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Economic Evaluations of Child and Adolescent Mental Health Interventions: A Systematic Review

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ABSTRACT

Background: The need has grown over recent years for economic information on the impacts of child and adolescent mental health problems and the cost-effectiveness of interventions. **Methods:** A range of electronic databases were searched using a predefined search strategy. To identify economic studies which focused on services, pharmacological interventions and other treatments for children and adolescents with a diagnosed mental health problem or identified as at risk of mental illness. Published studies were included in the review if they assessed both costs and outcomes, with cost-effectiveness being the primary interest. Articles meeting the criteria for inclusion were assessed for quality. **Results:** Behavioural disorders have been given relatively large attention in economic evaluations of child and adolescent mental health. These studies tentatively suggest child behavioural gains and parent satisfaction from parent and child training programmes, however the cost effectiveness of the location of delivery for behavioural therapies is less clear. In general the quality of economic evaluations was limited by small sample sizes, a narrow conceptualisation of costs, narrow perspectives and limited statistical and econometric methods. **Conclusion:** Economic evaluations in the field of child and adolescent mental health services are few in number and generally poor in quality, although the number of studies being undertaken is now rising relatively quickly. **Keywords:** adolescence, behavioural interventions, childhood, depressive disorder, developmental disorder, mental health, parent training, pharmacotherapies, psychosis, substance abuse, economic evaluations, costs. **Abbreviations:** ADHD: attention deficit hyperactivity disorder; CAMHS: child and adolescent mental health services; QALY: Quality Adjusted Life Year; CEMH: Centre for Economics of Mental Health.

INTRODUCTION

Developments in mental health interventions for children and adolescents have improved the effectiveness of treatment in terms of symptoms, behaviour, personal functioning, educational attainment and other needs related dimensions. But achieving greater effectiveness, fundamental though that must be, is not enough. Decision makers also need to know whether those outcome gains are 'worth it': are they cost-effective?

In an effort to obtain the best value from decisions about service delivery, pharmacological treatments and other interventions, there have been increasing calls for economic analysis. The high cost of many mental health problems in childhood and adolescence has been evidenced in various studies around the world such as Julian et al, 1992 and Jackson 1996. These studies emphasise the economic impact for families, the health services and other agencies of the of morbidity of mental illness in children and adolescents. Although these studies provide important information about the description of services and costs of mental disorders in young, they do not provide insight into which interventions are relatively the most efficient in providing the best outcomes for given expenditures of resources. Given the high levels of demand for services, technology and treatments, and the high personal and social costs associated with mental health problems, evidence on the relative value of different service interventions and treatments becomes necessary. By assembling, assessing and comparing the costs, health effects and quality of life improvements of interventions, economic evaluation provides decision makers at all levels within a care system with information to help them make best value judgements.

The aim of this study was to review the economic evaluation literature in the child and adolescent mental health area. We systematically obtained and reviewed all published cost-effectiveness analyses in this area and assessed their quality.

METHODS

Search strategy

An electronic search was conducted in June 2001 on Medline (1966 to 2001), PsychINFO (1967 to 1983, and 1984 to March 2001) and EMBASE (1980 to 2001). These searches were updated in July 2002 on Medline (2001 to June week 2 2002), PsychINFO (2001 to May week 5 2002) and EMBASE (January 2001 to June week 2 2002). The details of the search strategy are available from the authors.

Inclusion criteria

For inclusion in the review, studies or papers needed to meet the following criteria:

- focused primarily on children aged 18 or under;
- focused on a diagnosable psychiatric problem or disorder, whether present or at risk;
- focused on psychotherapies, pharmacotherapies, service arrangements or policies; and
- Assessment of costs alongside outcomes or costs and savings.

Exclusion criteria

The exclusion criteria follow from the above list, but we particularly sought to exclude:

- studies of interventions aimed at *parents* of children with mental health problems;
- studies of adults diagnosed with mental illness who had childhood problems; and
- studies of non-health care interventions (for example, school-based interventions) unless one of the main objectives was to improve the mental health of particular subgroups of children (pupils).

Three reviewers (RR, SB, and MK) screened abstracts of all papers identified by the search and judged the eligibility of articles from the abstract. Where there was uncertainty about inclusion of an article or there was no abstract on which to make a judgement, the full article was included for data extraction.

Data extraction

A data extraction sheet was designed to collect information on the following aspects of each study: type of intervention, type of mental health problem, type of economic evaluation, range of costs included, study perspective (e.g. societal, health service, public sector or child and family), outcome measures, sample size, study design, statistical analysis, sensitivity analysis and generalizability. Table 1 summarises the basic aspects of each of the studies identified as economic evaluations.

Assessment of quality

To assess the quality of the economic evaluations, we referred to the ten-point checklist suggested by Drummond et al (1997), summarised in Box 1. Each paper was read by one author (the papers equally shared between the authors) and a summary and commentary drafted. A second author then read the paper and discussed changes to the structured account with the co-authors.

(Box 1 inserted)

RESULTS

In this section general remarks will be followed by more specific observations on the studies grouped by diagnostic categories.

Search results

The search identified a total of 1615 references, of which 56 studies appeared to meet our inclusion criteria and were extracted for review. On review of the full articles, a further 35 studies were subsequently found not to be eligible for inclusion and were excluded. The 21 included studies were all published in English between 1980 to 2002. Nine (43%) of the studies were from the US. Four (19%) were from the UK,

four (19%) from Canada and the rest from Australia, Sweden, Norway and the Netherlands.

Of the 21 studies located, 14 included assessments of both costs and outcomes of two or more interventions. These studies differed in the way effectiveness was expressed, which made it difficult to compare across studies. Most were cost-effectiveness analyses which compared costs and outcomes measured on disease-specific scales for symptoms, behaviour, parent child interaction, parent's sense of competence and functioning. Cost-utility analysis, involving the measurement of costs and measurement of outcomes in terms of the summary indicator, quality-adjusted life years, was only undertaken in one study. No cost-benefit analyses, measuring costs and outcomes in monetary terms, were located.

Seven studies, although variously referred to by the authors as cost-benefit, cost-effectiveness or cost-minimisation analyses, were in fact more appropriately classified as cost-offset studies. Cost-offset studies compare costs incurred with costs saved. These studies ignore child-focused outcomes such as changes in clinical status or quality of life, and as a result cannot provide insight into the efficiency with which the resources are deployed, that is they do not assess cost-effectiveness. For this reason they cannot be classified as economic evaluations. However, there is not always an unambiguous division between costs and outcomes, for savings that result from reduced service use are likely to result from reduced individual needs, which can obviously also be called outcomes. Moreover, some outcomes might be proxied by changes in service use – a good example being reduced antisocial behaviour measured by a reduction in crime. It is only a small step from there to measurement in cost terms of reductions in the criminal justice and societal implications of crime.

Table 1 summarises the basic characteristics of all the studies included in terms of the type of economic evaluation, the problem under study, the intervention(s) examined, the costs and outcomes measured and the main findings. Where the type of economic evaluation stated in the papers is disputed, our own classification is reported.

Diagnostic Categories

Behavioural disorders

Eight of the fourteen economic evaluations focused on behavioural disorders or antisocial behaviour. One evaluated a drug treatment for hyperactive children (Gilmore & Milne, 2001), while three others examined alternative behavioural techniques (Christensen et al, 1980; Jones & Offord, 1989; Thompson et al, 1996). Four studies evaluated the location of services (Cunningham et al, 1995; Grizenko & Papineau, 1992; Harrington et al, 2000; Slot et al, 1992).

In the study looking at pharmacotherapies as a treatment for hyperactivity in children, Gilmore and Milne (2001) estimated the cost per quality-adjusted life year (QALY). Of the papers that meet our inclusion criteria, this is the paper included in the review which combines costs with quality of life in a cost-utility analysis. The cost per QALY derived by the authors (£7,446-£9,177) depending on the severity of the disorder) was stated to compare favourably with other treatments currently available. However the methodology used has been debated (Freemantle & Mason, 1999; Campbell et al, 1999).

Three studies evaluated alternative behavioural therapeutic interventions (Christensen et al, 1980; Jones & Offord, 1989; Thompson et al, 1996). Both Christensen and Thompson measured costs narrowly in terms of professionals' time. A range of outcome measures was used, including parent perception of problem behaviour, overall satisfaction with family relationships (Thompson et al 1996), reduction in problem behaviours (Christensen et al 1980), skill development, integration, self-esteem and behaviour at home and school, and community measures of antisocial behaviour (police charges, security violations, fire calls) (Jones & Offord, 1989).

The findings of the Christensen study of behavioural family therapy indicate that, compared to controls, the parents who completed the therapeutic training programmes reported improvements in their child's externalising behaviour, more satisfaction and efficacy for parents and more satisfaction in family relationships in general. At treatment termination, the authors indicate that those receiving minimal contact bibliotherapy spent less time (5 hours) with the professional than those in individual treatment (11 hours). There were also significantly larger reductions in problem behaviours under clinical conditions. Although limited in its narrow range of costs and small sample size, the study provides valuable information in an under researched area.

Thompson et al (1996) found that parent training for those who completed the programme resulted in greater satisfaction in family relationships than controls. The additional direct cost per family was estimated at \$70 (£44). The authors admit that the results are limited due to non-random allocation to treatment, the narrow conceptualisation of costs, lack of a clear perspective and lack of discussion of the economic issues associated with use of one treatment over another.

The focus of the Jones & Offord (1989) study was non-school skill development to all children aged 5-15 living in a publicly-supported housing complex. Experimental and control housing complexes were compared over three years. Data on costs and potential savings were measured. Significant improvements were found in antisocial behaviour outside home and school, but there were no spillover effects on school performance or behaviour at home. Costs were only measured for the intervention programme. A cost-offset analysis found that programme expenditure was substantially smaller than savings.

Two other Canadian studies evaluated the location of services for young people with behavioural disorders (Grizenko & Papineau, 1992; Cunningham et al, 1995). Grizenko & Papineau (1992) compared the costs and effects of a residential unit in a psychiatric hospital with a day treatment programme. The findings indicate that each treatment group showed a significant improvement in the level of school integration. Costs of the day treatment group were significantly less than for the residential group. The authors point out a number of methodological weaknesses of the study associated with the overall design and costing methods.

Cunningham and colleagues (1995) assessed the cost-effectiveness of a large community-based group training programme compared to a clinic-based individual intervention. Outcome measures included adherence, behaviour problems at home and the child's behaviour. Cost measures were based on the programme costs, which

included the direct cost of the programme and use of educational and health care resources. Between pre- and post-test, community groups tended to report greater additional gains than individual participants. The total cost per participant was marginally lower for the individual programme compared to the community group. A review by the Cochrane Database argued that the conclusions of the authors appear justified given the data, although generalisability of the results to other settings have not been discussed.

In the Netherlands, Slot et al (1992) compared a residential-based teaching family model of care to a traditional state institute for antisocial behaviour. Fifty-seven young people from the state institute were matched by age with young people treated by the teaching family model. No differences were found between the two groups in terms of problems or ability to form relationships outside the family, but young people in the state institute showed improvement in community participation ability, whilst those in the teaching family model showed no change. The teaching family model was much less costly than the state institute. This very simple study was hindered by a narrow cost perspective, small sample, limited matching and limited statistical analyses.

In the UK, Harrington et al (2000) compared community-based with hospital-based parent education groups for children with behavioural disorders in a randomised controlled trial. Their findings suggest no differences in either outcomes or costs between the two groups. The authors also suggest that the sample size, determined on the basis of outcomes, may have been too small to detect a statistically significant difference in cost.

The only cost offset study in this diagnostic group was conducted by Bagley and Pritchard (1998), where the “impact” measure assessed included cost savings as a result of reductions in school exclusions. The results suggest that the reduction in school exclusions produced a net benefit of £273,550 as a result of the social work intervention.

Depressive disorders

Two of the fourteen economic evaluations focused on the evaluation of interventions for treating children with depressive illnesses. One involved an assessment of electroconvulsive therapy (ECT) in treatment-resistant bipolar adolescents in Canada (Kutcher & Robertson, 1995) and the other a home-based social work intervention for children who deliberately poison themselves in the UK (Byford et al, 1999). Disease-specific outcome measures were used and included the Brief Psychiatric Rating Scale (BPRS), length of stay in hospital (Kutcher & Robertson, 1995), the Suicidal Ideation Questionnaire (SIQ), the Hopelessness Scale and the Family Assessment Device (FAD), a measure of family functioning (Byford et al, 1999). Both these studies can be described as cost-consequences analyses, since a range of outcome measures are presented alongside the costs. The authors investigated broad (Byford et al, 1999) and narrow (Kutcher & Robertson, 1995) ranges of cost measures. Measures of costs included general and specific health care costs such as inpatient care, education and social services.

Byford et al (1999) report no significant differences between the two groups on any of the outcome measures used or in the total costs per patient, although the observed

costs appear to be lower in the social work group than the control group. Although this paper has a large sample size (172) in comparison to other studies in the review, the authors still recommend caution in interpretation given that sample size calculations were based on outcomes and not cost. Kutcher & Robertson (1995) report significant improvement in BPRS scores and lower total costs per patient for those in ECT compared to those who refused treatment, although this study is limited by non-randomised allocation and extremely small sample sizes (22 in total). Economic evaluations undertaken in depressive illnesses extracted for review are not conclusive in favour of or against the cost-effectiveness of the experimental interventions.

Psychosis

Two non-UK studies evaluated interventions for psychosis. Mihalopoulos et al (1999) evaluated a community-oriented treatment for early onset psychosis in Australia, and Rund et al (1994) from Norway evaluated a psychoeducational intervention compared to standard care for early onset schizophrenia. Both studies were before-and-after studies undertaken using retrospective reviews, one looking at 102 (Mihalopoulos et al, 1999) and the other at 24 young people (Rund et al, 1994).

Outcomes were measured using psychosocial functioning, relapse rates (Rund et al, 1994), quality of life and negative symptoms (Mihalopoulos et al, 1999). Costs were analysed from the perspective of the health service and included inpatient treatment, home visits, consultations with a private medical doctor and seminar costs for parents, including travel and other expenses. Both studies found lower costs for the experimental groups than the control groups, although there were no indications of the statistical significance of these differences in the papers. For the community-orientated treatment study, outcomes were found to be better in the experimental group. However, for the psychoeducational intervention there were no significant differences between the groups on length of hospital stay and relapse rates. The authors conclude that the experimental interventions are cost-effective with lower costs and better outcomes. In common with other studies in the review these studies suffer from retrospective designs and small sample sizes.

Developmental disorders

Our review identified one study of the cost-effectiveness of early intervention services for children with developmental disorders (Erickson Warfield, 1995). The author, in a follow-up paper to an analysis of twenty-five publicly-supported services, suggests that the service identified as more cost-effective varied by sub-group and outcome measure. The analyses suggest that group services are more efficient than home visits, although the generalisability of the results is limited.

Jacobson et al (1998) undertook an analysis of an early intensive behavioural programme for children with pervasive developmental disorder or autism. Although the title suggests a cost-benefit analysis, the study in fact compares the cost of the intervention in childhood with expenditure savings in adulthood. This paper has been criticised for its narrowly 'economist' approach.

Co-morbid substance use

King et al (2000) examined the costs and outcomes of adolescents with substance use disorders co-morbid with other psychiatric disorders in two different service systems

– the Fort Bragg Demonstration project, involving a continuum of care services, and two comparison sites that provided traditional fee-for-service mental health services. Outcomes were assessed at baseline and six months later and included substance use, impairment level specifically attributed to substance abuse, mental and physical impairment, caregiver strain and global functioning. Costs included all mental health services provided. Total costs were almost US\$40,000 (£24,873) per participant for the Fort Bragg Demonstration site and just over US\$18,000 (£11,193) for the comparison sites. Outcomes were not found to be influenced by service system. The authors do not come to any specific conclusion regarding relative cost-effectiveness, but it appears that the demonstration site may be less cost-effective than the control sites. Any conclusion, however, must be viewed cautiously given small sample sizes and the possibility of bias due to the lack of randomisation or adjustment for differences between the two groups.

Various mental health problems

Interventions geared towards a combination of mental health problems among youth, including children at risk of self-harm have used cost-offset as a means of assessing costs in relation to savings from reductions in the utilisation of mental health services (Foster and Bickman, 2000), reductions in direct service hours delivered (Yates and colleagues, 1994), averted hospitalisation costs (Margolis and Petti, 1994; Gustafsson and Svendin, 1998; Blumberg and colleagues, 2002) and reduction in direct service hours delivered (Yates and colleagues, 1994).

DISCUSSION

As the availability of health-related interventions and technologies increases and society's resources remain finite, questions of efficiency tend to be posed with increasing regularity in decision-making contexts. This is often the prompt for economic evaluations. A previous review conducted in 1997 suggests few economic evaluations of poor quality. As this review has demonstrated the situation has not improved markedly. Only 14 full economic evaluations were found suggesting the number undertaken remains small.

We found a number of descriptive cost studies that provide useful background and other data but cannot be seen as evaluative in that they do not measure outcomes. For example, Beitchman et al (1992) investigate the factors impinging on costs and argue that the disorders which consume the most resources should be the focus of early intervention. However, because this form of analysis ignores outcomes, and specifically the relative marginal benefits of alternative ways of spending the same fixed resources, it ought not to be seen as the (sole) basis for allocation decisions. A high cost disorder or behavioural problem may well - rightly - attract a lot of attention and generate much concern, but high cost *alone* cannot provide a basis for resource allocation.

The review also identified a number of cost-offset studies. These studies provide estimates of savings to health and non-health sectors as a result of mental health interventions. Though the measures of costs and outcomes (where they were measured) differ across studies, all of the studies indicated some level of savings as a result of the intervention. However, because each study is context - and country -

specific it is difficult to know how far it is possible to generalise the findings: the results are indicative.

Economic evaluations conducted in this field have focused on service-based interventions and their location as opposed to interventions directed to managing the illness. There has only been one study to date which has evaluated the cost-effectiveness of a drug treatment for children with mental health problems (Gilmore & Milne, 2001). This is no doubt due in part to the small market for drug treatment for children compared to adults (Knapp, 1997). There have been more - but still disappointingly few - economic evaluations of behavioural therapies for children and adolescents, particularly for behavioural disorders.

What also becomes apparent from this review are the methodological limitations common to most of the economic evaluations which could lead to invalid and biased decisions. Problems include small sample sizes that limit the power to detect significant differences, decision analysis or other models based on spurious, dubious or untested assumptions, and limited statistical and econometric methods (recent advances in statistical methods applied to economic evaluations has made less recent studies appear to lack robustness). Evaluations were mainly undertaken from just the provider perspective, resulting in a narrow conceptualisation of costs that may fail to uncover all important society-wide impacts of an intervention.

Cost-effectiveness analysis, employing disease-specific measures of outcome, was the most widely used method of economic evaluation in the area of child and adolescent mental health. This is not surprising given the wide range of outcome measures to be analysed in mental health and the comparative ease with which economic evaluations can be attached to a clinical study. There has been little use of incremental cost-effectiveness ratios in the CAMHS field, even though this has been standard health economics practice in many other clinical fields for some time. Nor has there been much exploration of QALYs, within cost-utility analyses. This is perhaps due to conceptual and methodological difficulties in translating measures of outcome into generic health-related quality of life measures. More generally, too few clinical analyses have been conducted to the exclusion of economic aspects.

CONCLUSION

General awareness of the need to focus health and social care decision-making on cost-effectiveness analyses, has prompted calls for economic evaluations of competing interventions in a number of areas. The area of child and adolescent mental health is no exception. There is, without doubt, heightened awareness among policy makers of the need for evidence-based information to guide policy and practice for children and adolescents with mental health problems. But there is also a widely recognised paucity of solid evidence. In this paper, we have reported the results of our search for economic evaluative data - the kinds of findings that could and should inform resource allocation decisions. What we have found has been disappointing but perhaps not surprising. Given the varied nature of mental health problems and mental health interventions, and the small number of economic evaluations undertaken it is difficult to come to any firm policy conclusions.

Our systematic review found that most of the economic studies focused on behavioural disorders or antisocial behaviour which are highlighted as clinical and social problems across many countries. Within this diagnostic group most of the studies compared the location of service provision, although location, forms of the intervention and methodologies used differed significantly across studies. Interventions for depressive disorders, psychosis, developmental disorders and co-morbid substance use were all examined using cost-effectiveness analysis, but again there were few such studies.

On the brighter side, the situation has improved since a somewhat less systematic review conducted a few years ago (Knapp, 1997). Over the last five or six years, there has been more awareness of the need for this evaluative perspective, and more discussion about the methodological needs for good research. More sophisticated and robust techniques are being employed. At our own centre - Centre for the Economics of Mental Health, at the Institute of Psychiatry staff are undertaking research in a wide spectrum of childhood mental health disorders. An economic evaluation of group versus individual psychotherapy for sexually abused girls has recently been completed. An investigation of the service use and costs for adults who were treated for childhood depression is underway. An assessment of the cost-effectiveness and cost-utility of fluoxetine and cognitive-behaviour therapy versus fluoxetine alone in adolescents with persistent major depression is also being undertaken. Other studies include an evaluation of the cost-effectiveness of specialist inpatient treatment, specialist outpatient treatment and general management in child and adolescent mental health services for adolescents with anorexia nervosa and a quantitative survey and qualitative case study analysis to determine the effectiveness of mental health provision for young people in custody and in the community. We are also aware of research in the US and other countries that will contribute importantly to solid economics evidence base for child and adolescent mental health policy and practice.

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Table 1
STRUCTURED SUMMARIES AND COMMENTARIES

| First author | Type of evaluation | Problem | Interventions | Outcome measures | Costs | Summary of results |
|------------------------------------|---------------------------|--|--|---|---|---|
| Bagley 1998 UK | Cost offset | Problem behaviours | School social work intervention | Cost of school exclusions | Cost of exclusion unit, home tuition and project workers | There was a statistically significant reduction in the rates of self-reported theft, truancy, bullying and net exclusions. Analysis of the reduction in school exclusion showed a net benefit to the project of £273,550. |
| Blumberg 2002 US | Cost offset | Children at risk of harm to themselves or others | Crisis intervention programme versus hospitalisation | Cost of hospitalisation | Treatment costs | In comparison to an historical control group, the programme resulted in a 23% reduction in the use of psychiatric treatment beds. The crisis intervention programme saved approximately \$20,000. |
| Byford 1999 UK | Cost effectiveness | Deliberate self poisoning | Home-based social work intervention plus routine care versus routine care alone | Suicidal ideation, hopelessness and family functioning | Cost of all health, education and social services | No significant differences between the two groups in terms of the main outcome measures or costs. In a sub-group of children with major depression, suicidal ideation was significantly lower in the intervention group at the six-month follow-up with no significant difference in cost |
| Christensen 1980 US | Cost effectiveness | Behavioural problems | Individual therapy, group therapy and minimal contact bibliotherapy (MCB) | Parental attitude measures, parental reported behaviour and observed behaviour | Professional time | MCB was the least costly in terms of professional time and was equally effective in terms of parental attitude, the primary outcome measure. |
| Cunningham 1995 Canada | Cost effectiveness | Disruptive behaviour disorders | Community based group training programme versus clinic based individual intervention | Adherence, behaviour problems at home, problem solving skills, parenting sense of competence, parenting-child interactions. | Cost of training programmes | Parents in the community groups reported greater improvements in behaviour problems than the clinic participants. Costs were similar between the two groups - CAN \$5.42 per participant for clinic based service as compared to CAN \$5.92 for the community group. |
| Erickson Warfield 1995 US | Cost effectiveness | Downs syndrome, motor impairment and developmental delay | Home-based individual versus centre-based group early intervention services | Child social competence, mother-child interaction and parenting stress | Treatment costs | The service identified as most cost-effective was found to vary by subgroup and outcome measure. |
| Foster 2000 US | Cost offset | Mental health problems | Continuum of care (Fort Bragg) | Cost of services used outside of the Fort Bragg Demonstration | Cost of services provided as part of the Fort Bragg Demonstration | Reductions in other costs do partially offset higher expenditures on mental health services for children at the Fort Bragg Demonstration, but the Demonstration site remains more costly than comparison sites. |

| First author | Type of evaluation | Problem | Interventions | Outcome measures | Costs | Summary of results |
|---------------------------|------------------------------------|---|--|--|---|--|
| Gilmore 2001 UK | Cost utility | Hyperactivity | Methylphenidate versus placebo | Quality adjusted life years (QALY) | Health service costs | Methylphenidate generated a reasonable cost effectiveness ratio of £7400 to £9200 per QALY in 1997 prices. |
| Grizenko 1992 Canada | Cost effectiveness | Behavioural problems | Day treatment versus residential treatment | Degree of school integration and clinical improvement | Treatment costs | The average cost of treating children at the residential unit decreased when the unit was converted to a day treatment facility. Clinical outcomes and the degree of school integration improved in both groups. |
| Gustafsson 1988 Sweden | Cost offset | Psychosomatic or somatic disorders | Family therapy | Cost of inpatient stays | Cost of treatment | Hospitalisation days decreased more in treated groups than controls. Total cost of treatment was offset by savings inpatient days. |
| Harrington 2000 UK | Cost effectiveness | Behavioural problems | Community versus hospital-based parental education groups | Child's behaviour and parental perceptions of parenting problems | Cost of health, education, social services, voluntary and private sector services | There was no significant difference between the two groups in terms of costs or outcomes at follow-up. |
| Jacobson 1998 US | Cost offset | Autism | Early intensive behavioural intervention (EIBI) | Cost savings into adulthood | Service costs, social security and net earnings | Cost savings range from \$187,000 to \$203,000 per child for people aged 3-22 years and from \$656,000 to \$1,082,000 per people aged 3 – 55 years. Differences in initial treatment costs for EIBI are outweighed by estimated savings. |
| Jones 1989 Canada | Cost effectiveness and cost offset | Poor children at risk of antisocial behaviour | Skill-development programme | Costs of crime, criminal charges, security reports, fire calls | Programme costs | Potential savings were found to exceed the cost of mounting the programme. |
| King 2000 US | Cost effectiveness | Comorbid psychiatric and substance use | Continuum of care (Fort Bragg) versus traditional mental health services | Substance use, impairment, functioning, caregiver strain | Treatment costs | Mental health outcomes not influenced by type of service system. Demonstration site costs were \$40,000 compared to \$18,000 in comparison sites. |
| Kutcher 1995 Canada | Cost effectiveness | Treatment resistant bi-polar disorder | Electroconvulsive treatment versus standard pharmacological inpatient care | Symptom severity and side-effects | Cost of hospitalisation | Outcomes were significantly better and hospitalisation costs lower in the ECT group than the ECT refusing group. |

| First author | Type of evaluation | Problem | Interventions | Outcome measures | Costs | Summary of results |
|-----------------------------------|--------------------|---------------------------|--|--|---|---|
| Margolis 1994 US | Cost offset | Various | Intensive home based service versus increased remuneration for providers of community based placements | Averted hospital costs | Cost of intensive home based services, cost for increased remuneration strategy | Analysis of costs and benefits of intensive home based services produced a favourable cost-offset ratio of 0.47. Analysis of the strategy to increase remuneration for providers of community-based placements resulted in a cost-offset ratio of 1 indicating financial savings. |
| Mihalopoulos 1999 Australia | Cost effectiveness | Psychosis | Early psychosis prevention (EPPIC) versus precursor service | Psychosocial functioning and negative symptoms | Cost of health and other services | EPPIC was shown to be more cost-effective. The weighted average cost per patient for the first 12 months was lower while treatment outcomes were superior |
| Rund 1994 Norway | Cost effectiveness | Early onset schizophrenia | Psychoeducational versus standard treatment | Relapses and psychosocial functioning | Treatment and social welfare service costs | The psychoeducational programme was more effective in terms of relapse and cheaper. Patients with poor premorbid psychosocial functioning were found to benefit most from this treatment. |
| Slot 1992 Netherlands | Cost effectiveness | Antisocial behaviour | Community-based residential treatment versus a State Correctional Institute | Problems, family relationships, community participation | Residential centre costs | Outcomes were poorer for the community intervention compared to the state institute, but costs were much lower. |
| Thompson 1996 US | Cost effectiveness | Behavioural problems | Parent training versus waiting list controls | Parents' perception of child's behaviour, parent's sense of competence and family satisfaction | Cost of staff time | Treatment parents recorded significantly greater improvements in child behaviour problems, parent attitudes and satisfaction with family relationships when compared to untreated controls. The direct cost of parent training was estimated to be \$70 per family. |
| Yates 1994 US | Cost offset | Various | Six methods of motivating therapists to meet service delivery goals | Cost savings in terms of therapist hours | Cost of incentive intervention | Four incentive interventions generated greater cost savings than they required in monetary outlays. The most cost beneficial intervention was payment of bonuses to therapists for exceeding their goals alongside staff rewards if total department goals were exceeded. |

Box 1

A 10-point checklist to assess the quality of an economic evaluation

1. Was a well-defined question posed in answerable form?

Did the study examine both the costs and effects of the service(s) or programme(s)?
Did the study involve a comparison of alternatives?
Was a viewpoint for the analysis stated and was the study placed in any particular decision-making context?

2. Was a comprehensive description of the competing alternatives given (i.e., can you tell who did what to whom, where, and how often)?

Were any important alternatives omitted?
Was (Should) a do-nothing alternative (be) considered?

3. Was the effectiveness of the programme or service established?

Was this done through randomised, controlled clinical trial? If so, did the trial protocol reflect what would happen in regular practice?
Was effectiveness established through an overview of clinical studies?
Were observational data or assumptions used to establish effectiveness? If so, what are the potential biases in results?

4. Were all important and relevant costs and consequences for each alternative identified?

Was the range wide enough for the research question at hand?
Did the costs cover all relevant viewpoints? (Possible viewpoints include the community or social viewpoint, and those of patients and third party payers. Other viewpoints may also be relevant depending upon the particular analysis.)
Were capital cost, as well as operating cost, included?

5. Were costs and consequences measured accurately in appropriate physical units? (e.g. hours of nursing time, number of physician visits, lost work-days, gained life-years)

Were any of the identified items omitted from measurement? If so, does this mean that they carry no weight in the subsequent analysis?
Were there any special circumstances (e.g., joint use of resources) that made measurement difficult? Were these circumstances handled appropriately?

6. Were cost and consequences valued credibly?

Were the sources of all values clearly identified? (Possible sources include market values, patient or client preferences and views, policy-makers' views and health professionals' judgements.)

Were market values employed for changes involving resources gained or depleted?

Where market values were absent (e.g., volunteer labour), or market values do not reflect actual values (such as clinic space donated at a reduced rate), were adjustments made to approximate market values?.

Was the valuation of consequences appropriate for the question posed (i.e. has the appropriate type or types of analysis – cost-effectiveness, cost-benefit, cost-utility – been selected)?

7. Were costs and consequences adjusted for differential timing?

Were costs and consequences which occur in the future ‘discounted’ to their present values?

Was any justification given for the discount rate used?

8. Was an incremental analysis of costs and consequences of alternatives performed?

Were the additional (incremental) costs generated by one alternative over another compared to the additional effects, benefits or utilities generated?

9. Was a sensitivity analysis performed?

If data on costs and consequences were stochastic, were appropriate statistical analyses performed?

If a sensitivity analysis was employed, was a justification provided for the ranges of values (for key study parameters)?

Were the study results sensitive to changes in the values (within the assumed range for sensitivity analysis, or within the confidence interval around the ratio of costs to consequences)?

10. Did the presentation and discussion of study results include all issues of concern to users?

Were the conclusions of the analysis based on some overall index or ratio of costs to consequences (e.g., cost-effectiveness ratio)? If so, was the index interpreted intelligently or in a mechanistic fashion?

Were the results compared with those of others who have investigated the same question? If so, were allowances made for potential differences in study methodology?

Did the study discuss the generaliseability of the results to other settings and patient/client groups?

Did the study allude to, or take account of, other important factors in the choice or decision under consideration (e.g., distribution of costs and consequences, or relevant ethical issues)?

Did the study discuss issues of implementation, such as the feasibility of adopting the ‘preferred’ programme given existing financial or other constraints, and whether any freed resources could be redeployed to other worthwhile programmes?

Source: Drummond et al (1997)

Summary criteria for assessing quality of cost effectiveness studies (possible alternative to Box1)

- Inclusion of focused study question
- Inclusion of statement on viewpoint of analysis
- Was there a clear description of comparators?
- Effectiveness of interventions established
- Were all relevant cost and outcomes identified for each alternative
- Were these cost and outcomes measured and valued plausibly
- Were cost and outcomes discounted?
- Inclusion of sensitivity analysis
- Incremental approach to analysis of costs and effects used
- How appropriate is the analysis to users?