COST OF ILLNESS OF SCHIZOPHRENIA

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ABSTRACT

Economic evaluation provides a methodology that allows policy makers, managers and clinicians to make choices between differing treatments, settings and illnesses in order to facilitate the judicious use of scarce resources. There are several methods of economic evaluation, cost of illness being one of them. Schizophrenia imposes huge economic impact on individuals, families, and communities. This paper attempts to review the issues related to carrying out cost of illness studies, the findings of cost of illness studies done for schizophrenia from various countries and various sociodemographic and illness factors which influence cost of illness of schizophrenia.

Key words: Schizophrenia, Cost of illness (COI), direct cost, indirect cost

INTRODUCTION

An estimated 20 million people worldwide suffer from schizophrenia [1]. The Global Burden of Disease Report [2] quotes a point prevalence of 0.4% for schizophrenia. Schizophrenia is a severe disorder that typically begins in late adolescence or early adulthood. It is characterized by fundamental distortions in thinking and perception and by inappropriate emotions. It follows a variable course, with complete symptomatic and social recovery in one third of cases. In the rest it generally follows a chronic or recurrent course with residual symptoms and incomplete social recovery. The residual symptoms include lack of interest and initiative in daily activities and work, social incompetence and inability to take interest in pleasurable activities. These cause continued disability and poor quality of life. These symptoms can also place considerable burden on families [3].

Economic evaluation is concerned with the best use of limited resources and occurs in a decision-specific context of identifying the most efficient way of meeting a stated objective. Its main function is to allow policy makers, managers and clinicians to make choices for achieving objectives by assessing the costs and benefits of each chosen method. Health–care budgets are limited. However, there is no limit to expenditure if all existing demands are to be met. Finite resources, and the discrepancy between the demand and the available supply, suggest that a formula be evolved for allocating resources among the various competing sectors. The choice has to be made between differing treatments, treatment settings, and illnesses to allow judicious use of scarce resources [4].

The economic impact of schizophrenia is wide ranging, long lasting and huge. Schizophrenia imposes a range of costs on individuals, families, and communities. Part of this economic burden is obvious and measurable, while other parts are almost impossible to measure. Among the measurable components of the economic burden are health and social service needs, lost employment and reduced productivity, impact on families and caregivers, levels of crime and public safety, and the negative impact of premature mortality. The part that cannot be measured in monetary terms is called intangible costs and includes effects on the patients in the form of stigma, stress and treatment side effects, and on the caregivers in the form of stress, psychiatric morbidity and stigma [3]. Therefore, measuring the economic burden imposed by schizophrenia on the family and society has been an important endeavor. Several studies have tried to document the cost of schizophrenia in terms of treatment expenses, family spending, loss of manpower etc.

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METHODOLOGICAL ISSUES IN COST OF ILLNESS STUDIES

Costs of illness (COI) studies describe the economic burden of disease on society. Cost of illness studies also allow for comparison between different illnesses. COI studies emphasize the issue of cost containment as well as the benefits of total elimination of the disease. COI studies can draw attention to disorders with an overall high burden; disorders with poor investment in services and other resources used in their treatments; the possible impact of preventive measures on primary, secondary and tertiary prevention; comparison with other disorders in a common currency. An important limitation to COI studies in estimating the economic burden is that costs of health service intervention reflect the existing pattern of service delivery [4].

The COI methodology is based on the human capital approach, which assumes an individual's value to the society in his or her production potential. This methodology distinguishes between direct costs, which are resources used for treatment of the illness, and indirect costs which estimate the lost or reduced productivity of the individual as a consequence of the illness. The COI approach doesn't explicitly refer to treatment interventions. Nevertheless, it is useful in identifying the burden of the disease on society in economic terms, in identifying possible areas for future intervention, and in prioritizing health-care expenditure. In this way, the COI approach forms the basic building block for more sophisticated and advanced methods of economic evaluation such as the cost-benefit or cost-utility analysis [5].

COMPONENTS OF COST PACKAGES

The various components of cost estimation are direct costs, indirect costs, hidden costs and non-measured costs or intangible costs. **Direct costs** are the actual monetary expenditure related to treating an illness or disorder, i.e. it includes costs associated with hospitalization, outpatient services, nursing care, drugs, services of a range of professionals, residential care, day care, domiciliary care and rehabilitation etc [4,6]. It includes provider's cost which is the cost borne by the hospital for providing medical facilities [4]. **Indirect costs** concern the monetary value of lost output due to reduced or lost productivity of patients and caregivers, caused by illness, disability or injury of patients [7], family costs in looking after a sick relative, and cost of various allowances[4]. Some authors also include costs associated with public awareness campaigns, crime control and health insurance, and losses due to premature death[8]. **Intangible costs** cannot be expressed in monetary terms, and include effects on the patient in the form of stigma, stress, and treatment side effects; and on the caregiver in terms of stress, stigma and psychiatric morbidity [4]. Usually the costs of interest vary depending on the economic perspective of the investigator. If a study is conducted from the perspective of a health care system it will be concerned with direct costs only. But if a study is conducted from the point of burden on society as a whole (macroeconomic perspective), data would be collected on both direct and indirect costs. Finally, if a study conducted with the individual as a focus (a microeconomic perspective), it will include direct, indirect, and intangible costs[9].

TYPES OF COST OF ILLNESS STUDIES

Several different methodologies have been used to compute costs as a part of the COI studies. These can be based on either prevalence or incidence rates, and employs either a top-down or bottom-up approach.

The underlying rationale of the prevalence-based method is that costs are assigned to the year in which they are borne. This type of costing identifies the major contributors to current expenditure. Expected future earnings lost as a result of premature death are assigned to the year of death. If cost control is the aim of the exercise, this approach allows identification of possible targets for economizing. It can be of great help when societal burden of two diseases are compared. The incidence approach is based on the principle that the flow of costs associated with disease should be assigned to the year in which that flow begins. All future direct and indirect costs are estimated and discounted so that they can be measured in monetary terms of the year in which the illness first occurs. It is assumed that once the illness has occurred the society at one level or another is committed to meet the streams of cost that will be associated with the illness. This approach is useful because it can provide prediction about the likely long-term impact of programs that reduce incidence, make treatment less costly or improve outcome. An incidence- based COI study is helpful when one has to decide between alternative methods of interventions, because an intervention will affect all future treatment costs and productivity losses[10]. One or the other method is chosen for different reasons. When information is required about the economic burden of disease on the society as a whole, or to compare the economic burden of one disease with another, a prevalence-based COI approach is more helpful[11]. Study designs employed in the COI method could either be based on diagnostic category data from general population surveys, or on cost projections from previous studies, or on responses from individual subjects[12].

Methods used in estimating direct Costs: Most of the COI studies use either of two computational methods to determine the direct costs of disease: a "top-down" ap-

proach or a "bottom-up" approach. The 'top down' method uses data on total health expenditures and the disease-specific rates of health-care utilization to arrive at disease-specific cost estimates. In contrast, the 'bottom-up' approach is based on individual units of service performed. It measures the average costs of such services, and applies this data to the total number of health-care encounters related to the disease.

Methods used in estimating indirect Cost: Three alternative approaches have been advocated for the estimation of indirect cost, those are: a human capital approach, willingness-to-pay or contingent valuation approach and a friction cost approach. The human capital approach views the individuals as producing a stream of output that is valued at market rates, and the value of life is the discounted future earnings. The willingness to pay approach values life according to what individuals are willing to pay for a change that reduces the probability of illness or death. This is more difficult to measure, for it takes into account perception of pain and suffering associated with a condition [13]. Friction costs represent the costs associated with the replacement of a sick worker. The concept behind the use of friction costs is that production losses due to illness may not be as great as expected, because existing labor pools and workplace structures can absorb some of this lost productivity. Friction costs include costs associated with the amount of time needed to replace a sick worker, training costs for new or temporary employees, and costs associated with any decrease in productivity during temporary work absence of the sick employee, or from the substitution of the workforce needed to replace the sick employee [14].

Methodological Issues in relation to cost instrument: A cost instrument should capture the information that would enable comprehensive costs to be calculated. It is realized, that there are limits as to how comprehensive a cost evaluation should be. Collecting data on every possible cost may sacrifice the accuracy of measurement. It may sometimes be preferable to ensure that the major costs are measured with utmost accuracy with perhaps less emphasis being placed upon minor services. The time-scale during which costs are measured is crucial. It is important to choose a length of time that would be a representative example of the user's service receipt. A three to six month period is usually acceptable [15]. Several strategies can improve the reliability of the costing data. Four basic rules for cost analysis have been suggested. Cost should be measured comprehensively and they should clearly reflect the perspective from which the analysis is undertaken. Secondly, cost differences between patients should be closely examined for a potential explanation of the variation. Thirdly, cost comparisons should ideally be based on comparable samples. Lastly, wherever possible cost information and outcome data should be combined [4].

FINANCIAL BURDEN OF SCHIZOPHRENIA

Various aspects of burden on the family have been studied, including financial burden, social discrimination, restriction of social and leisure activity, effect on health of others etc [15-19]. Among all these, financial burden was found to be a common area of burden, especially in studies from India [16,18,20]. This was truer when the person was an earning member of the household [20]. Schizophrenia imposes a high financial burden because of various reasons. These include early onset, which may lead to lifelong disability; disease chronicity, which may result in long-term morbidity; hospitalization and maintenance drug therapy; and social and economic effects on caregivers, like expenditure incurred due to extra arrangements, loans taken or savings spent, putting off any planned activity because of the financial pressure of the patient's illness etc [21]. Financial constraints further lead to poor drug compliance and relapse, which further perpetuates the financial burden.

RESEARCH ON COST OF ILLNESS IN SCHIZOPHRENIA

Schizophrenia is arguably one of the most costly mental illness in terms of its impact on the economy, on the health system and on patients and their families [22]. A number of studies have attempted to calculate the cost of care of schizophrenia in developed countries. The findings of these studies show wide variations because of methodological dissimilarities. In contrast, there are only few studies of cost of illness from developing countries where comprehensive costing has been undertaken [4].

Findings from developed countries

Costs as percentages of annual health care budgets: The cost of illness of schizophrenia has varied from 1.6-2.5% of the annual health care budgets as shown in table-I. These data were obtained by combining the average cost of treating a person with schizophrenia with estimates of the prevalence of the disease in that country.

Actual costs: The total cost of schizophrenia has been studied mainly in the U.S.A. and the U.K., and has varied from 2.35 billion US dollars to 3270 billion U.S. dollars per year for all patients of schizophrenia depending on the type of methodology and year of study as shown in table-I. Most of these studies have been prevalence-based, but have used different methods to estimate the cost, for example, Goeree et. al.,[32] used a method called

Table I
Cost of illness studies from different countries

Authors	Year of estimation	Country	Cost as % of health care budget	Costs per annum for the country in billion US $	Direct treatment cost in Million US $	Direct treatment cost per patient in US $
Evers & Ament, 1995 [10]	1989-90	Netherlands	2		518	12,470
Rice & Miller, 1996 [23]	1990	USA	2.5	32.5	17296	6,918
Dehert et. al.,1998 [24]	1994	Belgium	1.9		304	12050
Davis & Drummond, 1993 [25]	1987	UK	1.6	3270	397	1670 #
Andrews et. al.,1985 [26]	1975	Australia			8.8	11,074
Lund, 1994 [27]	1992	Denmark			562	14,312
Rund & Ruud, 1999 [28]	1994	Norway			164	39,000
Salize, 2001[29]	1994	Germany	2			
Gunderson & Masher,1975 [30]	1975	USA		11.6-19		
Knapp ,1997 [31]	1992/93	UK		2.6		
Goeree et. al., 1999 [32]	1996	Canada		2.35		
Wiersma et. al., 1995 [33]	1979	Netherlands				17,000
Fischer & Barrelet, 1987 [34]	1981	Switzerland				12,300
Guest et. al.,1996 [35]	1988-93	Sweden/UK				31,076
Davis & Drummond, 1994 [36]	1990	U.K.				3,560
Wistedt,1992 [37]	1990	Sweden				17,285
Hu et. al.,1996 [38]	1990	USA				31,890
Kavanagh et. al.,1995[11]	1991-93	UK				17,421
Salize & Rossler,1996 [39]	1994	Germany				18,377
Guest & Cookson ,1999 [40]	1992-97	UK				23,000 #
Knapp et. al., 2002[41]		Europe				5038 #
Wu et al, 2005[42]	2002	USA		62.7	3030	

 # in pounds

Table II
Percentage of Direct and Indirect Cost

Study	Type of Study	Direct Cost	Indirect Cost
Tarricone et. al., 2000 [5]	Prevalence	30%	70%
Guest et. al., 1996 [35]	Incidence	51%	49%
Kissling et. al., 1999 [43]	Prevalence	13%	87%
Goeree et. al., 1999 [32]	Prevalence	48%	52%
Davis & Drummond, 1994 [36]	Incidence	19%	81%
Rund, 1995[44]	Prevalence	51.5%	48.5
Rice & Miller,1996 [23]	Prevalence	53.2%	46.8%
Davis & Drummond, 1993 [25]	Prevalence	18%	82%
Gunderson & Mosher,1975 [30]	Prevalence	15-30%	70-85%
Guest & Cookson ,1999 [40]	Incidence	49%	51 %
Wu et al, 2005 [42]	Incidence	48.5 %	51.5 %

the "friction cost approach" to assess the indirect costs, but did not take into account earning-loss due to unemployment of caregiver. Similarly, they estimated the direct cost borne by the health agencies, but did not consider the financial cost to the families. The wide variations in actual costs are probably a result of these methodological variations.

Direct treatment costs: Many studies have evaluated direct treatment costs of schizophrenia. Most of these studies have focused mainly on the cost borne by the health-care system. This has varied from 8.8 million US dollars to 17,296 million US dollars per year as shown in table-I. Direct treatment cost per patient has varied from 3560 U.S. dollars to 39,000 US dollars per patient per year as shown in table-I. Inpatient care has been found to be largest cost driver for direct costs, suggesting that relapse prevention is the key to reduce health care costs.

Direct and indirect costs: Studies comparing direct and indirect costs have come up with mixed results. There is a wide variation in percentage attributed to each, depending on the type of study. Direct costs have ranged from 13%-53% of the total cost, and indirect costs from 47%-87% as shown in table-II. On the whole, however, different authors have claimed that either the proportion of direct costs and indirect costs are nearly equal [1, 23], or that indirect costs are three to four times higher [26, 30,36].

Drug cost: Studies have constantly shown that drug costs forms a minor bulk of the total cost, varying from 2%-5.6% of the total cost [35, 45]; and 3%-5% of the direct cost [25].

What becomes evident from the above review is that although various attempts have been made to calculate the cost of schizophrenia, all the expenditures due to the illness has not been taken into consideration in most of the studies. Further, there is a wide variation in the percentage of direct and indirect costs, mainly due to the method used to calculate indirect costs.

Comparison with other illness: The cost of illness of schizophrenia has been compared with both physical and psychiatric illness, and the consistent finding is that the cost of care of schizophrenia is much more than other illnesses. Andrews et. al.,[26] showed that cost of illness of schizophrenia was six times higher than that of myocardial infarction. Rice & Miller[23] reported that schizophrenia accounted for 22% of the total cost of all mental illnesses, compared to affective disorder which accounts for 20.55%, anxiety disorder which accounts for 31.5%, and other mental disorders which account for 26% of the total costs. The financial burden due to schizophrenia was disproportionately large when the prevalence of various disorders was considered [23]. Burns & Raftery [46] showed that care of patients with schizophrenia was twice as expensive as care of patients with other psychiatric disorders. Grassi et. al.,[47] found that overall direct cost of schizophrenia was more than the neurotic disorders, but they did not find any significant differences in costs of inpatient services and drugs administration between the groups.

FINDINGS FROM DEVELOPING COUNTRIES

There are only few studies from developing countries which have calculated the cost of psychiatric illnesses. There is only one published cost-benefit analysis study of mental illness from Guinea-Bissau. This study was based on national model of delivering mental health services through a service framework [13]. The few published cost- effectiveness studies that exist are those of family therapy of schizophrenia in China[48], simulated modeling of treatments of both schizophrenia and manic depressive illness[49], home care compared to hospitalization in rural China[21], screening and psychiatric case finding in primary care from Brazil[50] and India[50,51] home visiting after discharge from a psychiatric hospital in South Africa[17], and cost of integration of mental health care into primary care in India and Pakistan [52].

Studies on cost of illness from developing countries are on social costs of alcoholism in India[53], cost of illness studies in Hong Kong, Taiwan and Beijing on suicides [54], financial cost of treating out patients with schizophrenia in Nigeria[7] and cost of care of schizophrenia in India[55]. Suleiman et. al.,[7] estimated the monetary cost of treating a group of Nigerian outpatients with schizophrenia in comparison with insulin dependent diabetes mellitus. They studied 50 outpatients with schizophrenia and 40 with diabetes mellitus, attending government hospitals. Direct and indirect costs were assessed using a self –designed questionnaire, at monthly intervals for 6 months. The cost of schizophrenia in 6 months was significantly less than that of diabetes mellitus. This was largely due to the cost of insulin injections, needles and syringes. The cost of antipsychotics drug accounted for 52.8% of the total cost of schizophrenia, while insulin injections accounted for 92.8% of the total cost of diabetes mellitus. Patients with schizophrenia and their relatives suffered significantly more loss of working days. The authors concluded that these findings were in sharp contrast to Western reports where cost of drugs for schizophrenia accounted for only 2-5% of the total costs. They attributed this to lack of disability benefits and nursing homes; and drastic currency devaluation, since all the drugs used for treating these patients were imported at very high exchange rates.

Cost of illness studies from India includes studies such as social cost of alcoholism by Benegal et. al., [53], cost of drugs used in treatment of schizophrenia by Girish et. al.,[56], cost of one outpatient visit to a general hospital clinic by Sarma[57] and cost of care of schizophrenia in India [55]. Girish et. al., [56] found that antipsychotic drugs are affordable and are comparable to drug treatment costs of other physical illnesses. They found the monthly cost of treatment with chlorpromazine was Rupees (Rs.) 55, an equivalent dose of trifluperazine amounted to Rs. 25/month, risperidone Rs 60 and clozapine Rs. 225 per month. They also noticed that there was a marked price difference across brands. They concluded that although antipsychotic drugs are affordable, the other costs associated with treatment make them more expensive, like coprescribed antiparkinsonian agents, antidepressants, anxiolytics etc. Sarma [57] showed that cost of one outpatient visit was Rs. 201 in which management contribution was 68% and patient's contribution was 32%; it was found that salaries accounted for a maximum proportion, i.e. 48% of the total cost, this was followed by loss of earnings which accounted for 17%. Drug accounted for less than 10% of the total cost. Chisholm et. al.,[52] screened four rural populations in India and Pakistan for psychiatric morbidity. Individuals with a diagnosable mental disorder were invited to seek treatment, and assessed prospectively on symptoms, disability, quality of life and resource use. Seventy two percent of cases in Bangalore and 92% cases in Rawalpindi belonged to broad category of mood disorders. They found that cost of treatment in the Bangalore site at baseline was Rs 700 per month and in the Rawalpindi site the baseline cost was more than Rs 3000 per month. The total cost was equivalent to between 7 and 14 days of agriculture worker's wages in India, and approximately 20 days in Pakistan. These total costs, decreased appreciably by the follow-up assessment point in 3 of the 4 localities. Grover et al[55] assessed the cost of care of outpatients with schizophrenia compared to a group of patients with diabetes mellitus at a general hospital outpatient clinic. Cost of illness in 50 outpatients with schizophrenia was assessed over a 6-month period using a specially designed questionnaire, together with structured assessments of psychopathology and disability. Similar assessments were carried out in 50 outpatients with diabetes mellitus. Total annual costs of care of schizophrenia were Rupees 13,688 and these were not significantly different from the diabetes mellitus group (rupees 14,517). The major proportion of the total costs of schizophrenia was made up of indirect costs (63%), followed by direct costs (32.6%) and provider's costs (4.4%). Drug costs were high. Total treatment costs in schizophrenia were significantly higher in those who were unemployed, those who visited the hospital more often, more severely ill and disabled.

FACTORS INFLUENCING COST OF ILLNESS OF SCHIZOPHRENIA

Various factors might influence cost of care of schizophrenia. Important among them are the socio-demographic factors, socio-cultural factors, and illness variables [4, 7, 28, 39,56].

Socio-demographic factors: Several studies have assessed the influence of sociodemographic variables on costs of care in schizophrenia. However, inconsistent results have meant that it is difficult to arrive at any definite conclusions. For example, some authors have found no positive association between any of the demographic parameters and costs of treatment[7, 58]. Others have reported higher costs among men [28, 41, 59] or women [39,] failure to complete high school education[59], in the young [28, 41, 60-64] as well as old [65]. Living alone, being single or unemployed have all been linked to increased total, direct or indirect costs [5], but on the other hand there are studies which have found higher cost for patients who live with others and unemployed [41]. Being previously married was associated with higher indirect costs but having higher availability of friends was associated with lower total costs [59].

Socio-cultural factors: Several sociocultural factors such as religion, lifestyle, attitudes towards mental illnesses etc. can influence the cost of care. However, these have not been extensively investigated [4].

Illness variables: Some reports have suggested that a longer duration of illness leads to higher costs [5, 41]. Moscarelli et. al.,[66] found that the length of time between onset and first contact/admission was a significant determinant of total costs. In contrast, Suleiman et. al.,[7] reported no association of duration with treatment costs. Carr et al [59] reported that chronicity of the course was a significant predictor of cost. Studies have shown higher costs for patients with higher number of inpatient episodes in the past[41,61-64]. However, the most consistent associations across several studies are of severity of illness and levels of disability, with the costs of care. Treatment costs are significantly higher among the severely ill patients, or those with impaired functioning [24, 32, 58, 64, 67, 41].

CONCLUSION

While economic evaluation was of academic interest earlier, it is increasingly becoming more relevant and practical. This is because pharmacoeconomics is likely to become an important basis for health-policy decisions as a number of significant dynamics evolve in the market place. These include, consumers acting on their growing access to information and becoming more actively

involved in treatment decisions; payers, providers and patients deepening their interaction and overcoming their traditional focus on either cost or benefits alone; and manufacturers being challenged by other health-care constituencies as sponsors of cost-based outcome studies.

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