Psychoeducation in Schizophrenia: 7-Year Follow-Up Concerning Rehospitalization and Days in Hospital in the Munich Psychosis Information Project Study

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Objective: According to most of the relevant guidelines, psychoeducation is considered a basic part of routine therapy for patients with schizophrenia; scientific proofs of its efficacy are based mainly on the results of 1- and 2-year follow-ups. Therefore, the long-term effects of psychoeducation over a period of 7 years were investigated in regard to rehospitalization rates and hospital days.

Method: Of 101 patients with DSM-III-R or ICD-9 schizophrenia randomly allocated to either an intervention group or a control group between 1990 and 1994, 48 patients were available for follow-up after 7 years. During their index stay, the 24 patients of the intervention group and their key relatives each received a separate psychoeducational group therapy. The 24 patients of the control group received the usual treatment. After index discharge, all 48 patients received a comparable outpatient treatment. Main outcome measures were rehospitalization rate, number of intervening hospital days, compliance, and mean number of consumed chlorpromazine (CPZ) units.

Results: Seven years after index discharge, the rate of rehospitalization was 54% in the intervention group and 88% in the control group. The rate of rehospitalizations per patient was 1.5 in the intervention group and 2.9 in the control group ($p < .05$). In the intervening period, the mean number of hospital days spent in a psychiatric hospital was 75 in the intervention group and 225 days in the control group ($p < .05$). The mean number of consumed CPZ units after 7 years was 354 in the intervention and 267 in the control group.

Conclusion: Seven years after psychoeducational group therapy, significant effects on the long-term course of the illness can be found. Therefore, the integration of psychoeducation into standard therapy for schizophrenia should become obligatory.

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According to most of the relevant guidelines, psychoeducation should be part of the standard therapy among patients with schizophrenia.[1,2] An investigation of 625 psychiatric hospitals in the German-speaking countries revealed, however, that only 21% of the inpatients with schizophrenia had participated in psychoeducational interventions in the year 2003.[3] Therefore, many efforts should be made in the future to intensify the implementation of this method into routine care. For psychoeducation has the aim of improving insight and compliance by means of providing information and emotional relief to patients and their key relatives.[4,5] Participation in psychoeducational groups reduces rehospitalization rates of patients with schizophrenia in comparison with a control group; it was possible to prove this for follow-up periods of up to 2 years after index discharge.[6,7] Psychoeducation lowers the rate of psychotic re-exacerbations and rehospitalizations both by ensuring a sufficient dosage of antipsychotic medication[8–11] and by improving compliance.[12–17] Patients are assisted in developing insight and accepting relapse-preventing drugs for a longer period of time. In addition, the inclusion of the key relatives can reduce the rehospitalization rate among schizophrenic patients by about 20%.[18]

Until now, most of the studies have focused on the short-term and medium-term effects of psychoeducation on rehospitalization rates; data relating to long-term effects are reported in only 2 studies. Tarrier et al.[19] demonstrated a significantly lower rate of rehospitalizations after 8 years (67% vs. 88%) for patients who had taken part in

a psychoeducational family intervention together with their key relatives. Hornung et al.[20] showed that, 5 years later, the patients in the intervention group—psychoeducational medication training, cognitive-behavioral groups, and group sessions for their relatives—had significantly lower rates of rehospitalizations than the patients in the control group (42% vs. 67%).

Until now, there have been no published data that answer the question of whether the number of hospital days, and thus the costs of the inpatient treatment, can be definitively lowered by reducing the frequency of hospital stays. Therefore, the following topics are the main targets of our follow-up investigations after 1, 2, and 7 years:

- Survival analysis, rehospitalization rates, number of rehospitalizations, and number of hospital days
- Compliance with and dosage of the antipsychotic drugs
- Psychopathology
- Social functioning and quality of life

METHOD

PIP Study Design

A randomized multicenter study (Psychosis Information Project: PIP Study) was organized between 1990 and 1994 at 3 psychiatric hospitals in Munich, Germany (LMU: Ludwig-Maximilians-University; BKH Haar: Community Hospital of Munich; TUM: Technical University of Munich). All patients with a schizophrenic psychosis (DSM-III-R: 295.10–94; 297.10/ICD-9: 295.0–7; 297.0–2) were screened at admission. Inclusion criteria were schizophrenia, indication for an antipsychotic relapse prevention for a period of at least 12 months, age between 18 and 65 years, patients' agreement to undergo outpatient treatment at the study center, and patients' agreement to invite a key relative or a friend. This study was approved by the institutional review boards of all participating institutions.

Exclusion criteria were as follows: living at a distance of more than 150 kilometers from the hospital, less than 30 minutes' contact per week with the key relative, drug addictions during the past 6 months prior to admission, pregnancy, IQ < 80, insufficient knowledge of German, and a lack of remission of the psychotic symptoms during the previous 2 years despite an adequate therapy.

It was possible to include 236 patients (LMU and BKH Haar: N = 135; TUM: N = 101). Group randomization was done centrally; the groups were formed independently in each study center. Details of the screening process and the 2-year follow-up results are published elsewhere (Pitschel-Walz et al.[11]). After the period of 2 years, it was possible to further treat only the patients of the TUM in the study center; therefore, the following data of the 7-year follow-up are based exclusively on the TUM subsample.

Index Stay: Psychoeducation for the Intervention Group and Treatment as Usual for the Control Group

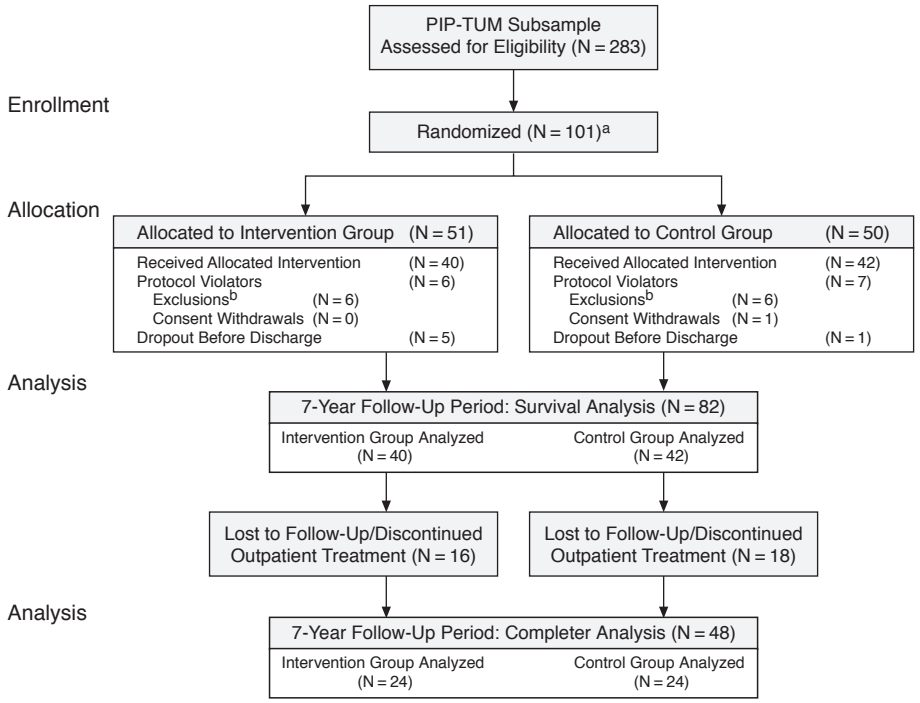
After random allocation to the intervention group, patients participated in 4 weekly sessions of 60 minutes each, depending on whether they could tolerate a group setting. Afterwards, 4 more monthly sessions were held. Relatives were separately invited to 8 biweekly sessions (i.e., every 2 weeks), each lasting 90 to 120 minutes. The group sessions of the patients and of the relatives were conducted by separate therapists who were not involved in routine treatment. Interactive spreading of information and emotional relief are the basic elements of the PIP concept.[5] The psychoeducational modules in patients' and relatives' groups were designed nearly the same in order to assist the family in "speaking the same language" as the patient. As a take-home message, they learned that schizophrenic psychoses are provoked by biological factors in combination with psychosocial stress, and, therefore, they must be treated consistently by a long-term antipsychotic medication in combination with psychotherapeutic interventions. Only on the basis of sufficient medication can the patients' empowerment be developed successfully and will a further psychosocial treatment show positive results. Pragmatic coping strategies were discussed during the group sessions; patients could speak about their illness, its treatment (especially the antipsychotic medication), their individual crisis plans, their current emotional state, and the awareness of solidarity with other patients who share a similar fate. In addition, patients and relatives received an information booklet.[21] The patients of the control group did not attend psychoeducational groups and were treated as usual.

Outpatient Treatment: Therapy as Usual for Intervention and Control Group

The outpatient treatment procedure after index discharge was the same for all patients. Patients in both study conditions were motivated to undergo maintenance therapy with antipsychotic medication. Choice and dosage of the medication were adapted individually according to clinical needs. Three hundred chlorpromazine (CPZ) units was defined as the optimum dosage.[22] Dosages for the newer atypicals were transformed into CPZ units following the method of Woods.[23] Comedication was not restricted. During years 1 and 2 of the outpatient treatment phase, 1 contact monthly in the study center was obligatory. If patients did not appear, motivational techniques were used. If indicated, relatives were involved; patients' agreement to this procedure was part of the informed consent.

After the second year, the study protocol had to be modified for organizational reasons; while patients were

Figure 1. Consort Flow Diagram of the Progression Through the Phases of the Study of the Partial Sample of the Technical University of Munich (TUM)



[a]These 101 patients constitute a subsample of the PIP Study, which included 236 patients (see Pitschel-Walz et al.[11]).
[b]Violations included change of diagnosis, no indication for antipsychotic relapse prevention, no remission during inpatient stay, and distance from patient's home to hospital more than 150 km.
Abbreviation: PIP Study = Psychosis Information Project.

further encouraged to continue their medication, it was no longer possible to involve their relatives. After the fourth year, the outpatient treatment in the study center of the TUM had to be discontinued completely, and all patients were referred to general psychiatrists.

Subjects: PIP-TUM Subsample, 7-Year Follow-Up

A total of 283 patients were screened at the TUM study center; 101 of them were eligible for inclusion. Nineteen patients had to be excluded prior to index discharge for formal reasons or due to premature discontinuation of the index intervention, and 34 patients dropped out during the 7-year follow-up period; these 16 patients of the intervention group and 18 patients of the control group could not be reached despite numerous attempts to contact them. For organizational reasons, active home visits could not be realized. Therefore, ultimately 48 (59%) of the 82 were available for investigation 7 years later (see Figure 1); for the assessment of the future compliance at index admission, ratings of only 79 patients existed.

At index admission, patients of the intervention group had a longer duration of illness (7.4 vs. 6.3 years) and more previous hospitalizations (4.4 vs. 3.2) than those in the control group. There were no significant differences in sociodemographic characteristics (see Table 1). In general, the 48 patients of the 7-year follow-up partial sample already showed significantly better compliance rates at study entry than the patients who later dropped out. This assessment was based on all information concerning the compliance of the patients in the last 12 months before index admission (see Figure 4).

Assessments

The main outcome measures were the rehospitalization rate, the number of intervening hospital days, compliance, and the mean number of consumed CPZ units. Compliance was rated by the treating psychiatrists on a 4-step ordinal scale (1 = very good, 2 = good, 3 = moderate, 4 = bad). Plasma drug level measurements were performed in order to validate the psychiatrists' compliance ratings; the results of this procedure revealed a very high concordance.[11]

Other measures were the Brief Psychiatric Rating Scale (BPRS)[24] and the Global Assessment of Functioning (GAF),[25] as well as patients' subjective rating of their quality of life (Lancashire Quality of Life Profile, Z-Scale[26]).

Table 1. Sociodemographic and Clinical Characteristics at Index Discharge

Characteristic	PIP-TUM Subsample (received allocated treatment): Intervention Group (N = 40) and Control Group (N = 42) (total N = 82)	PIP-TUM Completers at 7-Year Follow-Up	
		Intervention Group (N = 24)	Control Group (N = 24)
Female, N (%)	50 (61)	14 (58)	16 (67)
Age, y			
Mean	34	33	36
SD	10.9	9.3	10.3
(Sample size)	(N = 82)	(N = 24)	(N = 24)
High school graduate			
N (%)	30 (37)	8 (33)	12 (50)
(Sample size)	(N = 81)	(N = 24)	(N = 24)
Duration of illness prior to index hospitalization, y			
Mean	6.6	7.4	6.3
SD	6.0	5.9	4.6
(Sample size)	(N = 81)	(N = 24)	(N = 24)
No. of previous hospitalizations			
Mean	3.0	4.4	3.2
SD	2.5	3.0	1.9
(Sample size)	(N = 81)	(N = 24)	(N = 24)
Duration of index hospitalization, d			
Mean	93.5	97	96
SD	67.3	54.0	73.9
(Sample size)	(N = 81)	(N = 24)	(N = 24)

Abbreviation: PIP-TUM = Patients included in the Psychosis Information Project who were treated at the Technical University of Munich.

The therapists were not blind concerning the psychoeducational pretreatment conditions, but 3 of the 4 therapists had not been involved in the psychoeducational study group. They were told to treat all patients in the same manner, independent of the study condition. Readmissions of both patient groups happened mainly during the night or on the weekend when the study doctors could not intervene.

Up to the fourth year, data were collected during the outpatient treatment at the study center of the TUM. The data from years 5 through 7 represent the naturalistic outcome of the therapy of general psychiatrists.

The course of illness, compliance, medication, and psychopathology were documented monthly. Afterwards, any rehospitalization and the number of days spent in hospital were reconstructed from the information given by the patients and their relatives and by interviewing the patients' doctors and studying the documents of the hospitals involved. The 7-year follow-up state is based on the period of the last 6 months prior to the assessment. The investigator was blind to the study conditions and had not been involved in the construction of the PIP study.

Data Analysis and Statistical Methods

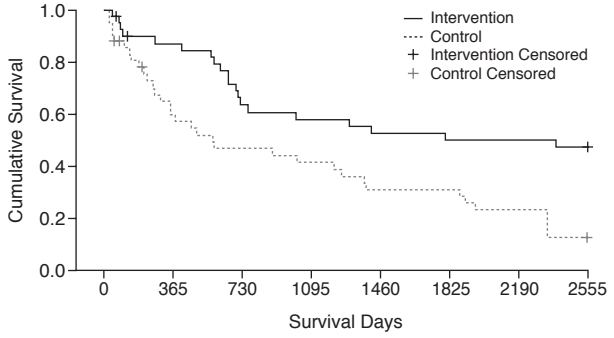
In comparison with the control group, patients in the intervention group were assumed to have superior outcomes in regard to all main items; rehospitalization outcomes were analyzed using the survival model by Kaplan-Meier with log-rank statistics. In addition, the rehospitalization rates in the intervention and the control groups after 7 years were computed and significance was tested using the Fisher exact test. For other comparisons between the study groups involving dichotomous variables, the Fisher exact test was employed. Chi-square tests according to Pearson were used for group comparisons involving categorical variables with several alternative answers. For continuous variables, equal variance t tests or nonparametric procedures (Mann-Whitney U test) for independent samples according to distributional characteristics were used.

The survival analysis refers to the subsample of the PIP-TUM study patients who began the outpatient treatment and who were not among the protocol violators (N = 82).

To evaluate the long-term follow-ups of Tarrier et al.,[19] Hornung et al.,[20] and the current study, phi (ϕ) was calculated as an effect size estimate according to the formula $\phi = \sqrt{X^2/n}$, which corresponds to Pearson's correlation coefficient r applied to dichotomous data. All calculations were performed according to the procedures proposed by Rosenthal,[27] which are acknowledged and often used in social and medical research.[18,28–30] The effect sizes were transformed to Fisher "z_r" values. The mean effect size r was then calculated from "z_r," the weighted mean of the "z_r" values. Results are presented as (mean) effect sizes along with their 95% confidence intervals (CIs), with positive values indicating effects in favor of the psychoeducational intervention.

The criterion for considering statistically significant results was set at $\alpha = .05$ (2-tailed). The statistical package used was SPSS for Windows, Version 12.1 (SPSS Inc., Chicago, Ill.).

Figure 2. Survival Analysis for the 7-Year Follow-Up Period (N = 82)[a]



[a]This graph shows the survival function for time to recurrence of rehospitalization. Some of the times were "censored" in that no rehospitalization occurred at the time point or contact was lost with participants.

Figure 3. Cumulative Days in Hospital for the Intervention Group (N = 24) and the Control Group (N = 24)

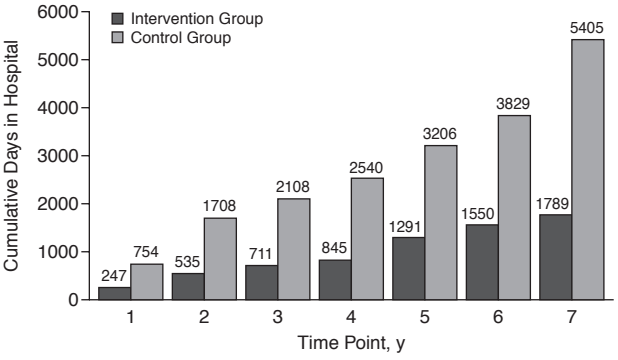
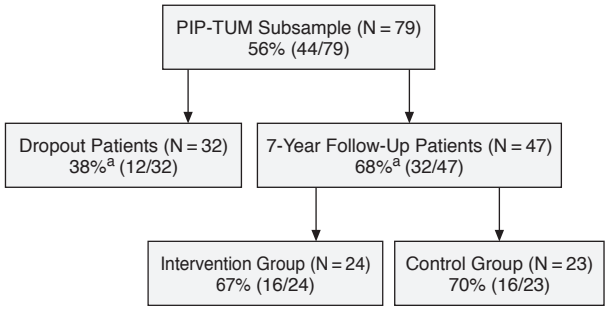


Figure 4. Percentage of Patients Predicted to Have "Good"/"Very Good" Compliance in the Future, as Assessed by Psychiatrists at Index Admission



[a]The difference between patients who completed the 7-year follow-up investigation and the dropout patients is significant (Fisher exact test; $p < .01$).
Abbreviation: PIP-TUM = Patients included in the Psychosis Information Project who were treated at the Technical University of Munich.

RESULTS

Survival Analysis, Rate of Rehospitalizations, and Days in Hospital

The survival analysis considering the time up to the first rehospitalization showed a significant difference in favor of the intervention group within the 7-year period (log rank = 7.139, df = 1, $p < .01$). This procedure estimates the survival function for time to occurrence of an event (here, rehospitalization). Some of the times may be "censored" in that the event "rehospitalization" does not occur during the observation period (7 years) or contact is lost with participants (dropout patients). The survival function for each treatment group is produced, and a test of equality of the survival functions across treatment groups is implemented (see Figure 2).

One year after index discharge, 13% of the patients in the intervention group and 33% in the control group had to be readmitted; 2 years later, the figures were 33% and 54%, respectively. Seven years after index discharge, 54% of the intervention and 88% of the control patients had to be rehospitalized ($p < .05$). The mean number of rehospitalizations per patient after 12 months was 0.3 in the intervention group and 0.6 in the control group; 2 years later, this value was 0.5 in the intervention group and 1.1 in the control group, and 7 years after index discharge, they were 1.5 and 2.9, respectively ($p < .05$).

During the first year after index discharge, the patients in the intervention group spent a mean of 10 days each in the hospital; patients in the control group spent a mean of 31 days each. Two years later, this value increased in the intervention group to 21 days and in the control group, to 67 days; and after 7 years, this rate was 75 days in the intervention group and 225 days in the control group ($p < .05$). The cumulative number of days in hospital for each group are listed in Figure 3.

Compliance With and Dosage of Medication Treatment

At index admission, the treating psychiatrists estimated the future compliance of all patients. In all, 68% of the selected sample of the 7-year follow-up patients had a "good"/"very good" compliance in comparison to 38% of the patients who later dropped out ($p < .01$) (see Figure 4).

At the time of discharge, the assessment of the compliance as "good" or "very good" was 88% in the intervention group and 92% in the control group. After 2 years, this rating remained at the same high level of 88% in the intervention group; in the control group, there was a noticeable decrease to 75%. At the time of the 7-year follow-up, both groups had the same "good" value of 83% (see Table 2).

Table 2. Results of the 7-Year Follow-Up (N = 48)

Outcome Variable[a]	Intervention Group (N = 24)	Control Group (N = 24)	Test, Value	p (2-tailed)
Rehospitalization rate, N (%)	13 (54)	21 (88)	Fisher exact test, 6.76	.024
Rehospitalizations per patient	1.5 (1.6)	2.9 (2.6)	t Test, –2.251	.029
Days in hospitals per patient	75 (96.5)	225 (284.9)	t Test, –2.454	.021
BPRS total score	32.7 (12.0)	32.9 (10.4)	t Test, –0.9	.929
GAF score	61.7 (19.3)	62.8 (14.4)	t Test, –0.221	.826
Compliance "good"/"very good," N (%)	20 (83)	20 (83)	Fisher exact test, 0	1.0
CPZ units (mean per day during last 6 mo)	354 (347)	267 (227)	t Test, 1.033	.307
Quality of life (Z-scale) score	4.9 (1.9)	5.3 (1.2)	Mann-Whitney U test, Z = –0.489	.625

[a]Values shown as mean (SD) unless otherwise noted.
Abbreviations: BPRS = Brief Psychiatric Rating Scale, CPZ = chlorpromazine, GAF = Global Assessment of Functioning.

During the first 2 years, the daily CPZ unit consumption was 287 in the intervention group and 202 in the control group. Seven years after index discharge, this value had risen in both groups; the intervention group were taking 354 CPZ units and the control group, 267. Despite the higher dosage for the intervention patients, this difference did not reach statistical significance. The rate of clozapine treatment was 29% (7 of 24) in the intervention group and 33% (8 of 24) in the control group (see Table 2).

Psychopathology

At index discharge, the mean BPRS scores of 29 in the intervention group and 27 in the control group were very similar; 2 years later, scores for the patients in the intervention group remained at the same level while the mean score for the control group showed a deterioration to 30. Seven years later, equal values were found in both groups (see Table 2).

Social Functioning and Quality of Life

At index discharge, the mean GAF score was 69 among the intervention group and 67 in the control group. After 2 years, the intervention group had better scores (mean = 80) than the control group (mean = 72); these differences did not reach significance. Seven years later, equal scores were found in both groups (see Table 2); the patients in the control group had, in comparison with the patients of the intervention group, a slightly better score on the German version of the Lancashire Quality of Life Profile[26] with no significant difference (see Table 2).

DISCUSSION

At the point of study recruitment, the 48 patients of the 7-year follow-up sample—intervention and control group—already showed a much better compliance than the 34 patients who dropped out during the following period of 7 years. This high basic adherence in both groups was presumably responsible for patients' good cooperation during the 7-year follow-up investigation.

The 24 patients of the intervention group were more severely ill and had had a few more hospital stays than the patients in the control group at index admission, yet the duration of the index stay was the same in both groups: 97 days in the intervention group and 96 days in the control group (see Table 1). Despite the good basic compliance of the complete 7-year follow-up partial sample, 88% of the patients in the control group had to be readmitted and spent 225 days in hospital during the follow-up period of 7 years. The corresponding data in the intervention group were 54% and 75 days, respectively.

In addition to these data, the patients in the intervention group showed significant advantages 2 years later in very relevant findings: rate of rehospitalizations, hospital days, CPZ units consumed, and rates of "good" and "very good" compliance; BPRS and GAF scores showed the same tendency, but these differences did not reach significance. After 7 years, the psychopathologic patterns approach one another. Patients in the control group have apparently learned to cope better with their illness in the meantime on account of their recurrent rehospitalizations with repeated psychiatric and psychotherapeutic interventions.

This raises the question as to whether patients of the control group had access in the meantime to additional psychoeducational groups. During the first 2 years, "crossover" groups can be excluded, because all patients were under the observation of the study centers and no additional psychoeducation was provided, neither for the patients of the intervention group nor for the patients of the control group. Later on, the therapeutic measurements followed their natural course. Some patients of both groups may have participated in further psychoeducational groups during the long run. But the psychoeducational concepts in the neighboring hospitals, independent of the PIP study, were characterized by open groups, less structured modules, and a lower extent of motivational techniques; regarding their specific effects on compliance and relapse prevention, no data are available.

It is concluded that the patients of the control group did not have significantly worse outcome after 7 years despite their nearly twice as high rate of rehospitalization (2.9 vs. 1.5). But they had to pay a high price for reaching the same level as the patients of the intervention group, with significant more days in the hospital (225 vs. 75).

Table 3. Comparison of Rehospitalization Rates During Long-Term Follow-Up in 3 Studies

Follow-Up Interval	Group Setting	Tarrier et al (1994)[19]	Bäuml et al (this article)	Hornung et al (1999)[20]	Total
1 y[a]	Intervention group, rate	12% (3/24)	12% (3/24)	15% (4/26)	14% (10/74)
	Control group, rate	48% (14/29)	33% (8/24)	23% (8/35)	34% (30/88)
	Effect size (95% CI)	0.38 (0.12 to 0.59)	0.25 (–0.04 to 0.5)	0.09 (–0.16 to 0.34)	0.24 (0.08 to 0.38)
2 y	Intervention group, rate	33% (8/24)	33% (8/24)	24% (6/25)	30% (22/73)
	Control group, rate	59% (17/29)	54% (13/24)	50% (17/34)	54% (47/87)
	Effect size (95% CI)	0.25 (–0.02 to 0.49)	0.21 (–0.08 to 0.47)	0.26 (0.00 to 0.48)	0.24 (0.09 to 0.39)
5–8 y[b]	Intervention group, rate	67% (14/21)	54% (13/24)	42% (10/24)	54% (37/69)
	Control group, rate	88% (21/24)	88% (21/24)	69% (24/35)	80% (66/83)
	Effect size (95% CI)	0.25 (–0.05 to 0.51)	0.37 (0.09 to 0.59)	0.27 (0.01 to 0.49)	0.29 (0.14 to 0.44)

[a]Tarrier et al.: 3/4 y.
[b]Tarrier et al.: 8 y; Bäuml et al.: 7 y; Hornung et al.: 5 y.

In Germany, a day in the hospital will cost 250 € on average. During a period of 7 years, in the intervention group it was possible to save about 37,500 € per patient in the inpatient sector. Through lowering the number of hospital days, not only the suffering of patients from their illness will be reduced, but also the expenses for health care in general.[5]

Comparison With Other Studies

The rehospitalization rates from all 3 psychoeducational long-term studies—Tarrier et al.,[19] Hornung et al.[20] and the current study—are summarized in Table 3. Despite some differences in the study populations and the psychoeducational procedures, very similar rates were found.

In agreement with the 2 other long-term follow-up-studies, the significant effects of psychoeducation with involvement of families on the rehospitalization rate 5 to 8 years later found in this study become quite evident. According to the effect size for 5 to 8 years, an average success rate difference of 26 percentage points can be achieved. Thus, psychoeducation does not produce merely short-term effects. The improvement of the illness concepts and the improvement of insight and compliance may help the patients and their relatives to cope more competently and successfully with the illness.[14,16,18,31–33]

The reduction of the number of hospital days in this study did not result in a corresponding improvement of psychopathology in comparison with the control patients 7 years later, nor could Hornung[20] and Tarrier[19] find any significant differences between the 2 groups in social functioning either 5 or 8 years later.

According to recent findings, a high rate of re-exacerbations of schizophrenia seems to induce structural impairment of the brain.[34] In order to investigate the potential long-term effects of this phenomenon, a 15-year follow-up is currently in progress.

According to these data, it is not enough to have good compliance at the point of index discharge.[35] Only by treating patients with bifocal psychoeducation can an increase of insight and an improvement of compliance in the long run with significant reduction of hospital days be achieved. Therefore, bifocal psychoeducational intervention should be made an obligatory part of standard therapy.[36]

To support the implementation of psychoeducation into the routine treatment, the society "Deutsche Gesellschaft für Psychoedukation" (DGPE) was founded in Germany in October 2005. The DGPE can be contacted at J.Baeuml@lrz.tum.de.

Drug names: chlorpromazine (Thorazine, Sonazine, and others), clozapine (Clozaril, FazaClo, and others).

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