

## Impact of Shortened Hospitalization on Outcome Parameters\*

Ole J. Thienhaus

University of Cincinnati Medical Center, Department of Psychiatry, Cincinnati, Ohio 45267-0559, USA

**Summary.** Due to administratively mandated changes in the reimbursement system for inpatient treatment, average length of hospital stay in a geropsychiatric hospital unit decreased by approximately 20% within 1 year. The impact of this change on selected key parameters of effective therapeutic management are analyzed. Three 90-day periods were compared, one before, two after the reduction in length of stay. It was found that postdischarge referrals to facilities with a higher level of restrictiveness than prior to hospitalization increased significantly from Period 1 to Period 2, but returned to the original level in Period 3. These findings were confirmed when data were corrected for changes in the diagnostic composition of the respective samples. Patients who lacked natural support systems were more likely to be referred to a postdischarge setting of greater restrictiveness than before the admission. This finding remained constant. Readmission figures increased by 5% immediately after introduction of the decreased average length of stay (Period 2). When corrected for diagnostic composition, early recidivism also returned to original level in Period 3. Patients' insurance status appeared unrelated to any of the measured variables. Some observations on the composition of the diagnostic mosaic among admissions over time and the relations between diagnostic categories and average length of stay are included.

**Key words:** Length of stay – Prospective payment – Readmission – Disposition – Support system

### Introduction

The imputed benefits or disadvantages of longer versus shorter average length of hospitalization for psychiatric inpatients have been discussed before [4]. However, to our best knowledge, ethical and logistic-financial circumstances have so far precluded meaningful experimental testing of the hypothesis that length of stay is a variable with any measurable impact on hospital treatment outcome.

A recent change in the hospital service reimbursement system in the United States offered a natural experimental stage to examine the possibility that duration of hospitalization plays a role in the effectiveness of therapeutic intervention. The administrative change consisted of a conversion from a fee for service system to a prospective mode which bases lump sum reimbursements on diagnostic clusters, i.e.,

the average resource consumption assumed to be implicit in diagnostic assignment. For instance, the third party payer pays a hospital a certain predetermined amount for each patient whose diagnosis meets criteria for the diagnosis-related group (DRG) "Psychosis", no matter whether the amount of time between admission and discharge from inpatient care is 3 days or 3 weeks (for extremely long lengths of stay certain modifications apply which need not concern us here). Obviously, such a reimbursement system encourages minimization of in-hospital stay. Indeed, average length of stay has been reported to have dropped by 22% within 1 year after introduction of prospective payment for the large group of Medicare patients (Medicare is the health insurance plan covering all older, i.e., over 65 years of age, and disabled Americans) [3].

In our sample, which comprised a 16-bed geropsychiatric inpatient unit in a University Hospital, we found a 20% decrease in average length of stay when we compared a 3-month period 6 months before implementation of DRGs (Period 1) with a seasonally matched quarter 6 months after the switch (Period 2) [5]. Length of stay was still found to be low 1 year after Period 2 when we analyzed a third 90-day time-span for patient turnover statistics (Period 3).

The question of how to measure treatment outcome is controversial. Many possible parameters require extensive and prolonged follow-up that can be difficult to institute in practice. Also, confounding and uncontrollable variables are a problem in comprehensive treatment outcome evaluations. In this study, we have confined ourselves to some key indicators that were simple to measure and that are reasonably uncontaminated. Specifically, we used incidence of early readmission and the relative frequency of postdischarge disposition to a more restrictive setting as indirect parameters of poor treatment outcome. Obviously, these are aggregate measures.

As other factors could largely be held constant, we were able to minimize the impact of confounding variables. A change in the diagnostic composition of the three samples had to be taken into account and was corrected by appropriate weighting of the raw data.

### Methods

**The Setting.** The study was conducted on a 16-bed inpatient unit of the geropsychiatric service of University Hospital Cincinnati. University Hospital is a teaching hospital of a state university with the mandate to serve all area residents who need hospital care.

\* Preliminary data of this work were presented, in part, at the 139th Annual Meeting of the American Psychiatric Association in Washington, DC, May 1986

Three seasonally matched 3-month periods for observation were selected. Period 1 comprised April, May, and June 1984, i.e., before the introduction of prospective payment. Periods 2 and 3 comprised the same months in 1985 and 1986 respectively. Prospective payment had been instituted as of October 1984. By using the same time of the year we tried to reduce the impact of confounding variables such as seasonal factors or physicians' level of experience. In each instance the primary physicians were psychiatrists-in-training (residents in their 3rd year out of medical school) of the University of Cincinnati Department of Psychiatry.

The typical composition of patients regarding their insurance status remained basically stable ( $\chi^2$  test showed no significant differences). Over 50% of patients were Medicare recipients, about one-quarter had no third party coverage, and the remainder were patients with other public coverage, private, or undetermined insurance.

**The Sample.** The average age of the patient population ranged between 62 (Period 1) and 63 years (Periods 2 and 3) with considerable spread (Table 1). Samples numbered 66 individuals in Period 1, 72 individuals in Period 2, and 73 in Period 3. Females outnumbered males approximately 2:1, which is roughly equivalent to the general sex ratio in the older age population [6].

**The Variables.** Patient data were analyzed regarding the following independent variables: patient's age, absence versus presence of a medical condition, source of the referral, such as nursing home, other hospital ward, own apartment or house, etc., existence of a natural support system such as family or neighbors (unspecified as to the quality of such support systems), and the patient's principal psychiatric diagnosis. The principal diagnosis was the diagnosis that in retrospect at the time of discharge, was found to account for the hospital stay. The diagnostic categories we used are summarized in Table 2. "Organic Mental Disorder" included presentations of dementia, delirium, amnesic disorders etc., in accordance with the Diagnostic and Statistical Manual of the American Psychiatric Association [1].

**Table 1.** Overall age and length of stay characteristics

	Period 1	Period 2	Period 3
Sample size	66	73	73
Mean age	61.74	63.23	63.03
SD	12.82	12.90	13.38
LOS <sup>a</sup>	21.12	16.84	16.53
SD	15.45	10.37	12.01

<sup>a</sup> LOS = average length of stay (arithmetic mean)

Dependent variables included length of hospital stay and the disposition or placement at the time of discharge. The latter was compared specifically to the setting the patient had been in prior to hospitalization in terms of level of restrictiveness. We further tested the hypothesis that readmission figures, as a measure of early recidivism, might have increased. To this end, we computed the percentage of patients who had been in the hospital during the respective 3-month periods preceding each observational interval, or were admitted more than once within the study period.

Data were analyzed statistically using the  $\chi^2$  test for association. Where appropriate, parametric statistics (*t*-test, ANOVA) were applied to test significance.

## Results

### Length of Stay

We found that the average length of in-hospital stay decreased from 21.2 days in Period 1 to 17.0 in Period 2. In Period 3 it remained low at 16.1 days. This represented a reduction of 20% (one-tailed *t*-test:  $P < 0.05$ ) from Period 1 to Period 2. Nationwide trends in other specialties have been reported to amount to 22% decrease in average length of hospitalization [3]. At the same time, the total number of admissions during the 3-month periods studied grew from 66 in 1984 to 72 in 1985 (and 73 in 1986), a 9% difference. As average length of hospitalization decreased more than twice as much as admission figures increased, we conclude that actual utilization must have decreased, i.e., on average, a larger proportion of beds remained empty during Periods 2 and 3 than during Period 1.

With the marked decrease in length of stay, we also saw a significant difference ( $\chi^2 = 35.98$ ;  $df = 4$ ;  $P < 0.005$ ) in the diagnostic composition of the respective samples. There were more organically impaired patients and patients with the diagnosis of a bipolar affective disorder admitted during Periods 2 and 3 than during Period 1. On the other hand, the proportion of patients whose principal diagnosis was a depressive disorder dropped from 48% to 26% and then rose again to 41% in 1986. The relationship between diagnosis and length of stay is shown in Table 2.

We have no explanation for the change in diagnostic mosaic among admitted patients. What is conspicuous in our figures is a much greater homogeneity of average length of stay between diagnoses after implementation of prospective payment as compared to Period 1. There was also a lessened variance of length of stay within a given diagnosis as can be concluded from a comparison of the respective coefficients of variation (Table 2).

**Table 2.** Average length of stay (LOS) and psychiatric diagnoses. The coefficient of variation (CV) for LOS figures is included to indicate the degree of homogeneity of length of hospitalization within each diagnostic category

Diagnosis	Period 1			Period 2			Period 3		
	%	LOS	CV	%	LOS	CV	%	LOS	CV
Schizophrenic disorders	23	14	1.0	25	18	0.8	16	20	0.6
Organic mental disorders	18	20	0.8	28	17	0.5	27	12	0.7
Depressive disorders	48	26	0.5	26	17	0.5	41	16	0.8
Bipolar disorder, manic phase	5	24	1.1	15	18	0.7	11	28	0.5
Other	6	13	0.8	5	11	0.9	4	4	1.1

**Table 3.** Changes in outcome parameters. Weighting corrects for the impact of different diagnostic composition of the three samples (Table 2). The mathematics underlying the weighting are as follows. The number of patients with early recidivism (or those who leave for a more restrictive setting, respectively) is computed for each diagnostic category as a percentage of total patients in that category. This percentage is multiplied by the quotient ( $n/N$ ), i.e. the percentage of the diagnostic category in the period's total number of patients (Table 2), and the products are summed

	Period 1	Period 2	Period 3
Early recidivism			
Raw data	7.5%	12.5%	11.0%
Weighted	7.7%	20.4%	8.4%
Disposition to more restrictive setting			
Raw data	28.8%	36.1%	30.1%
Weighted	29.1%	35.3%	29.8%

A further look at Table 2 reveals an interesting discrepancy. While the average length of stay for affective disorders declined considerably, length of stay for schizophrenia increased from Period 1 to Periods 2 and 3. Length of stay for organic mental disorders decreased only slightly.

### Disposition

It has been observed that the "Era of Deinstitutionalization" [2] has rather resulted in a large-scale transinstitutionalization. The contention claims that while the population of America's state hospitals has declined over the past 30 years, the total proportion of the population maintained in institutional settings (including acute care facilities, prisons, nursing homes) has remained largely unchanged.

For purposes of this analysis, we differentiated the following four levels of care and restrictiveness: patient's own home or apartment, extramural care facility, nursing home, hospital (listed in order of increasing care and restrictiveness). Obviously, this classification represented an ordinal scale so that nonparametric inferential statistics apply.

As outlined above, diagnostic composition changed considerably over time. Organically impaired patients may be assumed to be likelier candidates for disposition to a more structured setting. Differential preponderance of diagnoses rather than decreased length of stay, may thus be inferred to underlie a change in dispositional routes. Weighting of the relative raw data, as explained in the legend to Table 3, is a simple mathematical technique to correct for this impact.

We found that the percentage of patients who were referred to a facility with a higher level of care and restrictiveness than prior to hospitalization increased by approximately 7% from Period 1 to Period 2 but this change did not reach significance ( $\chi^2 = 0.75$ ;  $df = 1$ ; N.S.). In Period 3 referrals resumed the original level. These findings remained stable when we corrected data for change in diagnostic composition (Table 3).

Specifically, 29% of our patients in Period 1 went to a more restrictive environment than the one they had lived in before. In Period 2 this applied to 36% (35%, after weighting), in Period 3 to 30%.

Those who were referred to more restrictive settings were slightly more likely to have no known natural support systems. The absence versus presence of a medical condition seemed to make no difference in this respect, and the patients' insurance status likewise showed no consistent impact.

### Readmissions

The intuitive impression that the proportion of rehospitalized patients had rapidly increased was one of the factors that originally motivated the initiation of this study. We found that in Period 1 a total number of 5 patients were admitted who had been hospitalized on the same service at some point in time during the preceding 6 months. This figure represented 7.5% of all admissions during Period 1. For Period 2, we found the corresponding proportion to be 12.5%, i.e., 5% higher (equivalent to a total of 8 patients out of 73 admissions). After correction for diagnostic compositional shifts between periods, increase in early readmission leapt to 12.7% i.e. from 7.7% to 20.4% (Table 3). This difference indicated a trend which was statistically significant ( $\chi^2 = 5.74$ ;  $df = 1$ ;  $P < 0.01$ ). In Period 3, the readmission figure was not significantly different from the original level in Period 1 (8.4% vs 7.7%).

For all periods, only readmissions to the same service were considered. This restriction eliminated possible early rehospitalization involving two nearby state hospitals or any of numerous private community hospitals. Thus the absolute figures were less meaningful than the relative change in proportions. Even in this regard, a word of caution is in order. As indicated previously, average utilization was lower in Periods 2 and 3, thus more vacant beds were available. The greater availability of beds may account at least for part of the increase in rehospitalization on the service studied: more patients could conceivably return to University Hospital in 1985 and 1986, whereas in Period 1 a larger proportion had to be admitted elsewhere because University Hospital was utilized to capacity.

### Conclusion

With the implementation of prospective payment, a geropsychiatric hospital unit experienced a decrease in average length of hospital stay only slightly below that previously reported for other disciplines. Further, an increased disposition rate to higher care and restrictiveness facilities was observed. There was also a trend toward an increased rate of early readmission.

The discrepancy in the length of stay change between affective disorders and schizophrenia may suggest that a greater opportunity for reduction in hospital stay may exist for patients with diagnoses of a depressive disorder or a bipolar affective disorder. Depressive disorders in our sample included both major depressive disorders and adjustment disorders with depressed mood.

We saw an increased rate of referral to more restrictive settings than prior to hospitalization in the period immediately after introduction of prospective payment. The rate returned to its original level a year later. Early recidivism as inferred from early readmission figures also rose temporarily after implementation of prospective payment. A plausible suggestion is that these changes may be related to the different diagnostic mosaic and the inherently greater risk of poor treatment response and reexacerbation associated with certain diagnoses. However, the phenomena observed remained measurable even after the samples were statistically corrected for variability in internal diagnostic composition.

We propose instead that the changes may be a consequence of decreased length of hospitalization. Less time to

heal resulted in higher rates of early readmission. The greater likelihood of transfer to higher-level care facilities suggests a more defective average status at the time of discharge. More efficient utilization of resources, perhaps a function of learning to live with briefer hospital stays, eventually led to reversal of the trend. In other words, we submit that after doctors and staff have learnt to work with patients in the framework of short-term hospitalization as the rule, patients will benefit much the same from a 20% shorter time in the hospital, and neither early recidivism nor defective discharge status are significantly greater than at a time of longer average hospital stay.

Whether the phenomena reported are, indeed, causally related to shorter hospital stay and the introduction of prospective payment cannot be inferred. As we have emphasized elsewhere, a descriptive, exploratory study can only show associative relationships between variables, and additional studies, especially studies under experimental conditions (random assignment to control groups) are desirable to determine the impact decreased length of hospitalization has on the outcome of psychiatric hospital care. We submit that the administratively induced abridgment of inpatient stay offers a unique opportunity for research on the therapeutic efficacy of psychiatric hospital treatment. Data from such research, once it is

pursued on a larger scale basis, could provide crucial input to health policy decisions and, in consequence, influence the way we approach the therapy of the mentally ill.

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