Evaluating Effectiveness and Cost of Community Care for Schizophrenic Patients

by Heinz Hafner and Wolfram an der Heiden

Abstract
The two main types of mental health services research are (1) the evaluation of the mental health sector within comprehensive systems of health care and (2) the evaluation of individual mental health facilities or types of care. Depending on the information systems available, the difficulties of evaluating complex systems of care can be partially obviated by using descriptive approaches. Structural quality can be assessed by structural indices, the functioning of a system by monitoring utilization, and the overall effectiveness of a national mental health care system roughly by health indicators. Causal analyses of effectiveness are practical when they are based on individual facilities or types of care, which can be studied as isolated systems on the basis of intervention and outcome variables. Reliable and reproducible results can be achieved only if a standardized intervention is used or if the intervention and its objectives are described clearly, the output indicators are defined in terms of identifiable and repeatable operations. The assets and liabilities of quasi-experimental designs and three types of naturalistic approaches will be discussed. When the cost of a new type of care is compared with the cost of traditional mental health care, the section of the population actually served out of the total of patients with comparable needs for care should be considered. Results from the authors' studies will show how the neglect of this epidemiological aspect can lead to false statements.

Two Levels of Evaluation: Systems and Individual Components
The two main levels on which mental health services research as a domain of evaluative research is carried out are (1) the mental health sector within a national, regional, or community health service and (2) the individual mental health facilities or types of care. The first level is characterized by a system aspect, in which mental health care is perceived as a component functioning within a more comprehensive care system.

Evaluating National Health Systems. The more complex a care system, the more complex its qualitative, economic, and particularly its functional goals. Because of this complexity, the evaluation of a particular integral component (e.g., the mental health sector) is more difficult, the more its functions are consecutively or simultaneously connected with those of adjacent sectors. An example of consecutive connectedness is the aftercare provided by social services for the socially disabled mentally ill after their discharge from a hospital. An example of simultaneous connectedness is internal medical and psychiatric care in the case of attempted suicide by severe intoxication.

A comprehensive description of the care provided relies on systems of health data (table 1) that are not limited to subsectors such as hospital statistics. The structural quality of services can be assessed to a certain extent on the basis of structural indices or conventional norms, such as number of physicians per hospital admission or beds per room. It is more difficult to assess aspects of effectiveness, for example, whether the needs of the population served are met. Waiting lists may be an indication of an inadequate organiz-
Table 1. Mental health care information systems

<table>
<thead>
<tr>
<th>System of data collection</th>
<th>Missed information about</th>
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<tbody>
<tr>
<td><strong>Continued registration</strong></td>
<td>Multiple contacts</td>
</tr>
<tr>
<td>Hospital statistics (population based)</td>
<td>Complementary services</td>
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<tr>
<td></td>
<td>Psychiatric outpatient care</td>
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<tr>
<td></td>
<td>General practice</td>
</tr>
<tr>
<td></td>
<td>Unmet needs (population morbidity)</td>
</tr>
<tr>
<td><strong>Case register (population based; case related)</strong></td>
<td>Complementary services</td>
</tr>
<tr>
<td></td>
<td>Psychiatric outpatient services</td>
</tr>
<tr>
<td></td>
<td>General practice</td>
</tr>
<tr>
<td></td>
<td>Unmet needs (population morbidity)</td>
</tr>
<tr>
<td><strong>Discontinued registration</strong></td>
<td>Part of population not in contact</td>
</tr>
<tr>
<td>General-practice studies</td>
<td></td>
</tr>
<tr>
<td>Population studies (including cases in residential care)</td>
<td></td>
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</tbody>
</table>

or insufficient supply of a certain type of care. Needs for care not assessable from utilization data can only be elucidated, in a sporadic way, by collecting additional data, for example, in general practice or population studies (Wing 1972).

The evaluation of the functioning of complex systems such as national health services is usually based on rough indicators, such as general morbidity and mortality trends, perinatal mortality, suicide, number of avoidable deaths (Holland 1988), or degree of consumer satisfaction. But it is difficult to determine whether such rough indicators actually reflect the effectiveness of or deficits in a health care system or whether they are influenced by other factors such as economic cycles or health behavior of the population.

**Monitoring and Evaluating Community Mental Health Services.** Descriptive analyses of small-scale systems of care (e.g., at the community level, representing national health systems in miniature) provide valuable information for the interpretation of national health care statistics (Wing and Bransby 1970). At the community level, more detailed, comprehensive, and case-related utilization data can be obtained and, thus, a better basis for the understanding of functional associations. These data have substantially contributed to understanding changes in the functions of mental health and social services in general and in the care of the socially disabled mentally ill in particular during the transition to community-based care (Wing and Hailey 1972; Wing and Fryers 1976; Häfner and Klug 1980, 1982; Gions et al. 1984; Häfner 1985; ten Horn et al. 1986).

Continued documentation and analysis (monitoring) of the use of a delimited health care system also makes possible its objective control and management.

**Assessment of the Effectiveness of Services and Interventions**

Although descriptive evaluation is important as a social process of judging the worth of an activity free from the pressure of providing evidence of causality (Suchman 1967), it cannot replace causal analysis of effectiveness. The latter is indispensable for the assessment of new forms of care in particular and hence for reforming mental health care (McInnis and Kitson 1977). The analysis of a causal relationship between an intervention and an assumed outcome requires consideration of intervening variables and exclusion of possible competing explanations. A prerequisite is the isolation of a clear-cut system, including intervention and outcome variables, and the use of a design permitting the control of confounding and intervening variables.

These conditions are usually easy to fulfill when individual services or therapy programs are evaluated. In the evaluation of entire health care systems, however, this approach is usually employed without paying attention to the care delivered by other services or facilities as a factor that might also account for the effect. This problem can be at least partially solved by taking a patient cohort as a starting point for the investigation, instead of limiting the information about the intervention to a particular program or service. In this way all interventions on patients can be assessed under naturalistic conditions and assigned to individual patients, irrespective of the facility supplying them. This approach is recommended especially for the evaluation of the complex care of the socially disabled mentally ill in the community. Figure 1 depicts the utilization behavior of a cohort of 148 schizophrenic patients over a period of 18 months, it shows high variations in the frequency and combination of contacts with various services.
Objectives and Outcome Criteria of Mental Health Care

The evaluation of the outcome of an intervention requires the assessment of its contribution to the attainment of a defined objective. The following five characteristics are central to this approach (see Weiss 1972): (1) explicit definition of goals and objectives, (2) output indicators, (3) design, (4) measurement of variables, and (5) program evaluation.

Goals. Usually, there is agreement on the general goals of psychiatric care, for example, reduction or containment of mental morbidity (Wing 1973). Concrete, operationalized objectives are far more difficult to define. If, however, the global goals of mental health care are not translated into the specific operational objectives of a mental health service, it is impossible to define concrete measures for their realization and to sensibly assess their effectiveness (Rossi et al. 1985).

A classic example is the ongoing reform of the mental health care system. The decisive goals are the discharge of long-stay patients, the reduction or closing of public mental hospitals, and the development of complementary services in the community. These goals contain implicit value judgments, for example, that life in the community is of higher quality for the mentally ill than life in a mental hospital. This statement is true for those patients capable of leading a better life outside the hospital, but we do not know exactly what proportion of patients that includes.

Reduction of inpatient treatment has been laid down as an operative objective of mental health services, and indices of inpatient treatment have become the most frequently used outcome criterion in mental health services research, while readmission to the hospital is a synonym for "relapse" and "recidivism" (Herz and Melville 1980; Falloon et al. 1983; Falloon 1984). This development has been supported by economic factors: inpatient treatment is the most expensive form of care; thus, reduction of its share in total care reduces costs.

Output Indicators. Indices of inpatient treatment, like readmissions, are indispensable indicators of the process of care. Their usefulness as output indicators in the sense of im-

Figure 1. Analysis of patient streams: Type of care

<table>
<thead>
<tr>
<th>POINT OF TIME</th>
<th>INPATIENT</th>
<th>SHELT. HOMES</th>
<th>OUTPATIENT</th>
<th>NO AFTERCARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>148</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>136</td>
<td>4</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>115</td>
<td>14</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>87</td>
<td>14</td>
<td>37</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>70</td>
<td>12</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>63</td>
<td>17</td>
<td>55</td>
<td>13</td>
</tr>
<tr>
<td>36</td>
<td>25</td>
<td>27</td>
<td>65</td>
<td>31</td>
</tr>
</tbody>
</table>

proved mental health or social skills, however, is questionable. Decisions on hospital admission or discharge are not influenced solely by the mental state of the patient. In the case of socially disabled mentally ill persons in particular, these decisions are influenced by the availability of financial and social resources, by community acceptance, and by hospital factors such as bed capacity and discharge policy. A better adjustment of treatment objectives to the needs of patients requires the expansion of the outcome criteria. In addition to the so-called care indices, decisionmakers must consider degree of symptomatology, level of social functioning, and consumer satisfaction as an indicator of quality of life.

Most evaluative studies of mental health services use the three care indices discussed below. All three are related to inpatient treatment and only indirectly, if at all, associated with indices of mental health.

1. Readmission or readmission rates oriented according to the operational objective of aftercare, that is, reduction of readmissions to inpatient care (see Mayer et al. 1973; Franklin et al. 1975; Kirk 1976; McCranie and Mizell 1978; Nuehring et al. 1980). Point in time and length of readmission are not considered here.

2. Total length of inpatient treatment per time unit (see Byers et al. 1979; Dincin and Witheridge 1982). This measure is relevant for the cost aspect and expresses the length of absence from normal social life. As an outcome measure it is based on the assumption that a successful intervention stabilizes the patient's mental state so that, if a readmission occurs, the patient can be restored more rapidly and discharged sooner.

3. Time spent outside the hospital before readmission (see Kirk 1976; Beard et al. 1978; Solomon et al. 1984). With this criterion complementary to length of inpatient treatment, a similar association with outcome is assumed, that is, the intervention under study stabilizes the patient's mental state, permitting a longer stay in the community and outside hospital.

The three outcome indices differ in their value as evaluators of the effectiveness of mental health services (figure 2). First, additional assumptions must be fulfilled; second, conclusions drawn on the basis of the indices are less valid as the indices are less informative. With the criterion "number or rate of readmissions to inpatient care," single readmissions whose length is not taken into account may be classified as more favorable than repeated readmissions. However, it must be guaranteed that changes in the number of readmissions are not counterbalanced by length of stay in hospital. For example, it must be ruled out that one long-term inpatient treatment will be judged better than two short-term hospital stays.

When indices containing "readmission/readmission rates" and "total length of inpatient treatment" are combined, the problems discussed above are less pronounced. They allow a precise measurement of the assumed outcome without requiring additional assumptions about frequency, point in time, and length of readmission. As far as the assumption about the stabilizing effect on mental state of the intervention under study is concerned, the use of the two indices (time spent in the community before readmission and

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**Figure 2. Indices of inpatient care in evaluative research**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Characteristic feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number or rate of readmissions to inpatient care</td>
<td>A and B are regarded as more favorable than C and D; length of stay is not considered</td>
</tr>
<tr>
<td>2. Total length of inpatient episodes</td>
<td>A and C are regarded as more favorable than B and D; number of readmissions is not considered</td>
</tr>
<tr>
<td>3. Length of stay in the community before readmission</td>
<td>In combination with no. 2, sufficient assessment of disease course is possible</td>
</tr>
</tbody>
</table>
length of stay in the hospital after readmission) allows the necessary distinction between the two spheres of effect to be made. The latter index, length of inpatient treatment, is presumably determined by other disease variables as well as by hospital variables rather than length of stay in the community, as shown by our own study (figure 3; Häfner and an der Heiden 1989c). The additive measure of the outcome criteria "total length of inpatient episodes" alone does not pay attention to the point in time of readmission nor does it distinguish between frequent ("revolving door") readmissions and extended hospitalization. Our own results with representative cohort of schizophrenic patients placed in complementary care (Häfner and an der Heiden 1989c) revealed a significant effect of complementary care on the interval before the first readmission, but no effect at all on length of stay after readmission.

**Design.** Comparative studies of different forms of mental health care must compensate for lack of knowledge about or absence of opportunities for evaluating individual therapies within the framework of a mental health care system. This is usually done by making assumptions about the homogeneity of the care delivered. An outpatient contact or an inpatient episode must be subsumed under a category of care irrespective of the treatment or therapy actually administered. To quantify contacts with various services, an der Heiden and Klug (1980) have proposed a two-dimensional matrix. Based on short time periods, the matrix is designed for a case-related analysis of the utilization of particular health services over time and an exact assessment of their direct costs (figure 4).

In order to draw at least sufficiently plausible conclusions about the outcome of complex programs of care, it is necessary to study patient groups characterized by more or less homogeneous needs. It is hardly possible to interpret differences in the outcomes of care provided for heterogeneous patient groups, such as patients discharged from the hospital.

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*Figure 3. Survival analysis: The effect of “frequency of outpatient psychiatric contacts”¹*

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Figure 4. A chart scheme for recording use of mental health care facilities

<table>
<thead>
<tr>
<th>TYPE OF SERVICE</th>
<th>INTERVALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>INPATIENT</td>
<td></td>
</tr>
<tr>
<td>DAY HOSPITAL</td>
<td></td>
</tr>
<tr>
<td>SHELTERED HOME</td>
<td></td>
</tr>
<tr>
<td>SHELTERED WORKSHOP</td>
<td></td>
</tr>
<tr>
<td>PSYCHIATRIC OUTPATIENT CLINIC</td>
<td></td>
</tr>
<tr>
<td>PRIVATE PSYCHIATRIST</td>
<td></td>
</tr>
<tr>
<td>GENERAL PRACTITIONER</td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
</tr>
<tr>
<td>NO AFTERCARE</td>
<td></td>
</tr>
</tbody>
</table>


with various diagnoses.

For the mental health services studied, the appropriateness of the care provided is especially important. In evaluative studies, there is frequently no guarantee that every patient receives the care that meets his or her specific needs. Wing et al. (1972), for example, showed that occupational therapy can make excessive demands on a chronically ill person and thus have an unfavorable effect.

Consequently, there are certain prerequisites for a sensible evaluation of any type of care:

1. A standardized treatment program with specific active components must be used. If this is impossible, as is the case with studies of “natural” systems of care, the treatment program must at least be reproducible by a description of all its active components.

2. The active components of the program must be administered appropriately, that is, only when indicated.

3. Differences in outcome must not be accounted for by other factors. For example, a high proportion of severely socially disabled dropouts means that there is a selection of cases with favorable extramural care prognosis (Häfner and an der Heiden 1989b).

The main purpose of an evaluation design—the assessment of effects—must be described in detail and the method selected be well founded (Rossi 1982). The control and exclusion of rival explanations are particularly important. A study is said to possess internal validity if it is possible to explain changes observed in one variable by changes in another variable. A prerequisite is that factors that can produce measurable changes in the dependent variable are controlled for. External validity refers to the applicability of the results to conditions outside the study setting. To achieve this aim, representative populations must be used and all relevant variables and situational conditions must be objectively assessed.

The aim of the evaluation of extramural programs is to elucidate the influence of treatment facilities or interventions on disease course. In this context three categories of factors that influence outcome can be distinguished (figure 5; Häfner and an der Heiden 1989b):

1. The first category is the intervention under study (in our model the independent variable denoted by A), whose influence on the dependent variable B is investigated.

2. The second category includes variables (C) that do not correlate with the independent variable, but exert an influence on the dependent variable B, for example, “length of stay in the community.” A group of variables of this category—denoted by X in our model—are left unconsidered in the majority of evaluative studies. An example is the reduction of hospital beds, a purely administrative decision in many places that results in a shortened average length of stay irrespective of therapeutic success.

3. The third category contains confounding variables (Y) that correlate with both the dependent variable and the independent variable “extramural care.” A typical example is the so-called Hawthorne effect of model programs, which leads to effects not reproducible under normal conditions.
Figure 5. Model of a design for the evaluation of causal effects

Variables usually not controlled for

- Confounding variables (e.g., Hawthorne effect)
- External intervening variables (e.g., living conditions in the community, reduction of hospital beds)

Variables controlled for

- Intervening variables (e.g., severity or chronicity of illness)
- Intervention variable (e.g., extramural care)
- Outcome variable (e.g., length of stay in the community)

Variables of category 2 determine internal validity, whereas variables of category 3 influence external validity and, thus, the generalization of the results. A central objective of evaluative studies should be the control, if possible, of all relevant variables.

The (quasi-) experimental approach. The classic design for the elimination of the influence of intervening variables in causal analysis of outcome is experiment. Newcombe (1988) recommends that the classic “randomized clinical trial” be adopted as a norm in all evaluative studies of mental health care, but this is wishful thinking.

The simplest experiment is to set up various conditions of care and to measure their effects on outcome variables. At least one of these conditions—no-treatment controls—enhances the validity of the results concerning the actual treatment effects. To eliminate further confounding factors, randomization is used. The aim of the random allotment of patients to the experimental and the control group is to obtain a study population homogeneous with respect to all additionally relevant characteristics at the outset of the investigation. However, random allotment of patients to presumably inferior treatment programs and to placebo treatment in particular is being increasingly criticized on ethical grounds.

The naturalistic approach. Observation studies based on a naturalistic design play an important role in the evaluation of mental health services. The following three approaches can be used:

1. The patients under study are a posteriori placed in two or more subgroups according to the occurrence or frequency of an event relevant for the assessment of treatment outcome, for example, readmission to inpatient treatment. The subgroups are studied for significant differences in their utilization behavior.

2. A group of patients is observed with respect to their utilization of selected services over a certain period of time. Depending on the utilization data obtained, the group is divided into two or more subgroups and compared in terms of outcome criteria.

3. The effects of the utilization of different services with one another are directly compared (e.g., Vitale and Steinbach 1965). An example of this approach is the attempt to evaluate the closing down of two large mental hospitals in London (Friern and Claybury) and the concurrent establishment of community-based services (Leff 1988). In this study, two subgroups from the total group of long-stay (1 year or longer) patients were compared with one another: patients discharged to complementary services (group homes, hostels, private landlords, foster homes) and patients who remained in the hospital.

The three designs discussed differ in terms of three dimensions—degree to which situational conditions are controlled for; degree of controlling for or randomness in the administration of an intervention; and inclusion of a control group, ideally representing a random sample from a treatment population. When no randomization is possible, control groups should be arranged by paralleling or pairwise matching with respect to intervening variables.

Evaluative studies based on a naturalistic design also attempt to exclude alternative interpretations. The lack...
of control for intervening and confounding variables by random assignment must be counterbalanced by their explicit measurement and inclusion of assumptions about their effects in the study design. This means that all relevant variables must be carefully assessed and their contribution to the outcome of an intervention must be controlled and quantified using suitable techniques (Hafner and an der Heiden 1989a).

The advantage of such a design is its applicability to the natural conditions of complex mental health care programs, as far as the latter can be isolated from more complex systems.

Our study of a sample of 148 successively admitted schizophrenic patients in Mannheim may serve as an example. The patients were examined prospectively in four cross sections over 1.5 years. Figure 6 shows a diagram of the design. The first year of observation was regarded as the intervention period, the last 6 months as the outcome period. The intervening variables considered (symptomatology, duration of the disease, and living conditions) are marked by thin lines in the diagram. Their influence on the outcome variables was obtained by regression analysis and subtracted from the influence of the intervention variables (marked by thick lines). The results of this study indicate that a large number of social and illness variables must be considered to interpret the differences in outcome and cost correctly.

**Figure 6. Model of analysis**

By comparing the cost and effectiveness of different therapeutic strategies administered to the same target populations, it is possible to identify the program that costs least.

**Direct Costs as an Indicator of Appropriate Care**

By studying representative populations of chronic schizophrenic patients, Hess et al. (1989) in Bern, Switzerland, and Hafner et al. (1986) in Mannheim, Federal Republic of Germany, compared the costs of the total network of extramural services offered in defined catchment areas with those of continued psychiatric hospital care on the basis of directly measurable costs of medical, psychiatric, and social services. Both studies showed that the costs of extramural care, including readmission when relapses occurred, were more than 50 percent lower than the costs of continued hospital care (figure 7).
By analyzing the distribution of the costs per case in this study, we show that the findings are applicable only under certain conditions. With increasing proportions of chronically ill and disabled patients in extramural care, the average costs will increase as the more intensive care of the severely ill and disabled produces considerably higher costs than that of less severely disabled patients discharged from the hospital before them. At the same time, the psychiatric inpatient population will change, because fewer slightly ill and increasing numbers of severely ill patients are admitted.

Obviously, this epidemiological aspect of the utilization of health services is an important frame of reference for the generalization of results of small-scale evaluative studies and direct-cost analyses, which may eliminate certain sectors from the continuum of severity of illness or disablement for the care program measured. A comprehensive and continuous documentation of the utilization of the whole network of services by the population of a catchment area is of decisive importance for the interpretation of results yielded by studies covering only selected patient groups or programs and limited time periods.

References


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