ANALYZING STATE HOSPITAL LENGTH OF STAY PATTERNS:

A Longitudinal, Patient Level Study

by

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Background

Length of stay (LoS) in state hospitals has been a prominent issue in mental health service delivery for much of the twentieth century. Beginning in the 1940s, increasing numbers of individuals began utilizing state hospitals as de facto long term care facilities, a trend that became a major concern for hospital administrators (Grob, 1983). In the 1960s and 1970s, the deinstitutionalization process, revised civil commitment criteria, new methods of treating mental illness, and a burgeoning interest in community based care all led to a shortening of length of stay. Nevertheless, prolonged length of stay remains a problem, and in an environment where the cost of care is a major concern of policy makers, length of stay has become an increasingly important indicator of performance for hospitals and the larger systems of which they are a part.

The significance of LoS as an issue extends beyond that of reducing the time individuals spend in hospital. It has long been recognized that even a few individuals attaining prolonged state hospital stays can lead to the growth of a "long stay population" that retains a hold on beds (Reuter and VonKorff, 1980; Fisher and Phillips, 1990). The individuals who comprise this population, described as "bed blockers" in some settings (New York State Commission on Quality of Care, 1988) may effectively reduce the accessibility of the inpatient system to those requiring acute treatment. But while prolonged LoS and the accumulation of a long stay population has been problematic for the state hospital, the dynamics of this process pose an even greater problem in the current mental health policy environment. Calls for a shift in the locus of inpatient treatment from the state hospital to the local general hospital have been voiced since the 1960s (Dorwart and Epstein, 1993). Recently the implementation of this policy has gained new momentum in several states with the decision finally to phase out or close many state hospitals and provide treatment for the severely mentally ill in general hospitals where the cost of care can be partially recovered through Medicaid reimbursement. However, the LoS patterns displayed by this population in the state hospital would prove disastrous in smaller facilities with highly inelastic bed supplies. Data to the effect has in fact already been reported (Salit and Marcos, 1991). The development of this new service system architecture, as well as continued rational allocation of these resources must therefore be carried out with a fundamental understanding of the LoS dynamics displayed by this population.
Problematic Issues in LoS Measurement

The importance of LoS notwithstanding, the way in which it traditionally has been measured poses problems for fully integrating LoS data into the planning and analytic process. The need to use LoS as a performance indicator may induce planners to use a single number, such as mean or median LoS, to categorize conveniently the duration of hospitalizations occurring in a given time period. But the use of this approach raises a number of problems. The most benign of these is the dramatic loss of information brought about by reducing an entire distribution to a single number. More significantly, however, the positive skewness and other symptoms of non-normality inherent in LoS distributions, generated by individuals displaying extreme lengths of stay, can generate a "number" that is clearly misleading. These considerations argue for the need to examine full LoS distributions, rather than just single parameters of those distributions.

Even when distribution based analyses are undertaken, however, data derived from such analyses can be misleading if the point in the hospitalization process at which LoS is measured is inappropriate. As we have described elsewhere (Fisher and Altaffer, 1992), the picture of LoS captured by measuring LoS in a group of discharges, in a point in time sample of hospitalized patients, or from measuring time from admission may be very different. These differences arise from the fact each approach incorporates the effects of system history in different ways. A group of discharges, for example, may include individuals discharged after years of hospitalization. A point in time sample will overrepresent the presence of patients with long hospitalization and underrepresent the importance of short stay patients. The latter approach gives important information about the characteristics of hospitalized patients in a facility, but a highly distorted view of how the facility is actually utilized. This approach, too, uses information on patients who in some cases may have been hospitalized for years and who may differ in important ways from contemporaneous admittees. But while interesting from a historical perspective, such data may provide little information on contemporary hospital utilization patterns or the effects of existing system architecture or resource levels.

Arguably the most complete picture of state hospital LoS dynamics is one that incorporates each of the three perspectives mentioned above. The single most useful approach, however, is one that assesses the LoS distribution of persons admitted during a particular time period and followed until discharge or until the occurrence of some other terminal event. The advantage of this approach is that it allows the assessment of LoS distribution measured prospectively and permits these data to be linked to contemporaneous system and policy variables.

The desirability of measuring LoS distributions prospectively from admission notwithstanding, the ability to adopt such an approach has been severely hampered by the inability of many state mental health agencies to maintain state hospital data meeting the requirements for such analysis. This approach requires episode level data which, at a minimum, must include patient level admission and termination dates, as well as information
pertaining to the way each hospitalization is terminated (e.g., through discharge, death, etc.). In addition, these episode parameters must contain a patient identifier that allows discharge and termination dates to be linked and LoS calculated for each hospitalization episode.

**Addressing Questions About Length of Stay**

Given access to data meeting these requirements obtained from state hospital systems in several states, we are able to address a number of basic questions regarding LoS dynamics and their variability across states and groupings of patients defined by key sociodemographic, diagnostic and legal variables. Specifically, the questions we will address here are:

1. What are the characteristics of state hospital LoS distributions?
2. Are these distributions similar across state systems, or is their significant between state variation?
3. Do patients randomly experience stays of varying length, or do LoSs vary as a function of patient characteristics measurable by data elements typically included in state mental health agency data bases?

**Methods**

**Measuring Length of Stay**

As the preceding discussion suggests, our lack of understanding of state hospital LoS dynamics stems in part from inappropriate or inadequate measurement approaches. In the analyses conducted to answer the above three questions, we will use episode level data to examine LoS prospectively from date of admission. The use of this perspective is itself not free of problems. In calculating LoS, one typically counts the number of days from the date of admission to the date of discharge. But a number of problems are encountered in adopting such an approach. Typically an analyst will define an observation period during which admitted patients are captured and followed for a designated time period, such as one or two years. Two problems arise in this approach. First, it is unlikely that all admissions will occur on a single day. Instead, they will be staggered throughout the observation period. As a result, however, persons admitted later in the period cannot be observed for as long a time period as those admitted at or near the period’s beginning. In other words, we cannot measure a one year length of stay for a person who is admitted one and one-half years into a two year observation period.

A second problem has to do with terminations. It is not unusual to find that some individuals will remain hospitalized at the end of the observation period. Still others will have terminated their hospitalization in a way other than discharge, through transfer, escape, or death. The analyst concerned only with LoS that ends in discharge may wish to deal differently with hospitalizations terminating through other means.
Data containing cases with these various forms of incompleteness characteristics are called "censored", and present thorny problems for ordinary statistical analysis. Fortunately they are not unique to the analysis of LoS, but have arisen in a wide range of other analytic domains, in particular in the analysis of survival times for patients diagnosed with terminal illnesses or following various forms of treatment for such illnesses. The development of techniques in biostatistics and operations research to address these problems has led to the creation of a family of analytic techniques, commonly referred to as "survival analysis", to examine duration data containing censored cases (Blossfeld, Hammerle and Mayer, 1989).

Survival analysis, and the life table which comprises the principal format for presenting survival analysis results, provide an array of probability functions that deal with the probability of remaining hospitalized for various lengths of time after admission (the survival function), the probability that a discharge will occur during a specified time interval (the probability density function) and the probability that in a given time interval after admission an individual who remains hospitalized at the beginning of that interval will be discharged during that interval (the hazard function). Each of these probability functions provides a unique window on the hospital retention and discharge process, and thus on the LoS distribution itself.

The ability of these methods deal with censored data stems from the fact that the calculations of probability functions in any time interval after discharge are based on individuals who remain at risk for retention or discharge in that interval. For example, data on an individual admitted one and half years into a two year observation period would be used in calculations of retention and discharge probabilities for days 1 through 180 after admission, but the case would be "censored" or removed from the pool of patients used in estimates for later intervals. Similarly, a person admitted on day 1 and still hospitalized at the end of the observation period 720 days later is known to have had a two year hospitalization, but we know nothing of the subsequent course of his or her hospitalization. He/she is "censored" at that point. Likewise, if the terminal event of interest to the analyst is discharge, then patients separating in other ways, such as death, will be used in calculations up to the time interval after admission in which they died, after which they will be censored. We will make extensive use of survival analysis in addressing the questions outlined above, drawing primarily on graphic representations of survival functions obtained from state hospital LoS data.

State Variations in LoS Patterns

Since Wennberg and Gittel's (1982) demonstration of wide variations in surgical rates across counties in Vermont, health services researchers have shown substantial interest in what has come to be called "area variation analysis", or the comparison of health service use across geographically defined areas. In addressing Question 2 above, we will be adopting this perspective in comparing state hospital LoS across several states. This use of survival analysis data in area variation studies of LoS previously has been presented in comparing
LoS patterns across service areas in Massachusetts (Fisher and Altaffer, 1992).

Area variation analysis is typically implemented to assess whether practice patterns differ across geographic areas with regard to the treatment of various conditions and/or the use of certain procedures or treatments (e.g., hysterectomy). In conducting such analyses, it is important to rule out area demographic and diagnostic case mix variation as an important source of the variation in practice patterns. In bringing the area variation perspective to between-state state hospital LoS, it is critical, therefore, to ensure that comparisons are made on comparable patients across all sites. Clearly, state hospital patients are by no means a homogeneous population, and much of the heterogeneity can be linked to state policies regarding the use of these facilities. For example, many states, but not all, use state hospitals as the site of forensic examinations (Grasso, Steadman, Cocozza, et al 1994). Some states continue to admit psychogeriatric patients, including those with organic brain disorders, to their state hospitals (Moak and Fisher, 1992). States may also vary in the minimum age at which individuals can be included in the adult state hospital population.

In order to adjust for these between state variations, we created a population of "generic state hospital patients" with characteristics that likely would be encountered in any state hospital anywhere in the nation. This sample, on which our comparative analyses (Question 2) were based, consisted of patients who: 1) were between 18 and 64 years of age; 2) had a primary diagnosis of either schizophrenia or affective disorder, including major depression and bipolar disorder; 3) were first admissions to the state hospital in 1987; and 4) were admitted either voluntarily or through involuntary civil commitment. "Forensic" (i.e., criminally involved) patients were excluded from the sample.

**Patient Level Comparisons**

We perform several types of bivariate between group analyses to answer Question 2. The first compares the LoS survival functions of patient groups defined by gender, age, diagnosis, and legal status. We present these differences using graphic representations of group survival functions, using combined data from all states and depict between state differences through graphic presentation of states' survival functions. We will test the null hypothesis that states do not differ in their LoS survival distributions using the Wilcoxon rank test (Blossfeld, Hammerle and Mayer, 1989), a distribution-free method for testing the equality of means of two groups of distributions. The test statistic is a function of the ranks of the observations in the groups, and not their values. The Wilcoxon test was originally constructed for the case of uncensored data, but has been generalized to the case of censored data (Gehan, 1965a, 1965b).

**Examining Correlates of Length of Stay**

Given the importance of LoS as a measure of system performance, it is not surprising that a number of researchers have attempted to characterize certain subgroups of patients as "long stay patients" in an effort to determine what characteristics, if any, differentiate this
subpopulation from other segments of the state hospital population. As we have noted, these efforts have typically employed arbitrary, in some cases administratively imposed definitions of "long stay" to develop these distinctions. As a result, the accumulating literature on prolonged stay and its correlates suffers from a lack of consensus as to what a long stay patient is and what the correlates of prolonged hospitalization are (Fisher, Altaffer and White, 1993).

A particularly problematic feature of the methodology employed in these analyses has to do with the concept of "long stay patient" itself. As we have consistently emphasized, LoS is a distributional phenomenon and, as such has naturally occurring extremes. For example, if LoS were to exhibit a normal distribution (which it rarely does), we would expect roughly 2.5% of all patients to experience a stay two standard deviations above or below the mean based simply on properties of the normal distribution. It might be interesting and useful to determine whether the individuals experiencing such stays had characteristics that differentiated them from other patients whose stays fell elsewhere in the distribution. But it is incorrect to characterize their LoS pattern as an anomaly when it would be perfectly predictable on probabilistic grounds.

A simpler approach to this problem is to ignore altogether the labelling of certain individuals as long stay patients and instead to choose a point, such as the median, that reasonably divides the LoS distribution and then to develop a multivariate predictive model that predicts the odds of an individual being above, rather than below the median. Logistic regression, a multivariate technique for predictive models involving binary dependent variables, is the appropriate statistical approach for developing such a model (Hosmer and Lemshow, 1989). The odds ratios generated by the logistic regression procedure are particularly useful in addressing questions concerning the risk associated with various patient characteristics of experiencing prolonged LoS. To assess the stability of these findings, logistic regressions will be carried out on a sample of 22 admission cohorts from 13 states. Meta-analytic procedures will be used to assess agreement between and synthesize the findings of the regressions performed on the cohorts.

Data

The analyses described here utilize the Collaborative State Hospital Longitudinal Data Base (Leginski, Manderscheid and Henderson, 1990). This episode level data base is the product of an effort by the National Institute of Mental Health, the Center for Mental Health Services, and the National Association of State Mental Health Program Directors Research Institute that began in 1984 and ended in 1989. This effort involved the collection of patient level state hospital data in 20 states following uniform protocols for data formatting and hospital inclusion. The data set consists of a patient identifier that allows the linkage of admission and discharge data over multiple hospitalizations, admission and discharge dates, gender, date of birth, primary and secondary diagnosis, legal status, and mode of termination (discharge, death, etc.). Several subsets of the data are used. Between state and bivariate analyses utilize state hospital episodes with an admission date between July 1, 1987 and June
30, 1988. Hospitalizations were followed until discharge or until June 30, 1989, thus providing a minimum of 12 months of observation for each case. Multivariate analyses utilize two admission cohorts, 1983-1984 and 1988-89. States involved in various analyses include Washington, Utah, Colorado, Oklahoma, Texas, Tennessee, Maryland, Ohio, New York, Vermont and Massachusetts.

Results

Overall Length of Stay Patterns

As a first step, a survival function was estimated for the pooled sample from the 11 states. The characteristics of this sample, which included 40,551 episodes, are shown below in Table One.

<table>
<thead>
<tr>
<th>Table One. Patient Demographic, Diagnostic and Legal Status</th>
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<tbody>
<tr>
<td>(N=40,551)</td>
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<tr>
<td>VARIABLES</td>
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<td>GENDER</td>
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<td>Male</td>
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<td>Female</td>
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<td>AGE</td>
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<td>35-64</td>
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<td>65+</td>
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<tr>
<td>DIAGNOSIS</td>
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<tr>
<td>Schizophrenia</td>
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<td>Affective Disorder</td>
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<td>Alcohol/Other Substance Abuse</td>
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<td>Organic Disorders</td>
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<td>Other</td>
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<td>LEGAL STATUS</td>
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<tr>
<td>Voluntary</td>
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<td>Civil Involuntary</td>
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<td>Criminal Involuntary</td>
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As these data indicate, the sample was skewed in the direction of males, persons between 18 and 34 years of age. Persons with schizophrenia and affective disorders are slightly more than 40% of the population. Despite the fact that some states in our sample do not admit persons with a primary diagnosis of schizophrenia to state hospitals, this diagnosis was the largest category in this sample. The modal legal status was involuntary.
Figure One

Length of Stay Survival Function
Total Sample

Probability Of Remaining Hospitalized

Days Since Admission
Figure Two
Length Of Stay Survival Functions
Admissions in Ten States

PROBABILITY OF REMAINING HOSPITALIZED

DAYS SINCE ADMISSION

STATE
A
B
C
D
E
F
G
H
I
J
Figure Three
Length of Stay Survival Functions
Gender

Probability of Remaining Hospitalized

Days since Admission

- Male (N=25936)  - Female (N=14615)
Figure Four
Length of Stay Survival Functions
Three Age Groups

Probability of Remaining Hospitalized

Days since Admission

- 18-34 (N=24613) — 35-64 (N=13661) * 65+ (N=2277)
Figure Five
Length of Stay Survival Functions
Schizophrenia and Affective Disorders

Probability of Remaining Hospitalized

Days since Admission

- Schizophrenia (N=9135)  - Affective (N=8339)
Figure Six
Length of Stay Survival Functions
Legal Status

Probability of Remaining Hospitalized

Days since Admission

- Voluntary (N = 11697) + Civil Invol. (N = 25186)
The survival function estimated for this sample is shown in Figure One. As indicated, roughly half of the sample remained hospitalized at the beginning of 20 days (and, therefore, half had been discharged by this time). The trend in the survival function indicates that stays of one year or more are relatively rare; there was only a 10% probability of a stay of that length in this group of 1987-1988 admissions.

**Between State Differences**

In order to examine between state differences in LoS separate survival functions were calculated for each of 10 states on the sample of 13,559 individuals who met the criteria for our "generic state hospital patient" described above. (One state's data contained significant missing data and were excluded from analysis.) The survival functions for the 10 states are plotted in Figure Two. The overall pattern of these survival functions suggest rather small differences in survival probabilities in the early portion of the LoS distribution, but more substantial between state differences with regard to the probabilities associated with prolonged stays. In some states, the probabilities associated with stays of over 360 days approach zero. In others, these probabilities exceed .20. One state's survival function points clearly to substantial greater probability of long stays. But even with this "outlier" state removed, the difference between the states with the next highest and lowest probabilities of was substantial.

**Patient Characteristics and Length of Stay**

**Bivariate analyses.** Comparisons of survival functions across groups defined by gender, age, diagnosis and legal status are shown in Figures Three through Six. These analyses used the full sample (40,551). Both the impression gleaned from graphic comparisons and formal statistical tests indicate that LoS patterns do not differ as a function of either gender or legal status. Statistically significant differences were noted for diagnosis and age using the Wilcoxon test described above. Patients with schizophrenia had higher probabilities of remaining hospitalized than those with affective disorders. Patients over age 65 showed significantly higher probability of extended state hospital stay than younger patients. For the oldest group, the probability of remaining hospitalized for nearly two years was approximately .20.

**Identifying Correlates of Length of Stay.** As discussed earlier, logistic regressions were carried out on a sample of 22 admission cohorts from 13 states. The sample included 160,190 non-forensic adult admissions to state hospitals for two time periods, July, 1983 through June 1984, and for April, 1988 through March, 1989. Data for both periods were available from nine states. Yearly admission totals across the 13 states differed from a low of 187 in Utah to 29,437 in New York.

Preliminary analysis of data from Vermont and New York revealed a median LoS of 30 days. This value was used in subsequent analyses of cohorts across all states. Using this 30
day cutoff point, a logistic regression model was used to examine the effects of seven risk factors identified earlier (sex, age, race, diagnosis, legal status, readmission status) on the probability of attaining the status of long stay patient.

The proportion of patients who stayed more than 30 days varied greatly from state to state, as did the proportion who were involuntarily admitted, and who were readmissions (as opposed to first admissions). A detailed profile of these patients is presented in a series of histograms comprising Figure Seven. All of the variables in the model were dichotomized. LoS was dichotomized at 30 days. Diagnosis was coded as schizophrenic/other (schizophrenic = 1). Legal status and readmission status were coded as involuntary/voluntary (involuntary = 1) and readmission/not (readmission = 1). Age was dichotomized at 35 (age > 35 = 1), race coded as white/not white (white = 1), and sex as female/male (female = 1).

The results of these analysis showed that in every admission cohort, people who were diagnosed with schizophrenia were more likely than other patients to stay more than 30 days in their respective state hospitals. Similarly, persons who were readmitted and those over 35 years of age were more likely to enter our long stay category in every cohort. Persons who were involuntarily admitted, women, and white persons were more likely to become long stay patients in 80% of the cohorts. The odds ratios for the two time periods are shown in Figure Eight.

The long stay probability of the person with the highest probability of staying over 30 days (as predicted by our six risk factors) divided by the probability of the person with the lowest probability is referred to as a cumulative odds ratio. For instance, in Vermont, the person admitted in 1983-84 who had the highest probability of being long stay was a white female over 35 years of age with schizophrenia who was a readmission on involuntary status. This patient was 21.7 times as likely to stay more than 30 days than a person of the opposite characteristics. The cumulative odds ratios across the 22 admission cohorts ranged from 3 to 274.2. Three risk factors had a similar effect in every cohort. Patients with schizophrenia, who were readmissions, or who were over 35 years of age at the time of admission were more likely to stay in excess of 30 days in every cohort. The cumulative odds ratios for these three factors ranged from 2.1 to 19.7.

Meta analysis

The relationship between risk factors and the probability of staying longer than 30 days was tested in three ways. First, variables were divided into three classes -- clinical condition (e.g., diagnosis), personal characteristics (e.g., gender and age), and institutional process factors and their categories compared. Second, the median and interquartile ranges of each of the variables were examined. Third, the ordinal agreement of the odds ratios across the cohorts was statistically assessed.

The odds ratios for the clinical variable were substantial (greater than 2.0) for 64% of the
Figure 7 Length of Stay and Risk Factor Profile, 1983-84 and 1988-89 Admission Cohorts

- Stay greater than 30 days
- Schizophrenia Diagnosis
- Involuntary Admission
- Readmission
- Age greater than 35
- White
- Female
Figure 8  Odds Ratios for Patients Staying in State Hospitals for More Than 30 Days

Patients Admitted 1983 - 1984

Patients Admitted 1988 - 1989

- Schizophrenia Diagnosis
- Involuntary Admission
- Readmission
- Age > 35
- White
- Female

Note: Odds ratios end at 2 for graphical purposes only.
admission cohorts, moderate (1.5-2.0) in 27%, and minimal (less than 1.5) in only 9%. The odds ratios for the institutional/process variables and for the personal/demographic variables were substantial for 6% of the cohorts, moderate for 21%, and minimal for 73%. The median odds ratio for our clinical variable was 2.15 with an interquartile range of 1.7 to 2.4. The median odds ratios for our two institutional/process variable were 1.5 and 1.7 with interquartile ranges of 1.05 to 2.05 and 1.3 to 2.0. Finally, the median odds ratios for the personal/demographic variables were 1.4, 1.2, and 1.2 with interquartile ranges of 1.3 to 1.6, 1.1 to 1.4, and 1.1 to 1.3.

Finally, in order to test our original hypothesis that clinical variables would be the strongest predictors of LoS and personal/demographic characteristics the weakest, we applied Kendall’s test of concordance to the results of the logistic regressions. Kendall’s Concordance is a nonparametric test of the similarity of the ordering of the effects across the cohorts. The concordance would be "0" if there were no agreement at all among the cohorts, and "1" if agreement were perfect in the order of the odds ratios. Kendall’s Concordance for the entire 22 cohorts from 13 states using the five independent variables that were available for all states (excluding the variable involuntary admission) was .507 (p < .0001). The overall distribution of odds ratios, together with the results of the above statistical analysis strongly suggest that the observed relationships between these risk factors are stable and consistent across the 22 cohorts. This finding provided convincing support for the primacy of clinical variables as the strongest predictors of LoS.

**Discussion**

The findings of these analyses indicate that, as we might have suspected, the probability of prolonged stays occurring for contemporary admissions to state hospitals is small. However, it is not zero. Our analyses indicate that, across the sample of states, persons admitted to state hospitals have roughly a 10% probability of remaining hospitalized after one year. In addition, these analyses show that LoS is not a random process, but is instead associated with a number of system factors and patient characteristics, such as age and diagnosis. Finally, our patient level analyses show that a number of variables that are commonly included in patient level data sets constitute significant risk factors for attaining the status of long stay patients. The models we have developed are simple, and have not examined potential interactions among risk factors or between risk factors and service system characteristics. Clearly, however, the significant relationships identified in our "main effects" model point to the potential for developing better models incorporating other variables and interactions.

Our findings of significant differences in LoS survival functions across states suggests that service system variables captured by these state differences may have significant effects on LoS. These observed differences argue for further exploration of factors that might account for such variation. A major step in this direction might be the use of smaller units of analysis, such as county or hospital, and the incorporation of resource and county level sociodemographic and/or socioeconomic factors as covariates and potential explanatory factors.
Recommendations

The analyses presented here are among the most basic that can be conducted given the current availability of multi-state uniform episode data for state hospital use. Other analyses, such as studies of recidivism, are also possible using these data. However, when more complex analyses of mental health service use are attempted, the limitations of these data quickly become apparent. For example, LoS and other aspects of the population dynamics of state hospitals are widely assumed to be strongly related to the availability and accessibility of community based services. However, despite the importance of this relationship, there are as of yet no systematically developed multi-state data sets incorporating community service use that could support such analyses.

In order to make data such as these the basis for understanding the dynamics of the mental health system, a capacity must be developed for readily merging these data with those currently generated by other components of that system, as well as other systems with which mental health populations commonly interact. One such system consists of non-state hospital inpatient settings. Preliminary efforts are underway in many states to merge state hospital data with Medicaid data bases to capture the general hospital use of public sector mental health consumers. These efforts are often laborious. Nevertheless, attention must be directed toward such efforts if planners and researchers are to be able to gain an understanding of the full range of inpatient utilization in an era when increasing numbers of inpatient admissions are being diverted to non-state hospital settings. This type of data infrastructure is critical to such fundamental planning efforts as estimating the size of risk pools for the development of capitation and managed care models.

It is also critically important that the capacity be developed to link patient level longitudinal mental health data with data from the criminal justice system. There is longstanding concern that as the rate of deinstitutionalization has accelerated, increasing numbers of persons with mental illness have been detained in prisons or jails, where appropriate treatment and services may be scarce (Torrey, Steiber, Ezekiel, et al, 1992). Our current understanding of the dynamics of this intersystem migration is limited, and often rests on anecdote or on data that have not been scientifically gathered. Only through developing the capacity to monitor the movement between systems can researchers estimate its prevalence and identify individuals who are at risk for such intersystem migration. And only with such data can planners in both systems ensure that the necessary treatment capacity and community supports exist to minimize the risks and potential deleterious effects of such a process.

The availability of uniform, linkable records that could allow the examination of the careers of mental health service consumers and the dynamics of the system itself has long been a goal of researchers and planners. The analyses we have presented illustrate that this goal has been met with regard to the state hospital. With the experience gained from this effort, it is now time to pursue the next steps toward building data sets that allow a client based mapping
of the mental health system and other social structures with which the clients of state mental health agencies come into contact.

It would be inappropriate to conclude this discussion without mentioning that the episode level data state hospital data with which we have worked has permitted for the first time the presentation and analysis of multi-state data describing the distributional properties of an aspect of state hospital utilization, rather than merely a single number that may only crudely depict the true nature of these phenomena. The availability of such data and their future refinement and enhancement promises to usher in a new era in the systematic analysis of mental health service use patterns. These advances will enhance the capabilities of researchers and planners to examine these patterns with greater precision at a time when the need for highly reliable data has never been greater.

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