PATTERNS AND DETERMINANTS OF ACUTE PSYCHIATRIC READMISSIONS

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Objectives. Deinstitutionalisation and shortage of psychiatric beds worldwide has led to extensive research into the risk factors and interventions associated with rapid and recurrent admission to hospital. Little research of this nature has taken place in South Africa, particularly with regard to acute hospital admissions. This study attempted primarily to assess the effect of length of stay and administration of depot antipsychotics in hospital on time to readmission.

Design. A retrospective cohort of 180 admissions was followed up for 12 months, after an index discharge, by means of multiple hospital and community-based record reviews. Each readmission was analysed as an event using a survival analysis model.

Setting. Chris Hani Baragwanath Hospital, Gauteng.

Subjects. A random sample of patients admitted during a 6-month period in 1996.

Outcome measures. Time to readmission.

Results. Two hundred and eighty-four admissions were analysed. The only factor that provided a significant protective effect was being married or cohabiting ($P = 0.015$). Clinic attendance showed a slight protective effect early on but conferred a significantly higher risk of readmission on those who had been out of hospital for a long period ($P = 0.001$). Only 21% of discharged patients ever attended a clinic. The overall risk of readmission was significantly higher in the first 90 days post discharge.

Conclusions. The lack of impact of length of hospital stay and use of depot neuroleptics on time to readmission may indicate that patients are being kept for appropriate duration and that the most ill patients are receiving depot medication.

Several sampling and statistical artefacts may explain some of our findings. These results confirm the worldwide difficulty in finding consistent and accurate predictors of readmission. Low rates of successful referral to community aftercare need to be addressed before their effectiveness can be reasonably assessed. The inherent instability of the post-discharge period is a potential area for further investigation and intensive management.

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International trends have seen a policy shift from chronic psychiatric institutions and long hospital admissions towards acute, short hospital stays and community-based care. Following this process a dramatic increase in relapse rates has been noted among a particular subgroup of psychiatric patients. The general decline in number of hospital beds and mental hospital population size seems to have directly paralleled the increasing rate of readmissions for certain patients.[1]

The pressure on psychiatric beds has prompted much research on the variables associated with relapse, particularly those linked to rapid relapse. Studies of factors associated with multiple or rapid readmission in psychiatric patients have included demographic factors, illness-related variables and variables related to aftercare and quality of life.

The demographic factors associated with poor outcome include young age,[2-5] male gender,[1,2,4-6] marital status (single or divorced),[2] low educational level,[7] unemployment[6] and living in large urban environments.[8,9]

Illness-related variables include diagnosis, illness severity, length of hospital stay and previous admissions. Schizophrenia, bipolar mood disorder, schizoaffective disorder and co-morbid substance abuse patients are identified as diagnostic risk groups.[1-3,9] Severity of illness at discharge,[10,11] early age of illness onset,[1] duration of illness,[12] multiple previous admissions[11,13] and violent behaviour have also been noted as predictors of multiple and early relapse.

Because of the pressure to discharge patients prematurely, a number of investigators have asked whether early discharge and short hospital stays are predictors of early relapse. Although three studies[1,4,14] reviewed supported this notion, three others did not.[10,15,16] The influence of length of hospital stay on relapse rates remains a disputed area.

With regard to aftercare variables, poor treatment compliance was found to predict relapse,[9,13,17] but one study[9] found that use of outpatient services, number of clinic visits and access to care were not significant factors.

Quality of life indicators seem poorly predictive of the 'revolving door' syndrome.[9] In this category family criticism of the patient[9] and unsatisfactory family relations[11,16] are the only variables that have been associated with high relapse rates.

Finally, it has been suggested that the inconsistent and

contradictory findings in much of the research may be accounted for by variables that are significant only when they interact with other variables, for example employment and age with living status.[10]

The above studies[1-17] were done in developed countries and a review of the literature in Medline over the last 10 years reveals a paucity of research on risk factors for rapid readmissions in developing countries.

Context

This study was conducted at the Chris Hani Baragwanath Hospital, which has the only acute psychiatric unit in Soweto, South Africa. It has 155 beds, serving a large catchment area of several million people mainly living in conditions of social deprivation.

Because of the shortage of beds our clinical impression was one of patients being prematurely discharged and rapidly readmitted. The aim of the research, therefore, was to identify risk factors for rapid readmission. We looked at a wide array of variables thought to influence this risk and specifically hypothesised that longer length of stay and administration of depot antipsychotics in hospital would increase the time to readmission.

Methods

The study is both descriptive and analytical. A retrospective cohort of 180 acute admission patients were randomly selected from a total of 952 admissions between 1 February and 31 July 1996. Data collection involved reviews of our hospital records, those of the Soweto community clinics and the only other hospitals likely to have admitted Soweto residents, Sterkfontein and Tara hospitals.

Diagnosis was made by reviewing the case notes using *Diagnostic and Statistical Manual of Mental Disorders (DSM IV)* criteria.[18] Occasionally diagnosis was not stable for sequential admissions, and if more than one diagnosis was present in the data, a consultant psychiatrist reviewed the clinical notes and assigned the most likely diagnosis.

Use of community clinics was assessed by review of community clinic files and recorded as the proportion of expected monthly visits where attendance actually occurred. Attendance was assessed from 6 months before the index admission date.

Substance abuse involving cannabis and alcohol was assessed as being a factor on the basis of either biochemical evidence or reports by at least two clinicians. Violence was assessed as being a factor if a specific description of the violent behaviour was present in the records.

We have treated each time frame following an admission as an observation period and measured the time from that discharge until the next readmission, or until follow-up ceased, whichever was sooner.

Each patient was followed up for 1 year after the index discharge regardless of whether or not readmission occurred. The conventional approach to analysing such data in a multivariate fashion is using survival models. The simplest approach to such modelling is to use the Cox proportional hazards model[19] which assumes that for any risk factor, in this case readmission, the relative hazard is constant over time. Proportional hazards models are obviously unsuited where the hazard attributable to a given factor changes with time. The proportional hazards model can be simply modified to reflect hazards that change in relation to time by incorporating interaction terms between a time-dependent covariate and independent variables. We have estimated proportional hazard models for the independent variables using time until readmission or loss to follow-up as the dependent variable, with and without the use of a higher order time-dependent covariant. Both the full model and a reduced-form model determined by forward stepwise selection were used. In the latter case, a partial P-value < 0.05 was required for initial inclusion of a variable in the model, and a $P > 0.1$ was required for exclusion from the final model (both estimated using likelihood ratio tests). Maximum likelihood estimators were used in all cases.

Results

Descriptive statistics for the patients and admissions studied are given in Tables I and II. A total of 180 individuals were followed up for 365 days from their first discharge from hospital. During this time there were 284 admissions for psychiatric illness, giving an average admission rate (including the index admission) of 1.58 in the study period. While the analyses forming the basis of this paper have been done at the level of the admission, rather than the person, many of the explanatory variables will have remained constant for an individual across multiple admissions.

Descriptive statistics are therefore presented separately for characteristics unique to the individual (Table I) and the admission (Table II).

To summarise the personal characteristics: the typical patient followed up was male, single, between 20 and 30 years old, poorly educated, and suffering from schizophrenia or bipolar mood disorder. While most patients were unemployed, few were receiving disability support grants. Approximately one-third had a history of substance abuse and one-quarter a history of violent behaviour preceding admission. Almost two-thirds of patients were not readmitted to hospital during the 1-year follow-up period after the index admission.

Just over half of the patients admitted for psychosis were given depot neuroleptic medication before discharge. Length of stay averaged 37 days for all admissions, and diagnosis was a significant predictor of length of stay overall (one-way analysis of variance (ANOVA), $P = 0.02$). Parasuicide cases had a significantly shorter length of stay than the population average ($P < 0.05$). Schizophrenia and bipolar cases also had much

Table I. Descriptive statistics for patients enrolled

	N	%
Total number of patients studied	180	
Total number of admissions	284	
Age category (yrs)		
< 21	19	10.6
21 - 30	71	39.4
31 - 40	54	30.0
41 - 50	26	14.4
> 50	10	5.6
Receiving disability grant	32	17.8
Diagnosis		
Bipolar mood disorder	41	22.8
Major depression	14	7.8
Other psychotic disorder	18	10.0
Parasuicide	10	5.6
Schizophrenia	69	38.3
All other diagnoses	28	15.6
Alcohol dependency	3	1.7
Alcoholic hallucinations	3	1.7
Borderline PD	3	1.7
Cannabis intoxication	5	2.8
Dementia	1	0.6
Mental retardation	2	1.1
Insufficient information	10	5.6
Somatoform disorder	1	0.6
Highest educational level		
Unknown	24	13
Less than Std 8	89	49
Std 8 or 9	51	28
Std 10	11	6
Tertiary qualifications	5	3
Female gender	64	35.6
Married or cohabiting	52	28.9
Employed	32	17.8
History of substance abuse	64	35.6
History of violent behaviour	47	26.1
Number of readmissions per enrolled patient		
0	112	62.6
1	42	23.5
2	16	8.9
3	8	4.5
> 3	1	0.6

PD = personality disorder.

higher variance in length of stay (coefficient of variation = 1.34 and 1.46 respectively), reflecting the fact that a few cases had very long lengths of stay. Levels of treatment in the community were low, with only 21% of cases discharged attending their community clinic at all. Of those cases readmitted, 52.9% had been readmitted within 3 months of discharge, indicating that risk of readmission is significantly higher early after discharge.

In order to analyse the determinants of time until readmission, a Cox proportional hazards regression model was used. Model 1 in Table III shows the results for the proportional hazard of readmission model, with all explanatory variables included. None of the coefficients achieved statistical significance, and the overall explanatory power of the model was poor. Model 2 (in Table III) shows results for the full proportional hazards model with a time-dependent covariant. The time-dependent covariate was interacted with all independent variables, but since only the visits ratio interaction term was statistically significant, model 2 only includes this higher order effect. The positive sign on the time covariate × visit ratio combined with the negative, but non-significant sign on the visits ratio coefficient indicates a slight initial protective effect of clinic visits against readmission. This wanes over time, however, and for those who have been out of hospital for a long period, clinic visits are associated with a higher risk of readmission.

Models 3 and 4 (in Table III) were estimated with the same set of starting variables as models 1 and 2 respectively, but a stepwise variable selection routine was used to formulate the most parsimonious models.

In model 3, age categories were a significant predictor of risk of readmission, age 40 - 50 years having an apparent protective effect. This was only statistically significant for that group, however, and age categories were not rank ordered in terms of risk of readmission. In addition, being married or partnered appeared to have a significant protective effect against readmission. In model 4, the time covariate × visit ratio was again positive and highly statistically significant, and marriage again appeared to have a protective effect.

Discussion

In general, the patients' characteristics and treatment interventions studied showed poor ability to predict risk of readmission in studied psychiatric patients. The only patient characteristic showing a plausible protective effect was that of marriage/cohabitation versus being single.

This finding is in contrast to findings of many other authors.[12,14,15,20] The ability to maintain a partnership may indicate less severe illness, or it may be that a cohabiting partnership in this community confers a more protective effect by virtue of support and help from extended family structures.

The age effect found in model 3 requires further investigation, especially given the lack of rank ordering among the categories.

It appears that clinic attendance confers a small protective effect early after discharge. However, this effect diminishes rapidly and in fact reverses later after discharge. This may be because those who have left the area under study will have no clinic visits and no readmission in the study hospitals, thus falsely associating clinic attendance with higher risk of hospital readmission. Alternatively patients who are healthy and not at risk of readmission may themselves choose not to attend a

Table II. Descriptive statistics with regard to admissions

	N	%	
Psychosis and on depot neuroleptics	76	55.1*	
On depot neuroleptics	105	37.5	
At least one clinic attendance following admission	59	21.1	
Length of stay by diagnostic group	Mean	SD	Median
Bipolar mood disorder	34.3	50.1	21.0
Major depression	28.7	21.5	21.5
Other psychotic disorder	34.8	31.3	22.0
Parasuicide	4.5	2.1	4.5
All other diagnoses	21.4	22.4	15.0
Schizophrenia	48.8	65.5	31.0
All diagnoses	36.9	51.7	24.0
Time of follow-up for non-readmitted patients (days)			
< 31	11	6.1	
31 - 60	8	4.4	
61 - 120	10	5.6	
121 - 240	22	12.2	
> 240	129	71.7	
Time until readmission for those readmitted (days)			
< 31	25	24.5	
31 - 60	18	17.6	
61 - 120	22	21.6	
121 - 240	18	17.6	
> 240	19	18.6	

* Percentage of psychotic patients on depot neuroleptics.

clinic since they have no need for treatment. Several investigators[9,21,22] have found high levels of attendance at community aftercare facilities to be either inconsequential or even positively predictive of readmission. This was interpreted as reflecting a pattern whereby the more disturbed patients were more likely to remain in treatment and also to be re-hospitalised.

Solomon *et al.*,[20] however, refined this discussion with their finding that the specificity of outpatient services related to the individual patient's needs was a potent predictor of readmission. They argue against the use of crude clinic attendance as a proxy of quality of aftercare services.

It should be noted that very few patients attended community clinics at all (21%), and such low compliance rates make it difficult to evaluate the contribution of community care.

Length of hospital stay

Failure to show a correlation between short length of stay and likelihood of readmission was in line with findings of some authors,[16,17,23] and contradicted findings of others.[14,15,24] The positive interpretation is that patients are being given adequate attention for the severity of their illness and that patients are being admitted for the duration they require, despite the pressure on bed occupancy.

Severity of illness and particularly instability close to discharge have been noted as important predictors of readmission.[11,23,25] This may therefore obscure the relationship between length of stay and readmission, although Mojtabai *et al.*,[10] controlling for symptom severity on discharge, still showed a protective effect for shorter length of admission.

Depot neuroleptics

While it has been shown that depot neuroleptics reduce hospitalisation[26] and the direct costs of schizophrenia,[27] this study showed no protective effect even in the first 30 days post discharge. The absence of a protective effect was very likely due to the lack of randomisation and the likelihood that the most severely ill patients received depot medication. It would be useful in the future to focus on the effect of a pre-discharge depot neuroleptic on the post-discharge period in a randomised and prospective way.

Mojtabai *et al.*[10] incorporated interactions between independent variables in their model, and produced some significant results. Testing for multiple interaction effects was not possible here because of the small sample size. Specific statistical interactions with the 'marital status' term were tested, however, because of the findings of Mojtabai *et al.*[10] and our own model (not reported in the results). The protective effect of the partnered/married variable was significantly

Table III. Model results and stepwise model results

Model 1. Lower order terms only				Model 2. Independent variables plus time-dependent covariate		
N	269			269		
– 2 log likelihood	1 031			1 024		
Overall chi-square (DF)	29.2(23)			39.2(24)		
Overall model *P*	0.17			0.024		
Variable	B	SE	*P*	B	SE	*P*
On depot neuroleptics	0.0182	0.2492	0.9417	0.0158	0.2498	0.9495
Female sex	0.012	0.2744	0.9651	0.0027	0.2779	0.9924
Age category (yrs)			0.2077			0.1727
< 21*	– 0.0684	0.4972	0.8906	– 0.0467	0.5012	0.9257
21 - 30*	– 0.4588	0.4275	0.2832	– 0.4335	0.433	0.3168
31 - 40*	– 0.0733	0.3937	0.8523	– 0.0321	0.3971	0.9357
41 - 50*	– 0.859	0.5079	0.0908	– 0.8765	0.5098	0.0856
Diagnosis			0.1417			0.1107
Bipolar mood disorder†	0.2278	0.291	0.4337	0.1891	0.2963	0.5233
Major depression†	0.0144	0.4632	0.9753	– 0.0102	0.4654	0.9825
Other psychosis†	–0.4562	0.4282	0.2867	– 0.569	0.4334	0.1892
Parasuicide†	– 1.7107	1.0568	0.1055	– 1.8532	1.0669	0.0824
All other diagnoses†	– 0.6619	0.4156	0.1112	– 0.6808	0.4161	0.1018
Educational level			0.9756			0.9592
Less than Std 8‡	– 0.0505	0.7559	0.9467	– 0.1071	0.7605	0.888
Std 8 or 9‡	0.0354	0.7671	0.9632	0.0126	0.7705	0.9869
Std 10‡	– 0.1812	0.9077	0.8418	– 0.1988	0.9101	0.8271
Employed	– 0.2009	0.3928	0.609	– 0.1724	0.3946	0.6623
Married/partnered	– 0.4687	0.2938	0.1106	– 0.4841	0.2946	0.1004
Substance abuse	– 0.2325	0.2669	0.3836	– 0.2455	0.2693	0.362
Violent behaviour	0.1309	0.2655	0.6219	0.1747	0.2686	0.5153
Visits ratio	0.4738	0.3026	0.1175	– 0.4154	0.4889	0.3955
Discharge date			0.8418			0.8428
First quarter§	– 0.1523	0.4109	0.7109	– 0.1713	0.4133	0.6785
Second quarter§	– 0.0421	0.3642	0.9079	– 0.0647	0.3662	0.8597
Third quarter§	– 0.2567	0.3903	0.5107	– 0.2719	0.3922	0.4881
Length of hospital stay	0.00050	0.0026	0.8378	0.00069	0.0026	0.7925
Time covariate x visit ratio				0.241	0.0881	0.0062
	Model 3				**Model 4**	
–2 log likelihood	1 045				1 047	
Overall chi-square (DF)	16.7 (5)				19.17	
Overall model *P*	0.005				0.001	
Variable	B	SE	*P*	B	SE	*P*
Age category (yrs)			0.048			
< 21*	–0.524	0.437	0.231			
21 - 30*	– 0.65	0.364	0.072			
31 - 40*	– 0.133	0.353	0.706			
41 - 50*	– 1.004	0.476	0.035			
Married/partnered	– 0.654	0.269	0.015	– 0.652	0.267	0.015
Time covariate x visit ratio				0.177	0.052	0.001

* Compared with over-50 group.
† Compared with schizophrenic group.
‡ Compared with those with post-school qualifications.
§ Compared with fourth quarter.
B = coefficient; SE = standard error.

enhanced by employment and use of depot neuroleptics, and diminished by the presence of violent behaviour. However, these findings did not materially affect the conclusions of the study.

It is notable that the hazard of readmission is not fixed and that the period of 90 days post discharge constitutes a high-risk period despite hospital-based interventions. The hospital appears to serve an asylum function (keeping patients and community safe), but does not necessarily make an impact on the patient's ability to remain in the community.

The major limitation of the study was the small sample size. Record reviews limited diagnostic accuracy, but this was partially compensated for by the fact that many of the patients were well known to two members of the team (GMB and CC). The reliance on record reviews also limited our ability to track patients accurately and denominator loss may have been significant. Finally, the strict criteria used for recording substance abuse and violence may have masked the contribution of these factors.

The difficulty in identifying readmission risk variables in a consistent way is confirmed in this study. However, significant gains in relapse prevention have been demonstrated by specific aftercare interventions,[28-31] which are notably absent in our setting. It may be that the most important effect of these interventions is in stabilising the post-discharge period and that in societies with limited resources such as ours, intensive management of patients for the acute period of 3 months after discharge would yield significant gains.

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