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The costs of community-based psychiatric care for first-ever patients. A case register study

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ABSTRACT

Background. Analysing costs measures in conjunction with psychiatric case register (PCR) data can provide important epidemiologically-based information on resource utilization. Costing the service use patterns of first-ever patients can indicate the shape and likely resource consequences for mental health services operating within a community-based system of care.

Methods. Yearly costs were calculated for the 299 first-ever patients and 768 longer-term patients who contacted the South-Verona Psychiatric Case Register between 1 January 1992 and 31 December 1993. Bivariate and multivariate analyses were used to compare costs between these groups and to test the associations between costs and the sociodemographic and diagnostic data recorded on the PCR.

Results. For all diagnostic groups identified, first-ever patients were found to be less costly to support than longer-term patients, even after adjustment for various factors, including whether patients were single consulters. When multivariate analyses were employed, between 20% and 69% of the cost variation for first-ever patients could be explained by patient and other characteristics, and the effect of the contact (first or subsequent) variable was reduced.

Conclusion. This study considered only the costs to the specialist psychiatric services but the methodology allows the likely annual resource implications of supporting new patients to be predicted from data collected at first contact. Such information can help ensure that services are adequately funded and that the resources are deployed appropriately between client groups.

INTRODUCTION

In most Western countries the focus of psychiatric care is moving from psychiatric hospitals to community-based services. Community-based psychiatric care can be defined as a highly differentiated system of care devoted to a defined population, comprising a wide spectrum of facilities, including out-patient and day-patient services, general hospital psychiatric wards, and residential services away from the hospital. A

good mental health system should ensure early diagnosis, prompt treatment in response to emergencies, and close liaison with other health and social services (Tansella, 1991).

The pros and cons of community psychiatric care have been widely discussed in the literature (Hoult, 1986; Kiesler & Sibulkin, 1987; Lamb, 1993). The results of randomized controlled trials, conducted to compare the outcomes of treatment in hospital-based and community-based services, can be synthesized as follows: when considering either clinical or social outcome, community-based services are as effective as hospital-based services and provide easier access to care, decrease the number of hospital

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days and promote greater satisfaction in patients and relatives (Fenton *et al.* 1979; Stein & Test, 1980; Test & Stein, 1980; Weisbrod *et al.* 1980; Hoult *et al.* 1983; Muijen *et al.* 1992*a,b*; Burns *et al.* 1993; Dean *et al.* 1993; Marks *et al.* 1994; Leff, 1997). Burns & Santos (1995) reviewed the literature on randomized clinical trials of interventions using treatment principles and practices consistent with the Program for Assertive Community Treatment (PACT) model, and reached similar conclusions. More recently, community-based services were found to provide better continuity of care to patients resident in their catchment area when compared to traditional services based in hospital (Goldberg *et al.* 1996; Sytema *et al.* 1997).

Studies that have compared costs of treatment by hospital and community services have shown that the latter can be cost-effective alternatives to the former (Burns *et al.* 1993; McCrone *et al.* 1994; Knapp *et al.* 1994, 1997; Quinlivan *et al.* 1995; Goldberg *et al.* 1996; Merson *et al.* 1996; Beecham *et al.* 1997). Other studies attempted to identify the variables that predict higher or lower costs (Knapp *et al.* 1995; Salize & Rössler, 1996; Knapp, 1997). One of the main variables accounting for differences in costs between patients is previous psychiatric history: patients with a longer history of illness have higher costs (Beecham *et al.* 1997). In areas where a shift has taken place from a hospital-based to a community-based system of psychiatric care it is important for policy, planning and management, as well as for clinical work, to evaluate the costs of treating new patients.

To our knowledge no studies to date have analysed the costs of first-ever patients. Thus, the first aim of this paper is to provide preliminary, descriptive information on which services these patients use in the first year after their initial contact, with what associated costs, and how these costs relate to diagnosis and personal characteristics. If there is a difference between first-ever and longer-term patients, a more accurate prediction of future resource requirements for psychiatric services that are fully community-based, or moving in that direction, could be generated for periods beyond 1 year.

Case register research has concentrated so far on the analyses of inception and prevalence rates over time and on comparing patterns of

care over different periods of time within the same area as well as between different areas. For making these comparisons, indicators such as the number of in-patient admissions, day-hospital or day-centre attendances, or out-patient contacts have been used. The second aim of this paper is to propose an additional indicator for case register studies on patterns of care: a single economic index of costs that summarizes the complex information on the amount of direct care received by first-ever and longer-term patients over a specified period of time.

The epidemiologically-based research described in this paper concentrated on all first-ever patients in contact with psychiatric services of South-Verona over a 2-year period. Four specific hypotheses were tested: (1) it is feasible to add unit cost measures to case register data in order to describe the cost implications of treatment and to calculate a cost index which summarizes all information on the amount of care received over a specified period; (2) the costs of care and treatment for first-ever patients are lower than the corresponding costs for longer-term patients; (3) the costs of treatment of first-ever patients vary between individuals in response to patient characteristics, including diagnostic group, age, gender, education, marital status, accommodation, employment status and referral source; (4) the direct costs of mental health care for patients in the year after their first-ever contact can be predicted from patient data collected at the point of first contact.

METHOD

The psychiatric services

The South-Verona area includes part of Verona (a city of about 260000 inhabitants in the Veneto region in North-East Italy) and two neighbouring small towns (Castel d'Azzano and Buttapietra). South-Verona is a mainly urban area (population density 988/km²) with a predominance of service and manufacturing industries.

The South-Verona Community Psychiatric Service (CPS), is run by the Institute of Psychiatry, University of Verona, and is the main provider of psychiatric care for the adult population. The CPS offers a range of well-

integrated hospital and community services, including a 15-bed in-patient ward at the University General Hospital, a Community Mental Health Centre (CMHC) providing day-care and rehabilitation, out-patient departments, scheduled domiciliary visits, a liaison service for psychiatric and psychological consultations for other departments of the General Hospital, a 24-hour accident and emergency department, a 24-hour staffed hostel, and sheltered apartments. The South-Verona CPS is divided into three multi-disciplinary teams, each serving a sub-sector of the catchment area.

With the exception of hospital nurses, all staff (psychiatrists, psychologists, community nurses, social workers, etc.) work both inside and outside hospital ensuring continuity of care through different phases of treatment and the different components of the service (Tansella, 1991). Close integration between hospital and community components allows early discharge from hospital and is associated with a shorter length of stay (Amaddeo *et al.* 1995a; Gater *et al.* 1995). In addition to the South-Verona CPS, psychiatric care may be provided to South-Verona residents in two private inpatient units (with a total of 220 beds), an out-patient addiction service and a few general hospital neurological wards. In accordance with the Italian psychiatric reform there have been no new admissions to the state psychiatric hospitals since 1978, and no admissions at all to those institutions since January 1982. The hospitals continue to provide care for only a few very old long-stay patients: there were eleven such people from South-Verona on 31 December 1994.

The psychiatric case register

The South-Verona PCR started on 31 December 1978 with a prevalence count and has been operating ever since. At first contact with the psychiatric service, sociodemographic information, past psychiatric and medical history, and clinical data are routinely collected for people aged 14 years and over. Contacts with psychiatrists, psychologists, social workers and psychiatric nurses are recorded. Each attendance at an out-patient clinic and each domiciliary visit is counted as a contact. The time spent for out-patient and domiciliary visits is routinely recorded but not linked to named staff members, thus minimizing the possibility that time spent

with patients would be over-estimated. Each extramural contact is recorded as 'planned' or 'unplanned', according to whether or not an appointment was previously arranged.

Diagnoses are assigned according to ICD-10 (ICD-9 until 1991) and are routinely reviewed by the director of the case register (Professor M. Tansella). Diagnosis and sociodemographic data may be updated at successive contacts, if necessary. All psychiatric services in South-Verona and the larger province of Verona provide data for South-Verona residents. Psychiatrists and psychologists in private practice and general practitioners (GPs) do not report to the register.

Patients

All patients who had at least one contact between 1 January 1992 and 31 December 1993 with services which report to the psychiatric case register and received an ICD diagnosis were included in this study, some of whom were first-episode cases (people for whom this was their first life-time psychiatric contact). Patients with a diagnosis of drug dependence were excluded as they are cared for by an independent specialist service outside psychiatric system. The costs of care provided in the 365 days following the index contact were assessed for first-ever patients ($N = 299$) and for 768 longer-term patients.

For the purposes of the present study, ICD diagnoses were collapsed into four diagnostic groups: affective disorders (ICD-10 codes F30 through F33; F34.1, .8, .9, F38; F39; F41.2; F43.20, .21, .22), neurotic and somatoform disorders (ICD-10 codes F40; F41.0, .1, .3, .8, .9; F42; F44; F45; F48; F54), schizophrenia and related disorders (ICD-10 codes F20 through F29; F84), other diagnoses (including organic psychoses, alcohol dependence, disorders of adult personality and behaviour, etc.).

Unit costs

Costs were attached to each service recorded on the PCR so as to give the best local estimates a long-run marginal opportunity costs (Amaddeo *et al.* 1995b; 1997). This is the appropriate base for economic evaluations of this kind, and ensures that both capital and running costs are included, and that the long-term resource consequences of any changes to service utilization patterns are explicitly identified and measured

(Beecham, 1995). The costs of GPs, other medical care, private psychiatrists and psychologists, medication payments by patients, and all indirect costs were excluded from this study because data on the use of these services were not available from the PCR. Costs are expressed in lire at 1993 price levels.

The costs of support and treatment provided by the South-Verona CPS were estimated by dividing the total expenditure in 1993 for each service component by the number of items of care in the same year; and included the costs of personnel (including time spent in clinical or planning meetings), administration, medication, examinations and accommodation (including capital costs). The cost of out-patient contacts was calculated taking into account the total cost of a working minute for the different professionals (psychiatrists, psychologists, social workers, nurses, etc.) and multiplying this value by the estimated time spent in each contact. For the in-patient services the cost per day was calculated and for the rehabilitation groups and the day-hospital a cost per contact was estimated. The costs of private in-patient clinics were based on the prices paid by the Italian National Health Service. The support and treatment services listed here are mainly delivered, coordinated, and funded by the public sector health service.

Costs per year

The total 1-year cost per patient was calculated using PCR data, the unit cost list and a bespoke software package, linked to the case register and designed in Verona by our research group (Amaddeo *et al.* 1997). For each patient, costs were grouped by service type: in-patient costs, included all days spent in a public or private sector hospital for psychiatric care; sheltered accommodation costs, included all days spent in public sector specialized accommodation; day-patient costs, included all contacts at day-hospitals or at the rehabilitation groups; out-patient costs, included all contacts at the out-patient department, the community psychiatric clinics, the accident and emergency department and for general hospital liaison; and community costs, included visits made to patients' or relatives' homes, visits to patients temporarily supported by other agencies, or visits by clinical staff to voluntary organizations or social services premises.

Hypothesis testing

All statistical analyses were conducted at the level of the individual patient. Chi-square tests were used to test the significance of association between sample and demographic characteristics. Analyses of variance were conducted, testing for cost differences by diagnosis (affective disorders; neurotic and somatoform disorders; schizophrenia and related disorders; other diagnoses), gender, age (14–24; 25–44; 45–64; ≥ 65), marital status, accommodation, educational attainment, employment status, job status, referral source, characteristics of the first contact with psychiatric services (planned or unplanned cases) and single or multiple consultation cases. Multiple regression analyses were conducted to test for associations between yearly costs and these patient characteristics. Separate equations were estimated using ordinary least squares regression for each of the four diagnostic groups, taking the logarithms of total costs as dependent variables (because of non-normality of residuals, and hence misspecifications of the equations without the transformation). The final version of each equation was selected on the conventional criteria of parsimony, statistical significance interpretability.

RESULTS

In 1992, 137 first-ever South-Verona patients contacted the services reporting to the South-Verona PCR (2.09 per 1000 adult inhabitants). In 1993, the figure rose to 162 (2.46 per 1000). They represent 19% and 18% of the total 1-year prevalence in 1992 and 1993 respectively. (In the calculation of yearly prevalence rates people with a diagnosis of drug dependence were excluded.)

First-ever and longer-term patients

The total and component costs of 1 year's treatment for first-ever and longer-term patients are summarized in Table 1, distinguishing the four diagnostic groups. For all four diagnostic groups, the total costs of treatment for longer-term patients are higher than for treatment of those with first life-time contact ($P = 0.031$ for people with schizophrenia and related disorders, $P < 0.001$ for the other three groups). For in-

Table 1. Component and total costs by diagnostic group and whether first-ever contact (lire, millions, 1993 prices)

	Affective disorders	Neurotic and somatoform disorders	Schizophrenia and related disorders	Other diagnoses	<i>P</i> *
Sample size					
First-ever	82	66	16	135	
Other	203	169	149	247	
Total costs					
First-ever	1.128	0.666	2.281	0.701	< 0.001
Other	5.122	2.974	16.885	6.122	< 0.001
<i>P</i> †	< 0.001	0.001	0.031	< 0.001	
In-patient costs					
First-ever	0.435	0.122	1.035	0.303	0.005
Other	2.700	1.739	7.164	3.502	0.002
<i>P</i> †	0.002	0.004	0.425	< 0.001	
Day-patient costs					
First-ever	0.107	0.050	0.028	0.010	0.426
Other	1.420	0.508	4.136	1.356	< 0.001
<i>P</i> †	< 0.001	0.083	0.002	< 0.001	
Sheltered accommodation costs					
First-ever	0	0	0	0	—
Other	0	0	4.097	0.493	0.002
<i>P</i> †	—	—	0.415	0.199	—
Out-patient costs					
First-ever	0.568	0.491	1.005	0.358	< 0.001
Other	0.715	0.592	0.826	0.554	< 0.001
<i>P</i> †	0.463	0.707	0.146	0.880	—
Community service costs					
First-ever	0.019	0.003	0.213	0.030	< 0.001
Other	0.287	0.136	0.662	0.216	< 0.001
<i>P</i> †	< 0.001	< 0.001	0.071	< 0.001	—

* Significance tests from Kruskal–Wallis test on difference between diagnostic groups within sample.

† Significance tests from Mann–Whitney test on difference between samples within diagnostic groups.

Table 2. Analyses of variance of log(cost) by frequency of contact

	Affective	Neurosis	Schizophrenia	Other
One-way ANOVA by whether first-ever patient				
First-ever patient <i>F</i>	22.67	13.52	3.17	36.02
<i>P</i>	< 0.001	< 0.001	0.077	< 0.001
Two-way ANOVA by whether first-ever and by whether single consulter				
First-ever patient <i>F</i>	18.06	14.41	7.19	18.27
<i>P</i>	< 0.001	< 0.001	0.008	< 0.001
Single consulter	136.96	102.69	203.89	53.60
<i>P</i>	< 0.001	< 0.001	< 0.001	< 0.001
Sample sizes (<i>N</i>)	285	235	165	382

patient costs, longer-term patients are more costly than first-ever patients for all groups except schizophrenia and related disorders; day-patient costs are higher in all diagnostic groups, excluding neurotic and somatoform disorders. Out-patient costs do not differ significantly for any diagnostic groups, whereas community service costs register significant differences between all patient groups except schizophrenia. Sheltered accommodation was provided to a small number of patients, belonging to only two

of the four diagnostic groups, and costs were not significantly different.

Among the first-ever patients, people who only had one contact with services reporting to the PCR formed an important subgroup: 97 first-ever patients were ‘single consulters’, none of whom had schizophrenia or a related disorder. Table 2 reports the results of analyses of variance of total costs by diagnostic group. The first part, a simple one-way ANOVA, gives results which are comparable to the non-parametric tests

Table 3. Comparison of characteristics of first-ever contact and longer-term patients

	First-ever patients		Longer-term patients		P*
	N	%	N	%	
Marital status					
Single	109	36.5	305	39.9	0.591
Married	147	49.2	354	46.6	
Divorced, separated or widowed	43	14.4	103	13.6	
Total	299	100.0	760	100.0	
Living arrangements					
Alone, or with child	29	9.7	72	9.6	< 0.001
With spouse or partner	49	16.4	508	67.8	
Alone, with child	17	5.7	34	4.5	
With spouse (or partner) and child	100	33.6	58	7.7	
With other relatives	94	31.5	62	8.3	
Other	9	3.0	15	2.0	
Total	298	100.0	749	100.0	
Educational attainment					
Illiterate or none	17	5.8	60	8.2	0.005
Primary	87	29.9	293	40.0	
Secondary	125	43.0	256	34.9	
Secondary diploma or higher	62	21.3	124	16.9	
Total	291	100.0	733	100.0	
Employment status					
Employed	129	43.1	259	34.4	0.008
Unemployed	27	9.0	90	12.0	
Housewife	67	22.4	190	25.2	
Student	29	9.7	50	6.6	
Pensioner	39	13.0	116	15.4	
Other	8	2.7	48	6.4	
Total	299	100.0	753	100.0	
Age group					
14 to 24	64	21.4	84	10.9	< 0.001
25 to 44	122	40.8	306	39.8	
45 to 64	70	23.4	254	33.1	
65 and over	43	14.4	124	16.1	
Total	299	100.0	768	100.0	

* Significance of difference on chi-squared test.

reported in Table 1. In order to test the hypothesis that these differences are due to the impact of single consulters, we also report the results of a two-way ANOVA, which reveals that although the cost difference between single and multiple consulters is indeed significant, the cost difference between first-ever and long-term patients remains significant when the former source of variation is removed.

Diagnostic groups

Table 1 also reports the cost differences between diagnostic groups for first-ever and longer-term patients (final column), which are relevant to the third hypothesis. For first-ever patients there

Table 4. Total costs by patient characteristics (lire, thousands, 1993 prices) for first-ever contact patients in 1992 and 1993

	Mean	S.D.	N	P
Gender				
Male	1071	2299	116	0.257
Female	788	1950	183	
Age group				
15 to 24	716	1307	64	0.164
25 to 44	1227	2845	122	
45 to 64	669	1144	70	
65	612	1606	43	
Marital status				
Single	1204	2421	109	0.298
Married	802	1997	147	
Widowed	345	458	26	
Separated	645	795	15	
Divorced	177	49	2	
Accommodation				
Alone	1099	2610	29	0.684
With spouse	991	3163	49	
Alone with child	359	340	17	
With spouse and child	756	1087	100	
With other relatives	969	2210	94	
Supported residence	2508	2810	3	
Other	1223	2157	6	
Education				
Illiterate	202	184	4	0.634
No education	563	1379	13	
Primary only	760	1496	87	
Secondary	914	1545	125	
Secondary diploma	1305	3743	56	
Graduate	461	410	6	
Employment status				
Employed	842	1394	129	0.603
Unemployed	1749	4086	22	
Seeking first job	1016	1397	5	
Housewife	938	2798	67	
Student	599	1062	29	
Pensioner	781	1772	39	
Other	680	1036	8	
Job status				
Manager to > skilled	1045	2810	44	0.881
Skilled and foreman	1049	1462	36	
Other employee	1107	2038	43	
Self-employed	610	809	20	
Not working	845	2225	139	
Unplanned contact				
No	729	1666	222	0.018
Yes	1380	2958	77	

were significant differences between diagnostic groups in relation to total costs ($P < 0.001$) and all component costs, except day-patient costs. Among the longer-term patients there were significant differences ($P < 0.01$) for total and all component costs. Patients with a diagnosis of schizophrenia and related disorders are most costly, followed by those with affective disorders. Note, however, that diagnostic groups (alone)

Table 5. Cost functions (dependent variable is \log_{10} total cost)

	Affective disorders		Neurotic and somatoform disorders		Schizophrenia and related disorders		Other diagnoses	
	Co-eff	P	Co-eff	P	Co-eff	P	Co-eff	P
Constant	2.721	< 0.001	0.455	0.330	2.550	< 0.001	2.527	< 0.001
Age			0.093	< 0.001				
Age squared/1000	-0.124	0.013	-1.034	< 0.001				
Male	0.386	0.003						
Single					0.955	0.004		
Div/sep/wid*							-0.329	0.007
Single male			0.703	< 0.001				
Primary education	0.528	0.004						
Secondary education					0.722	0.004		
Living alone			0.535	0.061				
In any other accomm†	0.291	0.036			-0.786	0.025		
Skilled and foreman	-0.516	0.006						
Unemployed			0.512	0.006				
Unemployed, male			-0.515	0.014				
Referred by family			0.706	< 0.001				
Referred other specialists	-0.400	0.010					-0.447	< 0.001
Unplanned							0.301	0.006
R ²	0.387		0.430		0.686		0.204	
Adj R ²	0.334		0.359		0.600		0.184	
F	7.354	< 0.001	6.043	< 0.001	8.005	0.004	10.424	< 0.001
N	76		63		14		125	

* Divorced, separated or widowed.

† See Table 3 for accommodation categories.

can explain only 9% of the inter-patient cost variation (see also Havassy & Hopkin, 1989; Kivlahan *et al.* 1991).

Patient characteristics and type of first-ever contact

The sociodemographic characteristics of first-ever and longer-term patients were compared. Summarizing the results shown in Table 3, first-ever cases are much less likely: to be living with a spouse or partner; to have higher educational attainment; or to be employed. They are more likely to be under 25 years of age, and less likely to be aged 45 to 64. It should be noted that the analyses found no significant differences between the cases whose first-ever contact was recorded in 1992 or 1993, except for accommodation where a very much higher proportion of the 1993 patients were living with relatives or in communal accommodation.

A further series of ANOVAs were performed to explore whether the treatment costs of first-ever patients vary between individuals in response to their characteristics (Table 4). There were no significant differences in total costs by

any of the demographic characteristics recorded on the PCR; gender, age, marital status, accommodation type, educational attainment, employment status and job status. The costs of patients with an unplanned first-ever contact were significantly higher than the costs of those patients who made an appointment before their initial contact. The results of the multivariate analyses which examine these potential associations simultaneously are reported below.

Cost predictions

Four series of regression equations were estimated for first-ever patients only, separating the diagnostic groups. A single equation across all four diagnostic groups was also fitted but performed much less well statistically than these separate equations. The estimation procedure, described above, produced the 'final' equations summarized in Table 5.

The first thing to notice from Table 5 is the very reasonable degree of statistical fit obtained by each of the first-ever case analyses (notwithstanding the small sample size for the schizophrenia diagnostic group): between 20%

and 69% of the observed inter-patient costs variations is 'explained' statistically by the included patient characteristics and the referral source.

These results suggest a number of inter-relationships. Older patients with neurotic and somatoform disorders or with affective disorders, cost less, but there are no other age effects. There are gender differences, males with affective disorders and single males with neurosis costing more than females. Marital status has little effect, except that single patients, with a diagnosis of schizophrenia, are more costly than others, as are single males with neurosis. The level of education attained also has a positive effect on costs, but only for people with affective disorders (those with primary education cost more) and with schizophrenia (those with secondary education cost more). Unemployed people with neurotic and somatoform disorders are more costly, yet if they are male, being unemployed reduces cost. As far as the referral source is concerned, significant effects were found only in two groups: among patients with affective disorders (those referred by doctors from medical and surgical department were less costly) and among neurotic patients (those referred by relatives were mostly costly).

Finally, cost differences were tested by type of first ever contact (planned or unplanned). Using the bivariate analysis, the mean cost for unplanned contacts was found to be nearly twice that for planned contacts ($P = 0.018$, see Table 4). However, the findings from the multivariate analyses, which are more reliable and more relevant, showed no cost differences between planned and unplanned cases, except for people in the 'other diagnoses' group, where those patients whose first contact was unplanned cost, on average, 1.1 million lire more per annum ($P = 0.005$) than planned cases.

DISCUSSION

In many countries today, as in Italy, it is increasingly being recognized that information on the costs of care can help to achieve a more cost-effective deployment of scarce resources (Amaddeo *et al.* 1995*b*; Knapp, 1995*a,b*; Percudani *et al.* 1995; Gray *et al.* 1997). Improving the cost-effectiveness of a health care system means that available resources can serve

a larger number of people and/or improve the quantity and quality of care for individual patients.

The present study has concentrated on subjects who contacted a psychiatric service for the first time in their lives, a group of patients about whom no cost studies appear to have been published so far and little is known, particularly in relation to service utilization. Scanning the literature of the last 5 years we have been able to identify only one large sample study on service use by first-ever patients. Tansella *et al.* (1995) used case register data to study the care episodes of 1423 first-ever psychiatric patients. The survival analyses showed that the duration of care episodes increased consistently from the first to the fifth episodes, and that the probability of opening a new episode of care after the first increased consistently from the second to the sixth episode. More recently, patterns of care over 2 years for a cohort of 1056 first-ever patients have been evaluated (Tansella & Micciolo, 1998).

The use of a case register for calculating costs

A unit cost list was developed and used to calculate the direct costs of all patients in contact with psychiatric services reporting to the South-Verona PCR in the years 1992–1993. Although the unit costs for each service need to be calculated carefully, and this can be quite time-consuming, it is clear that PCR data can be supplemented with cost indicators with which the financial implications of the varying service utilization patterns can be calculated. The software prepared for the South-Verona case register facilitates the aggregation of costs data by type of treatment or for different groups of patients, making routinely collected data more useful to planners and practitioners. Cost studies should, of course, be repeated periodically to reflect the evolution of psychiatric care but the developmental work described above shows that the first hypothesis can be accepted. Local case registers are increasingly being used to monitor the psychiatric care provided by different, often overlapping, services to residents in a geographically defined area. The approach described in this paper is an efficient and powerful method for assessing the cost of psychiatric care for large numbers of patients. It also provides a single economic index which summarizes the

complex information on the amount of care received over a specified period of time, which can usefully supplement other descriptive indices of service use.

Comparing costs of first-ever and longer-term patients

The results of the present study show that first-ever patients, in the first year after the index contact, were significantly less costly than the longer-term patients in contact with the same services during the same period of time. Closer examination of the first ever patients revealed that 34% were 'single consulters', that is they were seen only once in the 365-day period. This percentage is similar to that found in previous studies (43% in the 1-year follow-up study by Tansella & Micciolo, 1998; and a very similar proportion in the study by Tansella *et al.* 1995, referring to all first-ever patients seen the years 1982–1991). Many 'single consulters' were referred to the CPS by general practitioners (GPs) for screening and assessment and then referred back to GPs. The percentage of single consulters among longer-term patients was only 14%. However, after adjusting for the different proportions of single consulters there are still significant cost differences between first-ever and other patients.

The cost difference is confirmed for all diagnostic groups identified in our research. However, when total costs are disaggregated in their component parts (in-patient care or day-patient care, for example) the difference is no longer significant for in-patient and community care for patients with a diagnosis of schizophrenia, for day-patient care of patients with a diagnosis of neurotic and somatoform disorders, or for out-patient care in all four diagnostic groups.

The second hypothesis was therefore confirmed in all diagnostic groups for the total costs of psychiatric support as well as for the costs of day care and community care. The result for in-patient care in the subgroup of patients with a diagnosis of schizophrenia and related disorders (no significant cost difference) is not surprising. In South-Verona these patients are promptly admitted to hospital as needed, at the beginning of their illness as well as later on and patients are supported by the same team inside and outside hospital. Such continuity of care is particularly

advantageous for the most severely disabled and disturbed patients and has been shown to result in shorter in-patient stays for patients known to the service (Gater *et al.* 1995).

Similar amounts of out-patient care were required by longer-term and first-ever patients, but more (and more expensive) day care and community care (which includes home visits by all team members including psychiatrists) were used by the patients already known to the CPS. These data could be seen as being consistent with the experience of clinical practice. For patients with a previous psychiatric history, not only out-patient care, but all components of a community-based system of care are important; domiciliary visits, day-care and rehabilitation programmes are key service delivery modes. One implication of these results for service organisation is that resources should be dedicated to ensure sufficient provision of these types of care, alongside services provided in more traditional out-patient departments.

Our data also show that in the specialist public sector services, there are cost differences between the diagnoses, although diagnosis alone is a rather limited cost predictor. Costs are highest for patients with schizophrenia and related disorders and lowest for those with neurotic and somatoform disorders. This latter group are more likely to receive care from private psychiatrists and psychologists who do not report to the case register.

The predictive power of individual characteristics

The results of the bivariate analyses showed that no significant differences in cost were found by any of the demographic characteristics recorded on the PCR. However, these analyses ignore the more complex interrelationships which might occur between the variables. Differences do exist and they do have an impact on costs: hypothesis three was confirmed when multivariate analyses were conducted.

Among the many challenges of implementing a policy of community-based care is the prediction of service use (and, to some extent, of service needs) and the associated cost consequences. The costs of community mental health care will rarely be identical for different patients, so that the prediction of resource requirements for individual people is useful for service

planners, budget holders, purchasers and providers.

Between 20% and 69% of the observed inter-patient cost variation can be obtained statistically by the individual characteristics included in the cost functions reported above. The lowest percentage of the variance explained was found in the 'other diagnoses' group, which includes patients with a miscellany of diagnoses. The proportion of variance explained by individual characteristics in the more homogeneous groups, for example schizophrenia and related disorders, is higher.

Among patients who contacted the specialist psychiatric service for the first time in their lives, a number of variables were shown to be associated with costs: age; gender; marital status; unemployment; and referral source. While the effects of age and gender are difficult to explain and are probably related to accessibility of services, distance from home, etc., those of marital status and unemployment suggest that people who do not receive support from partners or within a work environment need more support and care from community-based public services. Where such services do not exist or are insufficiently developed a greater part of the cost burden would fall to patients and their families or needs would remain unmet. We would, therefore, have expected more significant effects to have come from the variable indicating that people lived alone as the formal services compensate for the reduced availability of care from family members or friends.

Those patients with affective disorders referred by non-psychiatric specialists had lower costs in the year following their first-ever visit. Again, a direct link can be made with CPS working practices. Most of these patients are referred by the general hospital liaison psychiatric service. After a few out-patient visits, general practitioners continue their care and treatment. The finding that neurotic patients referred by relatives were more costly is difficult to interpret. One possibility is that these patients represent a selected group of people, highly motivated to remain in continuous psychiatric care.

Previous analyses of the PCR (Tansella & Micciolo, 1998) showed that patients with a first-ever unplanned contact used considerably more community care services and in-patient

care when compared to other patients on the register. The bivariate analyses undertaken in the current study appeared to confirm this finding with higher yearly costs for those people whose index contact was unplanned. However, when multivariate analyses were performed, higher costs were confirmed only in the mixed 'other diagnoses' group. The need to use multivariate statistical methods in this field of research to tease out the interrelationships between influencing factors is again confirmed (Beecham *et al.* 1991; Knapp, 1997).

The fourth hypothesis can be accepted: it is possible to explain statistically some of the cost variations between new patients by reference to differences in patient characteristics, using information collected at the first contact with specialist services.

As a final point, two limitations of the present study should be mentioned. First, as this is a case register study, only the costs of care provided by the specialist psychiatric system were estimated; the total societal costs would be higher, although it is likely that the major areas of care and treatment have been included. Secondly, the cost evaluation was limited to the first year following the index contact. While it would be easy to solve the second problem by using the present methodology for a selected cohort over a longer period of time, the first limitation can be addressed only using appropriate instruments and a prospective research design. These studies are currently underway in South-Verona.

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