analyses, we then compare drug and alcohol treatment episodes for older (18+) and younger (17-) dependents of the primary insured.

Principal Findings: For inpatient care, upwards of 90 percent of the utilization and costs occur in the same diagnostic category as the initiating event. Outpatient episodes are somewhat more heterogeneous. Nonetheless, in episodes initiated by outpatient drug abuse treatment, for example, over 85% of the costs occur in the three alcohol, drug or mental health categories. Younger dependents of the primary insured generally incur higher costs and utilization of substance abuse treatment.

Conclusions: Treatment episodes (and particularly inpatient episodes) exhibit predictable patterns, based on treatment location and on the initial diagnosis. Episode descriptions and profiles may provide important insights for predicting health care utilization and costs, and for estimating the probability and magnitude of outpatient care following hospitalization.

Key words: Treatment episodes; substance abuse; drug abuse treatment; alcoholism treatment.

Introduction

Health care analysts have sought to operationalize the concept of health care episodes to better understand cost and utilization patterns. “Illness episodes” follow the individual from the beginning to the end of the illness. Although they are theoretically appealing, they present research problems since individuals seldom seek treatment the moment the symptoms begin, nor do they stop treatment the moment the illness ends. Further, many episodes of illness are not accompanied by contact with a health care provider. This is particularly true in the case of acute, self-limited conditions, such as the common cold. Individuals with such conditions often do not seek treatment from the formal health care delivery system.

“Treatment episodes,” in contrast, are defined by contact with health care providers, most typically in either inpatient or outpatient settings. They are usually characterized by days of inpatient care in one or more hospital stays, and/or number of outpatient visits. Episode length is usually measured in days, and clinically based criteria are used to distinguish between successive episodes. By these definitions, treatment episodes will most often be shorter (on both ends) than illness episodes, since they are likely to begin after the illness appears and finish before the individual may have fully recovered. Screening procedures or treatments that can prevent or shorten treatment episodes have substantive impacts on health care use and health care costs. Understanding the nature of treatment episodes enables health care providers and policy makers to predict the demands on the health care system and the costs associated with those demands.

This study defines a general method to characterize episodes by the treatment event that initiates them, with particular focus on alcohol, drug, or mental health episodes. Looking at a set of over 150,000 treatment episodes, experienced by more than 34,000 individuals, we categorize episodes by location (inpatient or outpatient) and by broad treatment type (alcohol, drug, psychiatric, surgery, medical – a “catch-all” category for all other types of care). We provide summary analyses of the 10 episode types, descriptive profiles of drug treatment episodes, and comparisons of episodes across selected groups of patients.

We conclude that inpatient episodes are well described by their initiating event, with by far the largest portion of the treatment utilization and treatment costs accruing to the particular inpatient category that initiated the episode. Episodes that begin with outpatient care (termed outpatient episodes) may also contain inpatient treatment. As a result, outpatient episodes are more heterogeneous in cost and utilization than inpatient episodes. Nonetheless, in episodes initiated by outpatient care, well over half of the utilization and treatment costs accrue to the category of care that initiated the treatment.

This article begins by discussing the appropriate characterization of treatment episodes. It follows by describing the database to be used as well as data-processing methods. It continues with analyses of the ten episode categories, and with particular attention directed to inpatient and outpatient drug treatment episodes. A concluding section summarizes results and observations.

Treatment Episodes

Measuring substance abuse treatment episode length is particularly important for two reasons. First, understanding the nature of substance abuse episodes helps develop parameters for anticipated costs of substance abuse coverage. Second, substance abuse episodes differ from other types of treatment episodes.

As policy makers debate the appropriateness of insurance for substance abuse treatment, opponents of such benefits argue that treatment episode costs would be high because the substance abuse treatment typically lasted longer than physical illness treatment. Frank and McGuire (1995) explain that mental health or substance abuse treatment cost estimates were among the “most variable” components of the entire 1993-94 debate initiated by the proposed Health Security Act. This debate resulted largely from analysts’ differing assumptions made in the face of significant uncertainty as to what would be covered, the costs of providing coverage and treatment, and the analysts’ failures to incorporate health services research results into the cost estimation process.

Mechanic, Schlesinger and McAlpine (1995) note that people who have trouble with drug or alcohol consumption may struggle over an extended period, often requiring a series of

different forms of treatment or continuing aftercare and supportive services. They conclude that establishing norms of appropriate substance abuse treatment (both utilization and costs) is more challenging than for other forms of mental illness.

Given the dearth of studies on treatment episodes, our analysis examines three important issues: (1) inpatient/ outpatient mix; (2) the diagnoses occurring within the treatment episodes; and (3) time between episodes. Some studies refer only to episodes of inpatient care (Greene and Gungelman, 1984; Levy and Ninan, 1989; Buczko, 1993). This approach fails to recognize the importance of outpatient visits before and after the hospitalization. In contrast, Kessler, Steinwachs, and Hankin (1980, 1982) examined ambulatory care only and thus failed to account for the effects of inpatient admissions. We use a more inclusive method that combines inpatient and outpatient events to define a treatment episode, similar to that derived by Haas-Wilson, Cheadle, and Scheffler (1989). For planning and prediction purposes, it is important to understand whether an inpatient episode is followed by outpatient aftercare, or whether a series of outpatient treatment events precedes a hospital admission.

A second issue is deciding whether an episode should be defined with only one diagnosis or a set of related diagnoses. Solon and colleagues (1967) view as potentially important whether conditions are medically managed separately or with a coordinated plan. A series of path-breaking RAND studies (Ball and Roskamp, 1986; Keeler and Rolph, 1988; Keeler, Manning, and Wells, 1988; Newhouse, et al. 1993; Wells, Keeler, and Manning, 1990) examine the creation and measurement of episodes, referring to a “medical problem” as the basis of grouping episode expenses. Thus services that investigators determine to be related to the same problem are grouped into one episode. However, the exact grouping methodology is not revealed in the RAND reports, and does not appear to be easily transferable to other databases. Here, we examine the types of different diagnoses occurring within a treatment episode to determine whether the episodes are heterogeneous in nature.

The third issue, determining the time interval between the end of one episode and the beginning of another, also raises a number of methodological challenges. Defining the interval

between episodes requires a definition of the episode's beginning and end. Typically, when using claims data or medical records, a treatment episode begins with the first diagnosis of a condition and ends when the condition is no longer being treated. It is possible to define an episode's start as the first patient/provider encounter prior to the diagnosis of a specific condition. An alternative is to define the start as the point at which a treatment protocol is initiated or a particular diagnosis is received (Hornbrook, Hurtado, and Johnson, 1985). The episode's end may also reflect exhaustion of benefits, rather than the successful completion of treatment.

The length of the interval between episodes depends on the medical condition and is often determined by clinical consensus. Moscovice (1977) uses physician estimates to determine the expected time frame for several acute conditions. According to his method, the episode begins with the first medical encounter within the time frame and ends with the last. If an encounter occurs in a second time frame, the reason for the visit is used to determine if this treatment represents a new episode or is part of the last episode. Salkever and colleagues (1982) consider the severity of acute conditions to define different intervals between episodes. Cave (1995) refers to what is a "reasonable" time in order to consider follow-up visits as part of the same episode. For example, a gap of 20 days between treatment events for the same diagnosis may represent a single treatment episode, while a gap of 35 days between two events may signal the beginning of a new treatment episode. Criteria for deciding upon the appropriate gap to indicate separate episodes are often arbitrary.

Chronic conditions such as psychiatric and substance abuse problems present additional problems in distinguishing one episode from the next, since treatment may be long term with varying intervals between visits. Typically, arbitrary intervals during which there was no treatment are used to separate episodes. Kessler et al. (1980) used 8 weeks between psychiatric treatments to define different episodes, but this definition has not been rigorously analyzed in other settings. Although Kessler and colleagues attempted to assess the interval's appropriateness, they found little statistical justification and eventually relied on clinical judgments. Intervals of 8 weeks, 2 months, or 60 days have commonly delineated different episodes in both psychiatric

and other types of health care literature (Haas-Wilson, Cheadle, Scheffler, 1989; Reynolds, Frank, Perel, et al. 1994; Branch, Goldberg, Cheh, Williams, 1993; Holmes, Deb, 1998).

Berndt, Busch, and Frank (1998) also use an 8 week period without treatment to define new episodes, but note that with alternative definitions such as 6 or 12 week intervals the results are “essentially unaffected.” Our current study offers an opportunity to address these timing and sequencing issues using an extensive database of health insurance claims.

Data and Methods

The study population was selected from a large health insurance claims database of 36 self-insured employers, for all treatment events starting January 1, 1989, and ending December 31, 1991 obtained from MEDSTAT[®] Systems, Inc. We included claims of over 34,000 beneficiaries less than 65 years of age (to avoid Medicare overlap) who incurred at least one drug abuse or alcoholism treatment event in the 3-year period. Drug abuse treatment was defined by a principal International Classification of Disease (ICD-9) diagnosis of 292 (drug psychoses), 304 (drug dependence), and 305.1-305.9 (drug abuse). Alcoholism treatment was defined by a principal ICD-9 diagnosis of 303 (alcohol dependence), 305.0 (alcohol abuse), and 291 (alcohol psychoses). Psychiatric comorbidities were also identified (defined by ICD-9 codes 290, 293-299, 300-302, and 306-319). The remaining diagnoses were defined as either surgery (either inpatient or outpatient), or as “medical” (all remaining ICD-9 diagnoses). Obstetric-gynecological treatment for women was excluded, to facilitate comparisons between men and women.¹

As previously noted, treatment episodes may span numerous treatment locations (providers’ offices, clinics, and/or hospitals), leading to problems in tracing subjects and in collecting data. Different studies may stratify episodes by treatment locations (inpatient or outpatient), alcohol, drug or mental health (ADM) or non-ADM diagnoses, or arbitrary time separations, typically 30 or 60 days.

Here, inpatient events consist of all services provided between and including the first and last dates of admissions involving at least an overnight stay. All other services constitute outpatient events, as defined by the employer providing the data. Thus alcohol, drug, psychiatric,

surgical and medical diagnoses are grouped at both the inpatient and the outpatient levels, for a total of 10 categories. Costs are determined by providers' billed charges. All costs were deflated to 1989 dollars by the appropriate annual value of the Consumer Price Index.

The database has both strengths and weaknesses. With the low prevalence of substance abuse treatment, and the stigma of reporting it, population surveys do not generally provide sufficient observations for meaningful analysis. Clinic-based substance abuse treatment data provide important information on treatment and outcomes at the clinic, but provide no information on non-clinic treatment. (Non-clinic treatment is likely to include non-substance abuse treatment, but it may also include therapy through Alcoholics or Narcotics Anonymous, which are not included in insurance claims.) Our claims database provides a large and varied source that examines a host of ADM treatment as well as all of the covered treatment for other conditions.

Since it is derived from employer-based data, the database is not fully representative of the larger population. Further, the health benefits offered to enrollees in this database are quite generous relative to the general market for health insurance in the United States. Moreover, the database cannot address changes in the system brought on by the advent of managed care in the 1990s. It must be pointed out, however, that ADM diagnoses were among the first to be managed and/or carved out, even during the period analyzed.

We cannot identify untreated substance abusers, nor can we identify those with out-of-plan use. The database provides treatment information only if the services are covered by the insurance plan and are defined with a substance abuse diagnosis code. Like medical records, insurance claims will not specify substance abuse treatment received within the context of other health care (and thus identified by a non-substance abuse diagnosis code) or community services.

Just as some substance abuse treatment may not be captured by insurance claims, some care may be inaccurately defined as substance abuse treatment. A single health care visit that uncovers a substance abuse problem may receive a substance abuse diagnosis even though no substance abuse treatment is initiated. Despite these limitations, the database enables us to explore issues of cost and utilization for a particularly defined at-risk population.

We use a 30-day break point to define episodes. Starting with treatment initiation, the episode is deemed to include all of the events occurring within 30 days of previous ones. Hence, a series of 6 outpatient visits, 28 days apart from each other, is considered to be one episode. However, events separated by 31 days or more are judged to fall into separate episodes.

Why 30 days, rather than 8 weeks or 60 days? We use the 30 day cut-off because a key clinical “performance indicator” defined by several major agencies is the proportion of people discharged from a treatment setting (particularly inpatient), and readmitted within 30 days.² In addition, most of the agencies (including the National Committee on Quality Assurance [NCQA], the American Managed Behavioral Health Association [AMBHA], and the Substance Abuse and Mental Health Services Administration [SAMHSA]) wish to see patients transferred from more intensive care settings (inpatient, intensive outpatient) to less intensive care settings (outpatient), again within 30 days of discharge. This reflects the premise that maintaining people in treatment by “transitioning” them through a “continuum of care” (hospital, residential, intensive outpatient /halfway house, outpatient) leads to the best outcomes. Thus the fact that an individual receives repeated treatments at intervals within 30 days indicates that the episode is not yet completed.

Parallel analyses (available from the senior author) were conducted with 60 day and 90 day break points. Other than reducing numbers of episodes, because multiple “30 day” episodes may be aggregated into a single episode using 60 or 90 day breaks, the results are not sensitive to the break point used. This is consistent with the findings of Berndt, Busch and Frank (1998).

Results

Table 1 provides important summary information on inpatient episodes. Recalling that sample inclusion was predicated on either drug or alcoholism treatment, it is not surprising that almost half (48.2%) of the inpatient episodes were initiated by alcoholism treatment, an additional 29.5% were initiated by drug treatment, and 10.4% were initiated by psychiatric treatment. Surgery constituted the smallest share (4.1%) of the inpatient treatment, while medical treatment accounted for 7.8%.

(Table 1 — Inpatient Episode Summaries)

The mean duration of inpatient alcoholism treatment episodes was 37.1 days, about 1.5 days longer than inpatient drug treatment episodes. Inpatient psychiatric treatment episodes were considerably longer (58.0 days) than any of the other episodes. Between 36 and 41 percent of the inpatient episodes may have been censored — that is, they either started within 30 days of January 1, 1989, the first day of the window, or they ended within 30 days of December 31, 1991. This suggests that the true averages are longer than are those we have measured because we may not be seeing other episode-related treatment within 30 days of the observed events, but outside the data window. Research in progress (Goodman, Hankin, Kalist, Peng, and Spurr, 2000b) investigates these potential biases from “probable censoring,” but we note that no category had substantially higher censoring percentages than did the others.³

The mean ADM inpatient episode consisted of far more inpatient care than did either surgery or medical episodes. Alcohol episodes averaged 21.6 days of care, and drug episodes averaged 23.2 days, while psychiatric episodes averaged 30.0 days. In contrast, surgery episodes averaged 11.2 days of care, whereas medical episodes averaged 10.1 days.

Drug and alcohol episode utilization had similar numbers of days, and similar numbers of outpatient visits (2.0 for alcohol, and 1.8 for drug) occurring within the episode. Inpatient costs were slightly higher for drug treatment, reflecting both a slightly larger number of days, and the slightly higher costs per day. For all categories of episodes initiated by inpatient care, inpatient costs constituted over 90% of total costs.

Outpatient episodes (Table 2) exhibited more heterogeneity than did inpatient episodes, but there were many similarities. As with the inpatient episodes, outpatient alcoholism and drug treatment episodes were about the same lengths. The mean psychiatric episode length of over 53 days was half again as long as either alcoholism or drug episodes. Between 36 and 39 percent of the outpatient episodes were potentially censored, and as with the inpatient episodes, the potential censoring suggests that the true averages are longer than are those measured.

(Table 2 — Outpatient Episode Summaries)

There were substantial percentages of single event (i.e. 1 visit) outpatient episodes. Between 36 (psychiatric) and 48 (medical) percent of the outpatient episodes consisted of single visits. These percentages may indicate qualitative differences between conditions that could be treated with a single visit, and those that might require additional care. They also suggest that the durations of the “non single visit” episodes are considerably longer than the Table 2 averages, although the rankings (by duration) among the five categories are not affected. Only 3.0 percent of the inpatient episodes were one day in length, and the ADM percentages were even smaller, as only 2.6%, 1.2%, and 1.5% of the alcohol, drug, and psychiatric episodes (respectively) had one day of treatment.

Alcohol and drug outpatient episodes contained slightly more than 4 visits each, while psychiatric episodes had almost 6 visits. Since our episode definition permitted inpatient care within outpatient episodes, the average alcohol outpatient episode contained 2.1 inpatient days; the average drug outpatient episode contained 3.1 days. In most cases, the inpatient averages come from large numbers of episodes with no inpatient care at all, and small numbers of episodes in which lengthy inpatient care stays were preceded by one or more outpatient visits. We revisit this issue below.

Because the outpatient episodes do contain inpatient care, and because the inpatient care is considerably more expensive than the outpatient care, inpatient costs exceed outpatient costs in the outpatient episodes. As with inpatient psychiatric episodes, outpatient psychiatric episodes are the most expensive of the five types, as they have both more visits and more inpatient days. In sum, Tables 1 and 2 indicate episodes beginning with hospitalization cost more than those beginning with outpatient care, and psychiatric episodes (either inpatient or outpatient) cost more than other kinds of treatment episodes, including surgery.

Episode Profiles

This section provides detailed profiles of treatment episodes. Because of the project scope, we focus on drug treatment episodes (profiles of other episode types are available on request) to indicate how well the episode construction method defines both inpatient and

outpatient episodes. Table 3 profiles inpatient and outpatient drug abuse episodes by episode length. Tables 4 and 5 profile the 4,383 inpatient drug and the 7,563 outpatient drug episodes by the ten types of diagnosis/location combinations.

(Table 3 — Inpatient and Outpatient Episodes by Episode Length)

Table 3 divides the inpatient episodes into seven intervals ranging from one day to 90+ days. For inpatient episodes, median length is 28.63 days with a mean of 35.67 days. Episode costs were largely related to the number of inpatient days per episode, with the longer episodes having higher costs.

The outpatient portion of Table 3 indicates a bimodal distribution of episode lengths. As a result, the median length is 13.81 days, although the mean of 36.85 days is slightly higher than for inpatient episodes. Over 39 percent of the outpatient drug episodes were single visit episodes lasting one day (i.e. there was no medical treatment of any kind in the 30 days following).

Tables 4 and 5 examine the 10 combinations of treatment type and treatment location occurring in inpatient and outpatient drug episodes respectively. Columns (a) through (e) consider inpatient treatment. Columns (f) through (j) consider outpatient treatment. Column (k) provides totals. The episode profiles are complex.

In Table 4, line (1) indicates number of admissions per drug episode, and line (2) indicates the number of days per admission if there was an admission. Just about all of the inpatient activity in inpatient drug episodes resulted from a drug diagnosis. We note from line (3) column (k) that these inpatient drug episodes had a mean of 23.15 days of inpatient treatment, 22.31 days of which were drug treatment. There were small incidences of other inpatient admissions per episode, but over 96% of the inpatient days (line 4) are attributable to inpatient drug care.

(Table 4 — Inpatient Episode Profiles)

Lines (5) through (8) summarize outpatient activity *within* these inpatient episodes. Almost one in four (22%) of the inpatient drug episodes contained outpatient drug treatment (line 5). If there was outpatient drug treatment in an inpatient episode, there were slightly more than three visits (line 6, column g). Over all, the average inpatient drug treatment episode had 1.81

visits (line 7, column k), of which a little over 38% (line 8, column g) were for drug use, with another 26% (columns f + h) for alcohol or psychiatric use.

Total costs attributable to each of the ten categories are given in line 9. Given these utilization rates, it follows that inpatient drug treatment costs of \$9,821 constitute almost 92% (line 10, column b) of the total treatment costs of \$10,714. Outpatient drug treatment costs (\$216) constitute 24.2% of the remainder of the total episode costs. Characterizing this type of episode by its initial inpatient drug event appears to be a valid procedure.

Table 5 profiles the 7,563 outpatient drug episodes in a similar manner. The mean outpatient drug episode contained 2.79 drug abuse visits (line 6, column g) that constituted about two-thirds of all outpatient visits (line 8, column g) and outpatient costs. Almost one in ten outpatient drug episodes contained an inpatient drug admission (line 2, column b), with an average length of stay of 19.67 days. Together, inpatient and outpatient drug treatment costs constituted almost 60 percent (line 10, columns b + g) of the total episode costs.

(Table 5 — Outpatient Episode Profiles)

Another way of indicating how well the initial event describes the episode is to look at the proportion of ADM costs in the episode. Even with the heterogeneity of outpatient episodes, those initiated by outpatient drug abuse treatment have 85.1% (line 10, columns a + b + c + f + g + h) of their costs accounted for by inpatient or outpatient ADM care.

Comparing Episodes

The material presented thus far is descriptive in that it establishes that the initiating event generally describes the pattern of episode utilization and costs, particularly for inpatient care. This section shows how episodes may be compared among groups. Our example examines dependents of insured workers.

Analysts have considerable experience in examining utilization and costs of insured workers, but less experience in looking at dependents, particularly children. Table 6 examines drug and alcoholism treatment episodes for the dependents, dividing the sample between those

dependents ages 18 and over (18+), and those 17 and below (17-). We find that episode treatment costs are significantly higher for the younger dependents.⁴

(Table 6 – Cost and Utilization Comparisons of Dependent Drug and Alcohol Episodes by Age)

Table 6a shows 1,830 inpatient drug episodes for all dependents, with 1,322 for the 18+ group (32.3% of all 18+ inpatient episodes) and 508 (29.7% of all 17- inpatient episodes) for the 17- group. Inpatient drug episodes for the younger group were 12.8 days longer. The mean 17- inpatient drug episode contained almost 34 days of treatment, 12.4 days longer than the 18+ inpatient drug episode. The mean 17- inpatient drug episode also contained 1.90 visits, more (although not significantly so) than the 18+ episode. The mean inpatient drug episode costs for the 17- group were nearly \$6,000 higher.

For outpatient drug episodes, the 18+ episodes were slightly longer, but the 17- episodes had 4.42 inpatient days, compared to 2.61 for the 18+ group. Largely due to the differential in inpatient costs within the outpatient episodes (the 17- group had more treatment days, when admitted), mean total outpatient drug episode costs for the 17- group were \$2,961, or almost \$800 more than for the 18+ group.

Alcoholism treatment involves another form of substance abuse. Although the inpatient treatment costs are approximately 20% less than the drug abuse costs (\$9,609 v. \$12,032), the age breakdowns are similar. People in the 17- category have 9 more days of treatment per episode, although slightly fewer outpatient visits. Total costs are significantly higher for the 17- group. Outpatient alcoholism treatment patterns are similar to the drug patterns. Mean episode costs for the 17- group are about \$660 higher than for the 18+ group. This difference occurs almost entirely due to the greater use of inpatient treatment.

To demonstrate the importance of inpatient utilization in the cost differentials, it is useful to employ the following decomposition. For category i (17- or 18+):

$$\text{Total Costs}_i = \text{Inpatient Days } (D) * \text{Costs/Day } (C^I) + \text{Outpatient visits } (V) * \text{Costs/Visit } (C^O).$$

Goodman and colleagues (2000a) show that the cost differences can be written as:

$$\Delta TC = TC_{17-} - TC_{18+} = [(Days_{17-} - Days_{18+}) * \bar{C}^I + (Costs_{17-}^I - Costs_{18+}^I) * \bar{D}] + [(Vis_{17-} - Vis_{18+}) * \bar{C}^O + (Costs_{17-}^O - Costs_{18+}^O) * \bar{V}]$$

where the terms in parentheses refer to differences in the mean values for the two groups, and:

$$\bar{C}_I = \frac{Costs_{17-}^I + Costs_{18+}^I}{2}; \bar{C}_O = \frac{Costs_{17-}^O + Costs_{18+}^O}{2}; \bar{D} = \frac{Days_{17-} + Days_{18+}}{2}; \bar{V} = \frac{Vis_{17-} + Vis_{18+}}{2}$$

Thus total cost differences can be decomposed into *utilization effects* (utilization differences multiplied by constant average costs) plus *cost effects* (average cost differences multiplied by constant utilization [days or visits]).

(Table 7 – Decomposition of Differences into Cost and Utilization Effects)

Table 7 decomposes the differences for both drug and alcoholism treatment. Concentrating on the drug treatment, the mean cost difference in inpatient episodes of \$5912 is almost entirely explained by differential utilization of 12.42 days. Holding average costs per day constant, this differential accounts for \$5769 of the difference. The remaining \$143 is accounted for by small differences in inpatient costs per day, and by modest cost and utilization effects in the outpatient portions of the episodes.

The outpatient episode differences of \$789 are decomposed similarly. In this case, the major component of differences is attributed to the levels of the inpatient treatment that occurs in treatment episodes initiated by outpatient care. On average the 17- sample had approximately 1.81 days more of inpatient care in episodes initiated by outpatient care, accounting for a difference of \$901. The remaining (slightly negative) effects mitigate this inpatient utilization effect, but as noted in Table 7 it is substantial, and statistically significant.

One must be cautious in drawing inferences since observed differences refer to episodes rather than to individuals. Moreover since the observations relate to treated individuals rather than all individuals, they do not constitute measures of treated prevalence. The information provided is important however. Insurers and benefits managers would recognize that a younger (17-) dependent initiating inpatient drug abuse treatment is likely to experience longer hospital

stays and considerably higher expenses than an adult (18+) dependent. These significantly higher utilization and costs might provide a measure, however imperfect, of episode severity.

Conclusions

This report presents descriptive summaries of over 150,000 episodes for over 30,000 people treated for drug abuse or alcohol problems from 1989 through 1991. We have carefully described our method for creating the episodes, a method that is consistent with theoretical norms for the treatment of substance abuse.

We conclude that characterizing treatment episodes by the initiating event is a valid process, particularly for episodes initiated by inpatient care. Upwards of 90 percent of the utilization and costs occur in the same diagnostic category as the initiating event. Outpatient events are more heterogeneous. Nonetheless, in episodes initiated by outpatient drug abuse treatment, for example, over 85% of the costs occur in ADM categories.

This analysis is a necessary precursor to more advanced analyses of episode duration. We believe that the methods proposed could be applied to almost any type of database with utilization and costs that are classified by treatment event. Analyses in progress by the study team examine determinants of episode length, time to first episode, and sequencing of episodes.

It is important to indicate the limitations of this analysis. Our database summarizes insurance claims between January 1, 1989 and December 31, 1991. To the extent that managed care has changed the health care system, some of the absolute utilization and cost figures may have changed, although ADM care was one of the earliest categories of care to be “carved out” or managed. We are looking at a set of employees of predominantly large, self-insured firms. These do not constitute a random subset of the population, so the figures cannot be generalized to the entire United States.

With respect to health policy, treatment episodes (particularly the costly inpatient episodes) exhibit predictable patterns, based on treatment location and on the initial diagnosis. There is a substantial probability of having outpatient care in an episode initiated by inpatient care. However, most episodes initiated by outpatient care do not contain inpatient treatment, and

large percentages of outpatient episodes contain one outpatient visit only. These episode descriptions and profiles may provide important insights for predicting health care utilization and costs, ex ante, as well as the probability of outpatient care following hospitalization.

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Table 1 – Inpatient Episode Summaries

	<u>Alcohol</u>	<u>Drug</u>	<u>Psych</u>	<u>Surgery</u>	<u>Medical</u>	<u>Total</u>
N	7169	4383	1553	616	1156	14877
Percentage	48.19	29.46	10.44	4.14	7.77	100.00
Duration	37.14	35.67	57.97	38.61	32.86	38.61
% Potentially Censored	37	41	38	37	36	38
Inpatient Days	21.58	23.15	29.99	11.24	10.11	21.60
Visits	2.01	1.81	4.31	3.54	2.85	2.32
Inpatient Costs	8436	10278	16976	13611	7744	10031
Outpatient Costs	440	436	961	1019	725	539
Total Costs	8876	10714	17937	14630	8469	10570

Table 2 – Outpatient Episode Summaries

	<u>Alcohol</u>	<u>Drug</u>	<u>Psych</u>	<u>Surgery</u>	<u>Medical</u>	<u>Total</u>
N	14905	7563	16471	13153	89333	141425
Percentage	10.54	5.35	11.65	9.30	63.17	100.00
Duration (in days)	35.91	36.85	53.21	24.38	27.44	31.55
% Potentially Censored	37	38	39	36	36	36
Inpatient Days	2.09	3.06	3.60	1.65	1.81	2.10
Visits	4.31	4.22	5.98	3.37	3.63	3.98
Inpatient Costs	988	1462	2026	1238	1296	1352
Outpatient Costs	843	934	888	869	686	756
Total Costs	1831	2396	2914	2107	1982	2108

Table 3 – Inpatient and Outpatient Episodes by Episode Length

Inpatient Drug Episodes

	Length in Days						
	<u>1</u>	<u>2-7</u>	<u>8-15</u>	<u>16-30</u>	<u>31-60</u>	<u>61-90</u>	<u>90+</u>
N	54	411	476	1774	1088	290	300
Cumulative %	1.23%	10.59%	21.42%	61.80%	86.57%	93.17%	100.00%
Mean Episode Duration	1.00	4.51	11.90	24.89	41.61	72.54	151.43
Visits During Episode	0.06	0.15	0.36	0.59	1.64	4.41	11.98
Days During Episode	1.00	4.29	10.93	23.13	29.61	32.13	40.90
IP Episode Cost	1480.36	2696.67	5499.68	10413.61	12734.74	13460.09	17162.37
OUT Episode Cost	6.12	98.80	139.18	195.50	507.59	1076.61	1975.21
Total Episode Cost	1486.48	2795.47	5638.86	10609.11	13242.33	14536.70	19137.58
Male	0.70	0.75	0.79	0.82	0.82	0.81	0.71
Age at Start of Episode	30.63	32.68	32.83	31.37	29.74	29.65	29.92
Hourly at Start of Episode	0.59	0.70	0.75	0.68	0.70	0.67	0.61
Self (1) v. Dependent (0)	0.41	0.54	0.58	0.62	0.56	0.60	0.55

Outpatient Drug Episodes

	Length in days						
	<u>1</u>	<u>2-7</u>	<u>8-15</u>	<u>16-30</u>	<u>31-60</u>	<u>61-90</u>	<u>90+</u>
N	2984	398	610	1088	1137	491	877
Cumulative %	39.34%	44.59%	52.63%	66.97%	81.96%	88.44%	100.00%
Episode Duration	1.00	4.01	11.37	23.87	43.08	73.78	182.10
Visits During Episode	1.00	2.09	2.41	2.86	4.48	6.72	17.62
Days During Episode	0.00	0.44	0.85	4.48	5.30	7.14	9.37
IP Episode Cost	0.00	320.10	475.97	1987.50	2393.55	3581.17	4763.01
OUT Episode Cost	331.55	673.94	607.49	844.44	1126.14	1457.09	2953.02
Total Episode Cost	331.55	994.04	1083.46	2831.95	3519.69	5038.26	7716.03
Male	0.70	0.69	0.71	0.71	0.74	0.74	0.71
Age at Start of Episode	32.79	32.85	32.61	32.73	32.22	32.45	34.24
Hourly at Start of Episode	0.54	0.50	0.56	0.55	0.57	0.58	0.62
Self (1) v. Dependent (0)	0.51	0.53	0.52	0.55	0.58	0.56	0.63

Table 4 – Inpatient Drug Episode Profiles

Inpatient Drug Initiation	4383
Episode duration (days)	35.67

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
	← Inpatient →					← Outpatient →					
	alcohol	drug	psych.	surgery	medical	alcohol	drug	psych.	surgery	medical	Total
<u>Inpatient Care</u>											
1. Admissions	0.02	1.07	0.02	0.01	0.01						
2. Days/Adm.	16.00	20.85	20.50	6.00	5.00						
3. Total days	0.32	22.31	0.41	0.06	0.05						23.15
4. % tot days	1.38	96.37	1.77	0.26	0.22						
<u>Outpatient Care</u>											
5. Probability of Visit						0.07	0.22	0.07	0.05	0.23	
6. Visits, if made						3.43	3.14	3.29	1.60	2.48	
7. Total visits						0.24	0.69	0.23	0.08	0.57	1.81
8. % total						13.26	38.12	12.71	4.42	31.49	
<u>Totals</u>											
9. Costs (\$)	94	9821	240	80	43	51	216	43	35	91	10714
10. % total	0.88	91.67	2.24	0.75	0.40	0.48	2.02	0.40	0.33	0.85	100.00

Table 5 – Outpatient Drug Episode Profiles

Outpatient Drug Initiation	7563
Episode duration (days)	36.85

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
	Inpatient					Outpatient					
	alcohol	drug	psych.	surgery	medical	alcohol	drug	psych.	surgery	medical	Total
<u>Inpatient Care</u>											
1. Admissions	0.03	0.09	0.02	0.01	0.01						
2. Days/Adm.	18.33	19.67	30.00	7.00	7.00						
3. Days	0.55	1.77	0.60	0.07	0.07						3.06
4. % tot days	17.97	57.84	19.61	2.29	2.29						
<u>Outpatient Care</u>											
5. Probability of visit						0.05	1.00	0.08	0.07	0.26	
6. Visits if made						3.20	2.79	4.50	1.71	3.04	
7. Total visits						0.16	2.79	0.36	0.12	0.79	4.22
8. % total						3.79	66.11	8.53	2.84	18.72	
<u>Totals</u>											
9. Costs (\$)	214	770	327	88	63	33	640	55	66	140	2396
10. % total	8.93	32.14	13.65	3.67	2.63	1.38	26.71	2.30	2.75	5.84	100.00

Table 6 – Cost and Utilization Comparisons of Dependent Drug and Alcohol Episodes by Age

a. Inpatient Episodes

	<u>Total Drug</u>	<u>18 + Drug</u>	<u>17 - Drug</u>	<u>t-ratio (diff.)</u>	<u>Total Alcohol</u>	<u>18 + Alcohol</u>	<u>17 - Alcohol</u>	<u>t-ratio (diff.)</u>
N	1830	1322	508		2423	1805	618	
Percent	31.50	32.26	29.67		41.70	44.05	36.10	
Duration	35.59	32.03	44.87	6.14 ^{***}	34.93	33.25	39.84	3.43
Inpatient Days	24.99	21.54	33.96	9.99 ^{***}	22.50	20.22	29.15	7.82 ^{***}
Visits	1.68	1.60	1.90	1.36	1.66	1.73	1.48	-1.43
Inpatient Costs	11615.35	10034.72	15728.72	7.38 ^{***}	9240.48	8581.76	11164.41	5.66 ^{***}
Outpatient Costs	416.47	355.99	573.86	2.61 ^{**}	368.41	379.83	335.05	-1.06
Total Costs	12031.82	10390.71	16302.58	7.51 ^{***}	9608.89	8961.59	11499.46	5.47 ^{***}

b. Outpatient Episodes

	<u>Total Drug</u>	<u>18 + Drug</u>	<u>17 - Drug</u>	<u>t-ratio (diff.)</u>	<u>Total Alcohol</u>	<u>18 + Alcohol</u>	<u>17 - Alcohol</u>	<u>t-ratio (diff.)</u>
N	3457	2188	1269		5193	3713	1480	
Percent	5.90	5.43	6.92		8.86	9.22	8.07	
Duration	31.14	32.56	28.68	-2.03 ^{**}	30.66	31.87	27.63	-2.68 ^{***}
Inpatient Days	3.28	2.61	4.42	3.24 ^{***}	2.21	1.77	3.32	4.25 ^{***}
Visits	3.70	3.80	3.53	-1.26	3.75	3.94	3.27	-3.42 ^{***}
Inpatient Costs	1630.87	1309.36	2185.22	3.08 ^{***}	1007.14	821.19	1473.64	3.61 ^{***}
Outpatient Costs	831.02	862.99	775.91	-1.32	775.79	772.52	783.99	0.21
Total Costs	2461.90	2172.35	2961.13	2.56 ^{***}	1782.93	1593.71	2257.63	3.42 ^{***}

*** Difference significant at 1% level.

** Difference significant at 5% level.

* Difference significant at 10% level.

Table 7 – Decomposition of Differences into Cost and Utilization Effects

a. Inpatient Episodes

	Total <u>Drug</u>	18 + <u>Drug</u>	17 - <u>Drug</u>	Total <u>Alcohol</u>	18 + <u>Alcohol</u>	17 - <u>Alcohol</u>
Total Costs	12031.82	10390.71	16302.58	9608.89	8961.59	11499.46
Difference (17-drug - 18+drug)	5911.87			2537.87		
Inpatient Costs	11615.35	10034.72	15728.72	9240.48	8581.76	11164.41
Inpatient Days	24.99	21.54	33.96	22.50	20.22	29.15
Cost/Day	464.80	465.86	463.15	410.69	424.42	383.00
Inpatient Cost Effect	-75.21			-1022.47		
Inpatient Utilization Effect	5769.21			3605.12		
Outpatient Costs	416.47	355.99	573.86	368.41	379.83	335.05
Outpatient Visits	1.68	1.60	1.90	1.66	1.73	1.48
Cost/Visit	247.90	222.49	302.03	221.93	219.55	226.39
Outpatient Cost Effect	139.19			10.96		
Outpatient Utilization Effect	78.68			-55.74		

b. Outpatient Episodes

	Total <u>Drug</u>	18 + <u>Drug</u>	17 - <u>Drug</u>	Total <u>Alcohol</u>	18 + <u>Alcohol</u>	17 - <u>Alcohol</u>
Total Costs	2461.90	2172.35	2961.13	1782.93	1593.71	2257.63
Difference (17-drug - 18+drug)	788.78			663.92		
Inpatient Costs	1630.87	1309.36	2185.22	1007.14	821.19	1473.64
Inpatient Days	3.28	2.61	4.42	2.21	1.77	3.32
Cost/Day	497.22	501.67	494.39	455.72	463.95	443.87
Inpatient Cost Effect	-25.58			-51.11		
Inpatient Utilization Effect	901.44			703.56		
Outpatient Costs	831.02	862.99	775.91	775.79	772.52	783.99
Outpatient Visits	3.70	3.80	3.53	3.75	3.94	3.27
Cost/Visit	224.60	227.10	219.80	206.88	196.07	239.75
Outpatient Cost Effect	-26.75			157.47		
Outpatient Utilization Effect	-60.33			-146.00		

Endnotes

1. Berndt, Busch, and Frank (1998) use MEDSTAT data for the years 1991 through 1995, but they focus on outpatient mental health care only. Holmes and Deb (1998) define mental health episodes using the NMES database.
2. The 30-day cut-off criterion was suggested by technical consultant Thomas McLellan. Dr. McLellan provided the discussion on transitioning through the continuum of care.
3. Goodman and colleagues find that median outpatient episode lengths adjusted for potential censoring increase by between 0.75 days (surgery) and 5.62 days (psychiatry), or between 14. and 22 percent. Median inpatient episode lengths adjusted for potential censoring increase by between 0.71 days (psychiatry) to 2.69 days (surgery), or between 2 and 15 percent. Goodman et al. (2000b) discuss the censoring adjustment through hazard function estimation.
4. Comparisons were also performed between the insured (18+ self) and the dependents (18+ dependent). The two groups are similar in utilization, although 18+ dependents are slightly more expensive in all categories but surgery. For outpatient episodes, 18+ self and 18+ dependents are almost identical. We thus concentrate on the differences by age.