

The costs and benefits of interventions in the area of mental health: a rapid review

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An Evidence Check review brokered by the Sax Institute for the Mental Health Commission of NSW

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This rapid review was brokered by the Sax Institute.

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Abbreviations and terms used in this report

ABS	Australian Bureau of Statistics
ACE-MH	Assessing Cost-Effectiveness of Mental Health
ACE-Prevention	Assessing Cost-Effectiveness of Prevention
ACT	Assertive Community Treatment
ADHD	Attention deficit hyperactivity disorder
ASP	Accommodation Support Providers
AIHW	Australian Institute of Health and Welfare
BFM	Behavioural Family Management
BIM	Behavioural intervention for families
BOD	Burden of disease
CBT	Cognitive behaviour therapy
CCBT	Computerised cognitive behaviour therapy
CD	Conduct disorder
CEA	Cost-effectiveness analysis
CMHP	Collaborative mental health care program
COI	Cost of illness
CRE	Centre of research excellence
DALY	Disability adjusted life year
DEX	Dexamphetamine
GAD	Generalised anxiety disorder
GP	General practitioner
HASI	Housing and Accommodation Support Initiative
HTA	Health Technology Assessment
HCA	Human capital approach
HRQOL	Health related quality of life
ICER	Incremental cost-effectiveness analysis
IPS	Individual placement and support
LOS	Length of stay
LPDS	Low Prevalence Disorders Study
MATISSE	Multicentre evaluation of art therapy in schizophrenia: systematic evaluation
MDD	Major depressive disorder
MDU	Mood disorder unit
MPH	Methylphenidate
MFG	Multiple family groups
NGO	Non-government organisation
NHMRC	National Health and Medical Research Council
NHS	National Health Service
NICE	National Institute Clinical Excellence
NPHS	National population health survey
NSMHWB	National Survey Of Mental Health And Wellbeing
OHP	Optimal health program
PBS	Pharmaceutical Benefits Scheme
PEP	Primary care evidence-based psychological interventions
PND	Post natal depression
PRIZE	Partial responders international schizophrenia evaluation
QALY	Quality-adjusted life year

QOL	Quality of life
REACT	Randomised evaluation of assertive community treatment
SCAP	Schizophrenia care and assessment programme
SE	Supported employment
SGA	Second-generation antipsychotics
SNRIs	Serotonin and noradrenaline reuptake inhibitor
SWAN	Supported work and needs trial
SSRIs	Selective serotonin reuptake inhibitors
TCAs	Tricyclic antidepressants

EXECUTIVE SUMMARY

Mental illness is a term describing a diverse range of behavioural and psychological conditions. The Mental Health Commission of NSW is an independent body which helps drive reform that benefits people who experience mental illness and their families and carers. The Commission is working with the mental health community towards sustained change regarding all aspects of mental illness and its impact on employment, education, housing, justice and general health. The Commission has been tasked with developing a draft strategic plan for Government by March 2014. To inform the development of the draft strategic plan, a rapid review was commissioned to examine the evidence on the costs and benefits of interventions in the area of mental health.

A rapid review was conducted with the assistance of an accredited librarian. A total of 50 studies were identified and included in this review. The vast majority of studies had been conducted in the UK (N=26) followed by Australia (N=17) and Canada (N=7). No study from New Zealand was identified. In terms of mental disorder, 17 studies had examined depression, ten in schizophrenia, nine were classified under the general mental disorder category, five in generalised anxiety disorder and four in conduct disorder. Very few economic evaluation or modelling studies were published in the areas of Attention deficit hyperactivity disorder (ADHD) (N=2) or panic disorder (N=2).

The studies included in this rapid review adopted a range of intervention approaches including targeted strategies and whole of population approaches. No study considered the whole of life approach to mental health but several authors made reference of the need to better understand the whole of life approach including the natural history of mental health disorders and targeted therapy according to treatment history. Pharmacological treatments were the most common type of intervention studied followed by psychosocial interventions. A limited number of studies investigated the cost-effectiveness of employment programs, art program, internet strategies, electroconvulsive therapy, discharge models and joint crisis plans. Most studies adopted a health sector perspective with only a small number considering other sectors such as housing, education, employment or justice sectors and/or intersectoral settings.

A leading expert from the World Health Organisation has observed that no country to date has been able to clearly link mental health strategic policy or investment decisions to a credible, consistent and evidence-based assessment of what interventions actually work best and at what cost. Indeed much more needs to be done. This review has identified several gaps and unanswered questions that would benefit from additional research.

First, there is a paucity of research relating to the costs and benefits of strategies to reduce the burden of harm and cost associated with mental disorders. A total of 17 studies have been conducted in Australia. This evidence base is insufficient to guide policy decisions given that the Australian Government spends over \$10 billion each year on mental and ancillary health services. More research is required to better understand the potential costs and benefits of treatments for mental disorders to ascertain value for money.

Second, this review found no evidence of education interventions and only limited evidence related to employment programs. Mental disorders reduce the likelihood of completing school, getting a job and being a productive member of society. Studies have demonstrated that the economic costs of this lost productivity far exceed government expenditures. More effective strategies to detect and treat children susceptible to a mental disorder are required together with employment programs to better re-engage those not in the labour force or even those in employment that are under mental stress.

Third, no Australian research has evaluated from an economic viewpoint continuity of care. Given the reduction of psychiatric hospital beds over the past few years, there is a demand for quality mental health services to be provided within the community. More research is required to examine the true cost of shifting patients out of primary healthcare arrangements and the implications if appropriate care is not provided.

Fourth, novel therapies including art, music and body movement therapy should be evaluated. These therapies are relatively low cost compared to pharmacological options and even small improvements in outcome would result in positive cost-effective ratios. In this context, the use of internet provided services including Cognitive behaviour therapy (CBT) show promise and would benefit from further evaluation.

A key purpose of this rapid review has been to provide guidance to the Commission on the development of the draft strategic plan. In terms of specific advice, the Commission may consider the following.

First, the Australian Assessing Cost-Effective (ACE) studies feature prominently in this rapid review. These cost-effectiveness analyses use secondary data to model a number of mental health interventions for the Australian population. Some of the strategies evaluated were based on hypothetical interventions. These ACE mental health interventions could be re-evaluated using more recent costing and epidemiological data with a focus on the NSW population. This would strengthen the evidence base for policy making.

Second, very few Australian studies in this rapid review were conducted alongside clinical trials. The Commission should proactively encourage the collection of primary data and evaluation. Evaluation should be an integral component of any independent, commissioned or joint project. A vital ingredient of any evaluation is having a good understanding of resources consumed and saved. The majority of UK cost-effectiveness studies used the Client Services Receipt Inventory to collect data on resource use. This instrument is valid, readily available and the Commission could champion its use in NSW. The evaluation should contain an economic study using either a cost-effectiveness or cost-benefit framework. Standard guidelines should be adhered to in conducting an evaluation. These guidelines provide information on what to collect and how results should be analysed.

Third, NSW has a range of good quality data, linked and administrative, to further investigate the costs and benefits of particular mental health strategies including large scale population level campaigns. In particular, linked data provides a gold standard data source by which a researcher may investigate patterns and/or trends in mental disorders and the impact of policy changes. Administrative data from the Australian Institute of Health and Welfare (AIHW) or the Australian Bureau of Statistics (ABS) can also be used to examine patterns and cost associated with mental health care service utilisation.

Fourth, the whole of government draft strategic plan will address health, housing, employment, education and justice. Increased involvement of people with mental illness with these agencies increases the benefits of service improvements within and across these agencies. To improve connectivity between different parts and players of the system, the Commission could explore options to collaborate more effectively with researchers and service providers through partnership grants and other multi-agency arrangements.

1 Background

The Mental Health Commission of NSW is an independent body which helps drive reform that benefits people who experience mental illness and their families and carers.¹ The Commission is working with the mental health community towards sustained change regarding all aspects of mental illness and its impact on employment, education, housing, justice and general health. The Commission has recently begun the process of developing a draft strategic plan for NSW. To inform the development of the draft strategic plan a rapid review was commissioned to examine the evidence on how economic modelling has been used for this purpose in other settings and, in particular, to examine the evidence on the costs and benefits of interventions in the area of mental health.

2 Introduction

Mental illness is a term describing a diverse range of behavioural and psychological conditions.² The most common illnesses are anxiety, affective (mood) and substance use disorders. Results from a 2007 survey, conducted by the ABS indicated that one in five (20%) Australians aged 16-85 years experienced one of these more common mental illnesses in the preceding 12 months, equivalent to 3.2 million people.³ Mental illness also includes low prevalence conditions such as eating disorders and severe personality disorder. Although no official statistics exist on the prevalence of these conditions, estimates suggest that they may affect another 2-3% of the adult population.⁴ Further, the Australian child and adolescent survey conducted in 1998 found that 14% of children and young people (or 500,000 persons) are affected by mental disorders within any six month period.⁵

The economic cost of mental illness in the community is high. The National Mental Health Report (2010) suggests that outlays by governments and health insurers on mental health services in 2007-2008 totalled \$5.32 billion representing 7.5% of all government health spending.² These figures reflect only the cost of operating the mental health service system. An additional \$4.63 billion was spent by the Australian Government in providing other support services for people with mental illness, including income support, housing assistance, community and domiciliary care, employment and training opportunities. In addition to healthcare expenditure, mental disorders have large economic impacts in other areas, including out of pocket personal expenses, carer/family costs, lost productivity and costs to other non-government organisations. Australian and international cost of illness studies suggest that these costs are at least equal to, if not more, than total government expenditures.⁶⁻⁸

Economic evaluation is a method for considering the benefits and costs of alternate uses of healthcare resources to aid decision makers in allocating and prioritising health resources.^{9,10} It is a useful technique whereby interventions can be compared and their respective value for money or worth determined. There are three main economic evaluation techniques: cost-effectiveness analysis (CEA), cost-utility analysis (CUA) and cost-benefit analysis (CBA). The main difference between them is the method used to measure and value the consequences or benefits of health interventions. CBA values benefits in monetary terms. CEA and CUA value benefits in physical units. The defining difference between CEA and CUA is that CUA combines both morbidity and mortality into a single unit of measurement such as a quality-adjusted life year (QALY) or a disability-adjusted life year (DALY) averted, whereas CEA utilises symptomatic or diagnostic indicators meaningful to clinicians (e.g. symptom free days, reduction in time to relapse, number of hospitalisations).

This review seeks to examine the evidence on the costs and benefits interventions in the areas of mental health. In doing so it aims to build on the evidence base to inform the allocation of resources towards best practice cost-effective services and to identify gaps in knowledge and research priorities to strengthen this evidence base.

3 Method used in current rapid review

An accredited librarian working at a leading Australian university assisted with the literature review of the peer-reviewed literature. The Mental Health Commission of NSW assisted with identification of grey literature, i.e., information that may not have been published in journal articles or books.

Information sources

The following databases were searched:

- Medline /Ovid; Embase /Ovid; PsycINFO /Ovid; EBM Reviews- Cochrane Database of Systematic Reviews /Ovid; The Campbell Library; APAIS-Health /Informit; CINAHL /Ebsco; Global Health /Ovid; EconLit /Proquest; PAIS International /Proquest; ABI/INFORM Global /Proquest.

Search strategy

In order to find studies on the costs and benefits of mental health interventions, the databases were searched with both keywords and subject headings specific to each database using the following strategy:

1. mental health OR mental disorders OR anxiety disorders OR mood disorders OR affective disorders OR depressive disorders OR schizophrenia disorders OR bipolar disorder OR depression OR post-traumatic stress disorder OR Obsessive compulsive disorder OR Phobia OR Panic disorders OR Eating disorders OR Personality disorders OR Mental illness OR ADHD OR Conduct disorders OR Oppositional defiant disorder
2. intervention OR prevention OR treatment OR rehabilitation OR universal
3. cost OR economic OR model
4. Australia OR United Kingdom OR Canada OR New Zealand
5. AND/1, (2 or 3), 4

The search was limited to studies published from 2000 to current (2013). Key journals were also hand searched to increase coverage of those research articles recently published.

The following terms were not included in this literature search: dementia, intellectual disability, substance use and abuse (including opioid, opiate, heroin, alcohol), or behavioural problems in youth (except ADHD).

Results

This search strategy returned 1,283 references. The author reviewed the abstracts of all references and deleted records for the following reasons: different country; not economic evaluation or modelling study; thesis, commentary or editorial; alcohol studies; or, inappropriate search term.

A total of 1,218 studies were deleted leaving 65 references. The author obtained text copies of all 65 articles and reviewed each study individually. A further 24 references were excluded for

following reasons: duplicate of another study; not an economic evaluation; different country; and, study conducted outside of time frame. A further six references were found and added through review studies and Commission contacts. A total of 47 references are included in this review.

Table 1 provides an overview of studies relating to economic evaluation or modelling studies by mental health disorder. It is important to note that three studies (Greenhalgh et al. (2005)¹¹, Heuzenroeder et al. (2004)¹² and Mihalopoulos et al. (2005)¹³) report cost-effectiveness results for interventions related to two disorders in the same study. Relevant interventions are reported in relation to the particular disorder. Hence, Table 1 reports results of 50 studies (47 actual studies + 3 studies that report findings for 2 disorders).

The vast majority of studies had been conducted in the UK (N=26) followed by Australia (N=17) and Canada (N=7). No study from New Zealand was identified. In terms of mental disorder, 17 studies had examined depression, ten in schizophrenia, nine were classified under the general mental disorder category, five in generalised anxiety disorder and four in conduct disorder. Few very economic evaluation or modelling studies were published in the areas of ADHD (N=2) or panic disorder (N=2).

Table 1 **Summary of studies included in this rapid review**

Mental disorder	Australia	Canada	United Kingdom	TOTAL
ADHD	1	0	1	2
Conduct disorder	1	0	3	4
Depression	5	0	12	17
Generalised anxiety disorder	1	2	2	5
Mental disorder	4	3	3	10
Panic disorder	2	0	0	2
Schizophrenia	3	2	5	10
	17	7	26	50

4 Review question 1: What is the evidence from economic modelling studies on the costs and benefits of interventions in the areas of mental health promotion, prevention, early intervention and treatment of mental illness?

To what extent are the areas defined in question 1 elements of the whole of life approach to mental health?

No study considered the whole of life approach to mental health. Intervention studies generally focussed on prevention or treatment. There was no reference to longitudinal research investigating the economic costs and benefits of treatment options along the whole of life approach.

The majority of the UK economic appraisals were conducted alongside clinical trials for the specific purpose of being considered by the National Institute Clinical Excellence (NICE) for the National Health Service (NHS). Most of these studies were commissioned by the NHS as part of their Health Technology Assessment (HTA) Program. The role of the HTA Program is to ensure that high-quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most efficient way for those who use, manage and provide care in the NHS. The majority of these NHS commissioned studies were related to pharmacological treatment agents for the purpose of listing on the British formulary. As treatment evaluations they had specific target groups with relatively short trial durations and follow-up periods.

The majority of Australian studies relied on secondary data (i.e. data reported in the literature as opposed to primary data which is data collected alongside a clinical trial) to model the potential cost-effectiveness of psychosocial and pharmacological approaches. These studies relied on either the ACE-Mental Health (ACE-MH) or ACE-Prevention methods. The ACE-MH project was jointly funded by the Australian Department of Health and Ageing, Mental Health and Suicide Prevention Branch and the Department of Human Services, Mental Health Branch, Victoria, in recognition of the importance of research into the cost-effectiveness of interventions in mental health treatment and care. The ACE-Prevention study aims to provide decision makers with information regarding the most cost-effective bundle of preventive services for non-communicable diseases given available resources.¹⁴ Consideration of the prevention of mental disorders was an important part of the ACE-Prevention project.

While ACE-Prevention focussed primarily on prevention, ACE-MH considered both prevention and treatment options. Both ACE-Prevention and ACE-MH use a consistent and comparable method that includes: results expressed as a cost per DALY averted; best available evidence on effectiveness is derived from the international literature; costs and outcomes are modelled based on realistic expectations of how interventions would be implemented under routine health service conditions in Australia; uncertainty is explicitly quantified and presented around all results; and, results are considered together with other policy relevant considerations such as acceptability, feasibility and equity.¹⁴

In spite of the lack of formal analysis of whole of life approaches to mental health, several authors make reference of the need to better understand the whole of life approach. For example, Kendrick et al. (2009) suggest it is important to better understand the natural history of mental health disorders¹⁵; Vos et al. (2005) suggests it is important to consider certain mental disorders such as schizophrenia as a chronic episodic disorder and not just those with three or more episodes as recommended in current treatment guidelines¹⁶; and, Davies et al. (2008) suggest that it is important to look at treatment history when targeting a particular therapy for mental health disorder.¹⁷

Intervention approaches are broadly defined and include both whole of population and high risk targeting approaches

The studies in this rapid review adopt a range of intervention approaches including targeted strategies and whole of population approaches. As highlighted above, the majority of the UK studies are economic appraisals of treatments (psychosocial or pharmacological interventions) for specific disorders for a targeted (NHS) audience. In contrast the Australian studies using ACE-MH and ACE-Prevention are economic appraisals of population level interventions using secondary data.

A common theme underlying a number of the studies in this rapid review is the importance of tailoring a strategy to suit the individual. Bower et al. (2000) found no differences in the cost-effectiveness of non-directive counselling, CBT and routine GP care in the management of depression and mixed anxiety and depression and suggested that given such equivalence, practitioners are in a position to decide on services based on factors other than outcomes and costs, such as staff and patient preferences or staff availability.¹⁸ Peveler et al. (2005) found no differences in the cost-effectiveness of Tricyclic antidepressants (TCAs) or Selective serotonin reuptake inhibitors (SSRIs) as first choice treatments for depression in primary care and suggested that it may be appropriate to base the first choice on doctor and patient preferences.¹⁹ Vos et al. (2005) summarised the cost-effectiveness results of ACE-MH and suggested that recommendations should not be seen as one size fits all.²⁰ The authors suggest that not all patients respond to any one treatment and patients (and doctors) have their own preferences for treatment which will inevitably impact on its effectiveness. For example, some people with depression may prefer antidepressants, while others prefer psychological approaches to treatment. Further, CBT may not be appropriate for all people who prefer psychological therapies. A combination of antidepressant and psychological therapies may be appropriate for others.²⁰ Although, such recommendations appear sound, it is difficult to provide an accurate assessment of the potential effectiveness of tailored treatment without sufficient evidence.

Intervention settings are not restricted to those undertaken in the health sector, and may include other sectors (for example, housing, education, employment or justice sectors) and/or intersectoral settings

The majority of studies in this rapid review were conducted from a health sector perspective perhaps reflecting the fact that health services are predominantly provided and funded by the government (through taxation) in the countries included in this review. The majority of the UK economic appraisals were conducted alongside clinical trials for the specific purpose of being considered by NICE for the NHS. The Australian studies using ACE-MH and ACE-Prevention methods are restricted to the health sector and include health-related interventions.

Only two of the 50 evaluated studies indicated that a social perspective was used but closer examination suggested that these studies did not capture the full range of social costs or consequences. Bower et al. (2000) broadened the perspective to a social viewpoint by including non-treatment costs and the cost of lost production.¹⁸ In the Jørgensen et al. (2006) study, 95% of total costs were associated with so called indirect costs (defined as productivity costs) which were derived using clinician opinion about time patients may take off work while receiving treatment.²¹

Two studies, Edwards et al. (2007)²² and Muntz et al. (2004)²³, adopted a multi-sector perspective that included costs associated with the health sector, special education and/or social services. Both of these studies evaluated a parenting intervention for conduct disorder and appropriately broadened the viewpoint to service providers outside of the health sector.

Only a small number of studies included other sectors such as housing, education, employment or justice sectors and/or intersectoral settings. Mihalopoulos et al. (2012) used the ACE-Prevention methodology to examine the population level cost-effectiveness of a preventive intervention that screens children and adolescents for symptoms of depression in schools and the subsequent provision of a psychological intervention to those showing elevated signs of depression.²⁴ The authors suggest that the intervention is cost-effective and represent good value for money.²⁴ Dewa et al. (2009) examined a collaborative mental health care program (CMHP) between a finance and insurance company and mental health care practitioners with the aim of getting people on disability benefit back to work as soon as possible.²⁵ The intervention was based on collaborative care concepts including psychiatric assessment, short term management by psychiatrist, psychiatric support of management by the primary care physician and availability of psychiatric consultation for non-referred workers. The authors found that with CMHC the extra benefits outweigh the extra costs. The authors note a key challenge of the study was establishing the relationship between specialist and primary care physician.²⁵ Chalamat et al. (2005) conducted a cost-benefit analysis of vocational rehabilitation for schizophrenia and related conditions. He used an ACE-MH approach to consider the net benefit of introducing individual placement and support (IPS) into current mental health services in Australia.²⁶ The authors found that IPS costs are greater than the monetary benefits primarily because the employment rate associated with IPS is low and people do not usually return to full-time work. The authors also argue that structural conditions surrounding welfare payments in Australia create disincentives to full-time employment for people with disabilities. The authors contend that more studies of vocational rehabilitation are warranted.²⁶

An interesting study that involved a partnership between Housing NSW, NSW Health, Non-government organisation (NGO) Accommodation Support Providers (ASPs) and community housing providers is the Housing and Accommodation Support Initiative (HASI). Although the HASI was not an economic evaluation, it is a novel strategy that is relevant to NSW. The HASI aims to provide adults with a mental health diagnosis with access to stable housing, clinical mental health services and accommodation support. HASI supports over 1000 mental health consumers across NSW living in social and private housing ranging from very high support (8 hours per day) to low support (5 hours per week) levels. Bruce et al. (2012) was commissioned to undertake a longitudinal, mixed method evaluation of the HASI program.²⁷ The annual cost of HASI per person ranged between \$11,000 and \$58,000, plus project management costs of between \$200 to \$500, depending on the level of accommodation support and the method of calculating the annual unit cost. Bruce et al. (2012) reported that consumer outcomes were positive for mental health hospital admissions, mental health, stable tenancies, independence in daily living, social participation, community activities and involvement in education and voluntary or paid work. Overall, HASI consumers had significantly fewer and shorter mental health hospital admissions after joining HASI: improvements included a 59% decrease in the average number of days spent in a mental health inpatient hospital per year; and a 24% drop in the number of admissions to hospital per year. Among consumers who were admitted to hospital at least once both before and during HASI, the average number of days hospitalised per admission decreased by 68%.

Further, HASI consumers were continuing to participate in education and work, with 31% currently involved in some type of activity (paid or voluntary work, education and training).²⁷

Intervention types are broadly defined, and may include, for example, legislative interventions, health service redesign interventions, or rehabilitation interventions

The search strategy used in this rapid review was broad enough to capture a wide range of interventions. However, the majority of interventions identified were evaluated from a health perspective. Pharmacological treatments were the most common type of intervention followed by psychosocial interventions. A limited number of studies investigated the cost-effectiveness of employment programs, art program, internet strategies, electroconvulsive therapy (ECT), discharge models and joint crisis plans.

Pharmacological treatments included: TCAs, SSRIs and the TCA-related antidepressant; antipsychotic agents (ziprasidone, olanzapine, quetiapine, risperidone, clozapine); dexamphetamine and methylphenidate for ADHD; venlafaxine XL, diazepam, escitalopram, paroxetine for Generalised anxiety disorder (GAD).

Psychosocial interventions included: CBT, brief psychological intervention based on bibliotherapy, a more comprehensive group-based psychological intervention and family interventions.

Two studies examined vocational rehabilitation programs. Chalamat et al. (2005) considered the benefit of introducing IPS into current mental health services in Australia.²⁶ The authors found that IPS costs are greater than the monetary benefits and suggest that more studies of vocational rehabilitation are warranted. Heslin et al. (2011) also evaluated an IPS programme focussing on rapid placement with continued follow-up support.²⁸ The authors found that IPS was a dominant strategy (i.e. cheaper and more effective than current practice) in spite of the findings of no statistically significant difference in cost or effect between intervention and current practice. Again more research is warranted to validate these claims.

Crawford et al. (2012) examined the cost-effectiveness of referral to group art therapy plus standard care among people with schizophrenia.²⁹ The authors found no differences in outcomes between trial arms and conclude that art therapy is not a cost-effective intervention. They do suggest, however, that other creative therapies, including music therapy and body movement therapy, should be evaluated.

Two studies examined CBT using the internet. Kaltenthaler et al. (2006) conducted a systematic review and economic modelling exercise of Computerised cognitive behaviour therapy (CCBT) for depression and anxiety.³⁰ The review found only one published economic evaluation of CCBT and subsequently conducted a series of cost-effectiveness models for CCBT. The authors found that the depression software packages were most cost-effective and noted that further research is needed to compare CCBT with other therapies that reduce therapist time, in particular bibliotherapy and to explore the use of CCBT via the internet. Mihalopoulos et al. (2005) used the ACE-Prevention methodology to evaluate the cost-effectiveness of an internet-based psychological intervention supported by either GPs or psychologists (Panic Online). Both interventions provided good value for money.¹³

Greenhalgh (2005) conducted a NHS review to establish the cost-effectiveness of ECT for depressive illness and schizophrenia.¹¹ For the schizophrenia model including ECT the authors found that clozapine is a cost-effective treatment compared with ECT. For depression none of the scenarios had a clear economic benefit over the others. The authors suggest that there is a

need for further, high quality RCTs of the use of ECT in specific subgroups that are most likely to receive this treatment including older people with depression, women with postpartum exacerbation of depression or schizophrenia and people with catatonia.

Forchuk et al. (2005) compared a transitional discharge model (TDM) of care with a standard model of discharge care.³¹ The TDM consisted of inpatient staff continuing their relationship with clients, until the clients had a working relationship with a community care provider, with peer support also available for a minimum of one year. A key objective of this study was to assist individuals hospitalised with a persistent mental illness transit to community living. The authors found that TDM post-discharge costs and Quality of life (QOL) were not significantly improved compared with the control group but suggest that with a reduction of psychiatric hospital beds there is a demand for quality mental health services to be provided within the community. More research like this is required to examine the true cost of shifting patients out of primary healthcare arrangements. Flood et al. (2006) examined the cost-effectiveness of joint crisis plans in addition to usual care.³² The plan establishes the preferences for treatment of those who use the service at a point when they are relatively well, to be applied in any subsequent crisis when the individual may be too unwell to indicate their preferences. The authors found that joint crisis plans produced a nonsignificant decrease in admissions and total costs but suggest that that advance statements in the form of joint crisis plans may have the potential to reduce both compulsion and costs. McCrone et al. (2009) evaluated the cost-effectiveness of assertive community treatment (ACT).³³ The authors found that the costs of ACT were not significantly different from usual care. ACT did, however, result in greater levels of client satisfaction and engagement with services and as such may be the preferred community treatment option for patients with long term serious mental health problems.

Interventions that have been identified as promising but have not been implemented may be included in the review

Part of the exclusion criteria for this rapid review was protocols and commentaries as they had no data to support economic arguments. To this extent some promising strategies may have been undetected. The majority of strategies reviewed were real life interventions – either psychological or pharmacological treatments. A number of studies did, however, model the potential cost-effectiveness of strategies where the evidence base was limited. For example, Sanderson et al. (2003) evaluated the cost-effectiveness of optimal, evidence-based treatment for depression, dysthymia and bipolar.³⁴ Although optimal treatment was not well defined, the authors suggest that population outcomes for affective disorders could be increased by nearly 50% with similar direct healthcare costs with implementation of an evidence-based package of optimal care.

All of the ACE-MH and ACE-Prevention studies use secondary data to model the potential cost-effectiveness of interventions. Mihalopoulos et al. (2004) evaluated the potential cost-effectiveness of three types of family interventions: behavioural family management (BFM) versus behavioural intervention for families (BIF) versus multiple family groups (MFG).³⁵ All of these strategies were considered cost-effective but the authors acknowledge that given issues surrounding the levels of evidence, feasibility and acceptability, it is advisable that implementation should be accompanied by collecting local evaluation data to confirm cost-effectiveness. Mihalopoulos et al. (2007) evaluated the Triple P Positive Parenting Program using a range of data sources and assumptions.³⁶ The authors note that although the economic case is promising further research is required to confirm the study results.

A number of authors provide guidance on the potential cost-effectiveness of promising interventions. Parenting interventions for conduct disorder show particular promise based on

preliminary evaluation. Internet based interventions, particularly CBT type strategies, are another promising area of research. School-based interventions are sparse and may provide a promising area of research, particularly to detect mental disorder and ensure adequate treatment is provided. The use of joint crisis plans and discharge models also warrant further inquiry given the transition out of hospital and into community care for a number of mental health patients.

Where available, include reviews of evidence addressing the question; if there is no review evidence, then include key studies on interventions within the specified areas

A total of eight reviews were included in this rapid review.^{11,16,30,37-41} An attempt was made to include all relevant articles identified from these reviews as separate studies in this rapid review.

Include studies from Australia and other countries with comparable healthcare systems (for example the UK, Canada and New Zealand)

Table 1 provides an overview of the number of studies and origin by mental disorder. The vast majority of published studies had been conducted in the UK (N=26) followed by Australia (N=17) and Canada (N=7). No New Zealand economic evaluation studies were identified.

Include expert opinion of the quality of the evidence

A number of guidelines for critical appraisal of economic evaluations are available in the literature.^{10,42,43} The Drummond 10-point checklist is perhaps the most widely used appraisal tool.¹⁰ The 10-point checklist considers: the research question; description of interventions; study design; identification, measurement and valuation of costs and consequences; discounting; a clear presentation of results with sensitivity and uncertainty analysis; and discussion of results in context of policy relevance and existing literature. Each of the economic evaluations included in this rapid review were scrutinised against the Drummond checklist. For the purpose of this review each item has been given a potential score of 1 with aggregate results categorised into studies that reflect, from an economic appraisal viewpoint, poor quality (scores ranging from 1–3), average quality (scores ranging from 4–7) and good quality (scores ranging from 8–10). This approach has been used by the author in the past.⁹ Appendix 2 outlines the rating score for each study.

The Drummond checklist was applied to 46 studies with 39 being rated as good, 4 as average and 3 as poor. UK studies conducted for the NHS adhere to the Drummond checklist and are of exceptional quality. Similarly, the ACE-MH and ACE-Prevention programs used a standard economic protocol that follows the Drummond checklist. The four studies assessed as being of average quality tended to be cost-saving exercises where the unit of outcome was expressed and little detail on economic evaluation methods were provided. The studies by Tilden et al. (2002)⁴⁴, McCrone et al. (2009)³³ and Heslin et al. (2011)²⁸ were rated as having a poorly evaluated cost-effectiveness analysis. This implies that the methods underpinning the analysis were not transparent, robust or credible.

There are two other quality aspects underpinning the economic evaluations that deserve attention: the use of surrogate measures and lack of epidemiological data.

As noted in the introduction, there are three main economic evaluation techniques: cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-benefit analysis (CBA). The main difference between them is the method used to measure and value the consequences or benefits of health interventions. CBA is the gold standard that attempts to place a monetary value on costs and consequences: no study in this rapid review used the CBA approach. CEA and CUA value benefits in physical units. The defining difference between CEA and CUA is that CUA combines both morbidity and mortality into a single unit of measurement such as a disability-adjusted life year (DALY) averted, whereas CEA utilises symptomatic or diagnostic indicators meaningful to clinicians (e.g. symptom free days, reduction in time to relapse, number of hospitalisations). The DALY is calculated as the sum of the years of life lost due to premature mortality (YLL) in the population and the equivalent 'healthy' years lost due to disability (YLD) for incident cases of the health condition: one DALY is one year of healthy life lost due to premature death, prolonged illness or disability, or a combination of these factors.⁴⁵ Most of the UK NHS studies and all of the ACE-MH and ACE-Prevention studies use a final outcome measure such as the DALY. A key advantage of this metric is that results can be compared across programs that use the same metric. For CEA studies that rely on a surrogate outcome measure, studies cannot be compared. For example, Flood et al. (2006) used admission to hospital as primary outcome variable.³² Chue et al. (2005) used avoided relapse as their primary outcome measure.⁴⁶ The results of these two studies cannot be compared given they have different outcomes. Further, the interpretation of these results by policy makers is also problematic. For example, how much does society value an extra day of relapse? This issue of affordability is also relevant to DALYs but thresholds have been adopted (e.g. \$50,000/DALY in ACE-MH and ACE-Prevention) to guide policy making in deciding what is a good return on investment or not.⁴⁷

Second, the quality of epidemiological evidence underpinning each type of appraisal impacts on the reliability of results. Those studies conducted alongside a clinical trial are able to collect relevant health economic information which provides a more reliable estimate of cost-effectiveness. Conversely, modelling studies rely on secondary data and are limited by the adequacy of available published data. The ACE-MH and ACE-Prevention studies all rely on secondary data and all have a caveat stating that the evidence base underpinning each analysis needs improving. This is one reason why the ACE studies rely on so called second filter criteria that consider the strength of evidence, acceptability, affordability and feasibility of an intervention.¹⁴ Further, it is often inappropriate to use data obtained from clinical evidence in one country in a study conducted in another country. Transferability of evidence is problematic due to cultural differences, variations that may exist in providing incentives to participants, primary care physician practicing behaviour or remuneration systems.

Include expert opinion about 'best buy' interventions in the areas of mental health promotion, prevention, early intervention and treatment of established mental health conditions

Two experts, Professor Theo Vos and Dr Cathy Mihalopoulos, have been instrumental in conducting economic evaluations of mental health interventions in Australia. Vos et al. (2005) summarised the key findings of ACE-MH. The authors suggest that there are cost-effective treatment options that are currently underutilised.^{20,40} These include CBT for depression and anxiety, bibliotherapy for depression, family interventions for schizophrenia and clozapine for the worst course of schizophrenia. The authors suggest that substantial opportunities exist to improve efficiency within our current mental health resources, if resources were shifted toward more cost-effective interventions. As noted before, Vos et al. (2005) also suggest recommendations should not be seen as one size fits all.²⁰ Not all patients respond to any one treatment and patients (and doctors) have their own preferences for treatment, which will inevitably impact on its

effectiveness. Mihalopoulos et al. (2011) summarised the key findings of ACE-Prevention for depression and anxiety disorders.⁴⁸ The authors note that a number of preventive interventions for mental disorders are cost-effective, have good evidence of effectiveness, and certainly need to be considered in any package of health promotion and illness prevention initiatives. These include: screening children/adolescents for symptoms of depression with subsequent provision of psychological therapy; parenting intervention for childhood anxiety prevention; and, screening for minor depression in adults for the prevention of depression.

In an earlier article by Sanderson et al. (2003), the authors suggest that population outcomes for affective disorders could be increased by nearly 50% with similar direct healthcare costs with implementation of an evidence-based package of optimal care.³⁴ Evidence-based medicine for affective disorders should be encouraged on both efficacy and efficiency grounds.

Include expert opinion on interventions where the evidence suggests disinvestment is appropriate

Most of the economic evaluation studies included in this review report positive cost-effectiveness ratios for newer or novel treatments. As such the older treatments, predominantly pharmacological agents are superseded by more effective and often more expensive newer agents. For example, Vos et al. (2005) considers the use of olanzapine and risperidone in the treatment of established schizophrenia to be less cost-effective treatments in current practice.¹⁶

5 Review question 2: What gaps have been identified within the literature/research on economic modelling and mental health that would benefit from additional research relevant to the NSW context?

Include gaps/key unanswered questions based on the findings from question 1

A leading expert from the World Health Organisation has made the observation that *“remarkable as it may sound, no country to date has been able to clearly link mental health strategic policy or investment decisions to a credible, consistent and evidence-based assessment of what interventions actually work best and at what cost”*.⁴⁹

Despite the considerable investment in mental health over the past decade by the Australian Government, several gaps and unanswered questions are evident from this rapid review.

First, there is a paucity of research relating to the costs and benefits of mental health interventions. This review includes 50 studies: 17 in the area of depression, ten under the general heading of mental disorder, ten in the area of schizophrenia, five in the area of GAD, four in the area of conduct disorder and two each related to ADHD and panic disorder. More research is required on each disorder to better understand the economic impact of these illnesses.

Second, only one Australian study was found in each of the areas of ADHD, conduct disorder and GAD. For ADHD, Donnelly et al. (2004) evaluated the cost-effectiveness of dexamphetamine (DEX) and methylphenidate (MPH) interventions to treat childhood ADHD, compared to current practice.⁵⁰ The authors used secondary data to model the cost-effectiveness and found that DEX is more cost-effective than MPH and noted that increased uptake of stimulants for ADHD would require policy change. Preliminary investigation by the current author using Australian Medicare data suggests that over the period 2000–2010 there were a total of 2,156,434 scripts filled for DEX at a total cost to the government of \$34,144,006. Real data now exist to model the costs and benefits of DEX related to ADHD, conduct disorder education attainment and range of other factors. Similarly, with the increased use of parenting program such as Triple P, particularly in Australia and Canada, more research could be done using primary data to examine the cost-effectiveness of a range of strategies for childhood mental health.

Third, this review found no evidence of education interventions and only limited evidence of employment programs. A mental disorder reduces the likelihood of completing school, getting a full-time job and being a productive member of society.⁷ Australian research suggests that mental illness in young men aged 12–25 costs the Australian economy \$3.27 billion per annum.⁷ Two studies examined employment programs. Chalamat et al. (2005)²⁶ relied on secondary data to examine vocational rehabilitation in Australia and Heslin et al. (2011)²⁸ investigated the cost-effectiveness of IPS in England. Both studies suggest that these employment programs hold considerable promise but more work is needed to strengthen relationships between employment agencies and mental health workers and more research is required (including the investigation of

alternative employment strategies) to better promote social inclusion for the majority of people with mental disorders. Given the impact that mental disorders have on education and lost productivity, further investigation of these issues may be considered a research priority.

Fourth, no Australian research was found on continuity of care. Forchuk et al. (2005) conducted a CEA of the transitional discharge model (TDM) of care compared to a standard model of discharge care in Canada.³¹ A key objective was to assist individuals hospitalised with a persistent mental illness in successful community living. The authors found that TDM subjects were discharged an average of 116 days earlier per person. A UK study by Flood et al. (2006) conducted a CEA of joint crisis plans where patients are able to outline preferences for treatment when they are relatively well, to be applied in any subsequent crisis when they become unwell.³² Both authors note that with a reduction of psychiatric hospital beds, there is a demand for quality mental health services to be provided within the community. More research like this is required to examine the true cost of shifting patients out of primary healthcare arrangements

Fifth, only one study examined the cost-effectiveness of art therapy. In this UK study conducted by Crawford et al. (2012), the authors found no differences in outcomes between trial arms and conclude that art therapy is not a cost-effective intervention.²⁹ However, more research with larger sample sizes and more detailed methodology would either validate or refute these claims. Crawford et al. (2012) also suggest that other creative therapies, including music therapy and body movement therapy, should be evaluated.²⁹ These therapies are relatively low cost compared to pharmacological options and even small improvement in outcome would result in positive cost-effectiveness ratios.

Sixth, along the lines of novel treatments, a range of studies examined the potential impact of using the internet. Two authors examined internet based CBT – Mihalopoulos et al. (2005)¹³ and Kaltenthaler et al. (2006).³⁰ Both studies suggest internet based CBT provides good value for money but the studies had several limitations including modelling using secondary data. More research is required to compare internet based strategies such as CBT that are able to reduce expensive face to face visits with health practitioners. Mihalopoulos et al. (2005) also suggest that the sustainability of these approaches depends on a range of factors, including funding, workforce availability, and acceptability to consumers and healthcare providers.¹³ This last point is emphasised constantly by ACE-MH and ACE-Preventions researchers.

Finally, as with most research there is always scope to improve the evidence base. The majority of studies conclude with recommendations for further research. Some of these issues have been raised above but other comments are worth noting. Peveler et al. (2005) suggest that more research is required to better understand the factors underpinning treatment non-adherence and to develop strategies for improving treatment persistence by means of enhanced consultation skills and possibly additional forms of medication management or support.¹⁹ Vos et al. (2005) suggests more research needs to be conducted into risk and protective factors for mental illness and the targeting of treatment according to patient preferences.²⁰

Include expert opinion regarding other gaps/unanswered questions that are relevant to the NSW context and what could be done to address these gaps/unanswered questions

A key purpose of this rapid review has been to provide guidance to the Commission on the draft strategic plan. In terms of specific advice, the Commission may consider the following.

First, the Australian ACE studies feature prominently in this rapid review. These cost-effectiveness analyses use secondary data to model a number of mental health interventions for the Australian population. Some of the strategies evaluated were based on hypothetical interventions. These ACE mental health interventions could be re-evaluated using more recent costing and epidemiological data with a focus on the NSW population. This would strengthen the evidence base for policy making.

Second, very few Australian studies in this rapid review were conducted alongside clinical trials. The Commission should proactively encourage the collection of primary data and evaluation. Evaluation should be an integral component of any independent, commissioned or joint project. A vital ingredient of any evaluation is having a good understanding of resources consumed and saved. The majority of UK cost-effectiveness studies used the Client Services Receipt Inventory to collect data on resource use. This instrument is valid, readily available and the Commission could champion its use in NSW. The evaluation should contain an economic study using either a cost-effectiveness or cost-benefit framework. Standard guidelines should be adhered to in conducting an evaluation. These guidelines provide information on what to collect and how results should be analysed.

Third, NSW has a range of good quality data, linked and administrative, to further investigate the costs and benefits of particular mental health strategies including large scale population level campaigns. In particular, linked data provides a gold standard data source by which a researcher may investigate patterns and/or trends in mental disorders and the impact of policy changes. Administrative data from the AIHW or ABS can also be used to examine patterns and cost associated with mental healthcare service utilisation.

Fourth, the whole of government draft strategic plan will address health, housing, employment, education and justice. Increased involvement of people with mental illness with these agencies increases the benefits of service improvements within and across these agencies. To improve connectivity between different parts and players of the system, the Commission could explore options to collaborate more effectively with researchers and service providers through partnership grants and other multi-agency arrangements. For example, two National Health and Medical Research Council (NHMRC) Centres of Research Excellence (CRE) have been established addressing Mental Health and Substance Abuse and Suicide Prevention respectively. Synergies between the whole of government draft strategic plan and the work of these NHMRC CREs could be explored for partnership opportunities, particularly in terms of identifying key research and systemic evaluation priorities for NSW. In addition, both the Australian Research Council and the NHMRC fund partnership projects and could present additional research opportunities, including joint research and systemic evaluation initiatives with the National Mental Health Commission and other Commissions.

6 Tabulation of relevant studies

Each of the studies included in this review is summarised in text in Appendix 1 and in tabular format in Appendix 2.

7 Conclusions

This rapid review has been conducted to provide information on economic modelling studies in relation to the costs and benefits of interventions in the areas of mental health promotion, prevention, early intervention and treatment of mental illness. Before discussing the key findings of this review it is important to reflect on several potential shortcomings.

First, although an accredited librarian assisted in the search strategy there is always scope to miss literature. The search strategy was purposely limited using specific key words, timing and country of interest. Studies from the US were omitted which may have impacted on the range of economic evaluations.

Second, given that the majority of articles were identified from the peer-reviewed literature, there is some possibility of publication bias on the nature of evidence available to inform the review. Publication bias, or more specifically the inability to identify studies that reported negative results, may distort any conclusions or recommendations. In this context it is important that the NSW Mental Health Commission take advantage of other available information sources that can be used to assist the identification of priorities, particularly in the area of research and evaluation. This includes information on prevalence, help seeking behaviours and service use from sources such as the AIHW, generic health and specific mental health surveys.

Third, the format of this rapid review aids the answering of policy questions specified by the commissioning agency. However, this format may contribute to readers experiencing challenges in synthesising the implications of the findings. Overlap in headings may result in duplication of key messages. Efforts to simplify the findings may have limited the coverage or description of certain studies. The interested reader is encouraged to read the appendices (text and table) and reference list to garner additional study information.

A leading expert from the World Health Organization has observed that remarkable as it may sound, no country to date has been able to clearly link mental health strategic policy or investment decisions to a credible, consistent and evidence-based assessment of what interventions actually work best and at what cost. Indeed much more needs to be done. Despite the considerable investment in mental health over the past decade by the Australian Government, several gaps and unanswered questions are evident from this rapid review. Addressing these research gaps and evaluation priorities requires investment by both the NSW government and potentially the Federal Government.

In relation to the actual findings of the review, there is a paucity of research relating to the costs and benefits of strategies to reduce the burden of harm and cost associated with mental disorders. Most of the studies identified are skewed towards the UK where the research was conducted in the context of justifying treatments under the NHS, hence extrapolating to the NSW

context needs to be undertaken cautiously. Many of the interventions are pharmacological, an area where federal health policy applies and where the NSW Commission is likely to have less influence than it will in areas such as NSW major system/structural issues. Further, none of the studies address comorbidities among people with mental illness. These comorbidities add an additional complexity to appropriate and efficient treatment options that need to be explored.

It is the author's opinion that this evidence base is insufficient to guide policy decisions, particularly when the majority of this evidence comes from modelling studies that rely on secondary data. Preliminary investigation by the current author using Medicare data suggests that the Australian Government has spent over \$34,144,006 over the past ten years on one Pharmaceutical Benefits Scheme-listed drug for ADHD. Although such an expense represents a small proportion of the \$10 billion+ expenditure on mental and ancillary health services, it is important to understand whether the treatment is providing value for money. More research is required to better understand the potential costs and benefits of treatment options for those with mental disorders and the extent by which comorbidities impact on treatment success.

Second, this review found no evidence of education interventions and only limited evidence related to employment programs. Mental disorder reduces the likelihood of completing school, getting a job and being a productive member of society. Studies have demonstrated that the economic costs of this lost productivity far exceed government expenditures. More effective strategies to detect and treat children susceptible to a mental disorder are required together with employment programs to better re-engage those not in the labour force or even those in employment that are under mental stress.

Third, no Australian research has evaluated from an economic viewpoint continuity of care. Given the reduction of psychiatric hospital beds over the past few years, there is a demand for quality mental health services to be provided within the community. More research is required to examine the true cost of shifting patients out of primary healthcare arrangements and the implications if appropriate care is not provided.

Fourth, novel therapies including art, music and body movement therapy should be evaluated. These therapies are relatively low cost compared to pharmacological options and even small improvements in outcome would result in positive cost-effective ratios. In this context, the use of internet provided services including CBT show promise and need to be better evaluated.

The Commission may consider the following issues when developing their strategic plan.

First, the Australian ACE studies feature prominently in this rapid review. These cost-effectiveness analyses use secondary data to model a number of mental health interventions for the Australian population. Some of the strategies evaluated were based on hypothetical interventions. These ACE mental health interventions could be re-evaluated using more recent costing and epidemiological data with a focus on the NSW population. This would strengthen the evidence base for policy making.

Second, very few Australian studies in this rapid review were conducted alongside clinical trials. The Commission should proactively encourage the collection of primary data and evaluation. Evaluation should be an integral component of any independent, commissioned or joint project. A vital ingredient of any evaluation is having a good understanding of resources consumed and saved. The majority of UK cost-effectiveness studies used the Client Services Receipt Inventory to collect data on resource use. This instrument is valid, readily available and the Commission could champion its use in NSW. The evaluation should contain an economic study using either a cost-effectiveness or cost-benefit framework. Standard guidelines should be adhered to in conducting an evaluation. These guidelines provide information on what to collect and how results should be analysed.

Third, NSW has a range of good quality data, linked and administrative, to further investigate the costs and benefits of particular mental health strategies including large scale population level campaigns. In particular, linked data provides a gold standard data source by which a researcher may investigate patterns and/or trends in mental disorders and the impact of policy changes. Administrative data from the AIHW or ABS can also be used to examine patterns and cost associated with mental healthcare service utilisation.

Fourth, the whole of government draft strategic plan will address health, housing, employment, education and justice. Increased involvement of people with mental illness with these agencies increases the benefits of service improvements within and across these agencies. To improve connectivity between different parts and players of the system, the Commission could explore options to collaborate more effectively with researchers and service providers through partnership grants and other multi-agency arrangements.

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Appendix 1: Text summary of studies included in this rapid review

ADHD – Australian study

Donnelly et al. (2004) evaluated the cost-effectiveness of dexamphetamine (DEX) and methylphenidate (MPH) interventions to treat childhood ADHD, compared to current practice.⁵⁰ Using the ACE-mental Health approach, the authors suggest that MPH and DEX are cost-effective interventions for childhood ADHD. DEX is more cost-effective than MPH, although if MPH were listed at a lower price on the PBS it would become more cost-effective. Increased uptake of stimulants for ADHD would require policy change. However, the medication of children and wider availability of stimulants may concern parents and the community.

ADHD – UK study

Cottrell et al. (2008) developed an economic model with complicated Markov processes to estimate the costs and benefits of atomoxetine versus other current ADHD treatment options.⁵¹ Five patient subgroups were considered according to treatment history and the existence of comorbidities precluding stimulant medication. A very detailed study, funded by Eli Lilly, that showed atomoxetine is an effective alternative across a range of ADHD populations and offers value-for-money in the treatment of ADHD. This study was probably used in a subsequent request to list the product on the British formulary.

Conduct disorder – Australian study

Mihalopoulos (2007) investigated the economic case (using threshold analysis) for the implementation of the Triple P Positive Parenting Program on a population basis in order to reduce the prevalence of conduct disorder in children.³⁶ Using data from a range of sources, the authors state that Triple P is a dominant intervention; that is, it costs less than the amount it saves, until the reduction in prevalence falls below 7% where net costs become positive. They contend that Triple P is likely to be a worthwhile use of limited health funds. The economic case is promising but further research is required to confirm the study results.

Conduct disorder – UK studies

Muntz et al. (2004) evaluated the cost-effectiveness of an intense practice-based parenting program for children with severe behaviour problems compared with a standard treatment.²³ A multi-sectoral perspective involved a number of public service providers, namely those involved in the provision of health, special educational and social services. An incorrect Incremental cost-effectiveness analysis (ICER) was reported and key finding was that the intensive intervention did not significantly differ from the control in terms of costs or effects.

Edwards et al. (2007) evaluated the cost-effectiveness of the Incredible Years parenting program.²² The authors adopted a multi-agency public sector perspective but limited the outcome measure to improvement on the intensity score of the Eyberg Child Behaviour Inventory.

The authors found that the cost of running one intervention to a group of eight families was £1933.56. If a cost ceiling of £100 was set then the intervention proved to be 83.9% cost-effective. An interesting statement from the authors was that the sensitivity analysis (i.e., varying input parameters) showed the intervention became more cost-effective in children at greater risk of developing conduct disorder.

Charles et al. (2011) conduct a review of the published economic evidence of parenting programs as a means to support families with children with or at risk of developing conduct disorder.³⁸ The authors found three articles that could be considered cost-effectiveness studies – Edwards et al. (2004), Muntz et al. (2004) and Olchowski et al. (2007). The first two are included in this rapid review while the latter is excluded as it is a US study. The key messages from this review are that evidence of the cost-effectiveness of parenting programs is essential for decision makers given that full economic evaluations can inform policy and practice decisions of which intervention to use, at what cost and with what benefit. This is vital, especially when these decisions could be potentially constrained by budgetary limitations.

Depression – Australian studies

Haby et al. (2004) assessed the ICER of CBT and SSRIs for the treatment of major depressive disorder (MDD) in children and adolescents, compared to current practice.⁵² The authors found that CBT provided by a public psychologist is the most effective and cost-effective option for the first-line treatment of MDD. SSRI's were also found to be cost-effective. The authors contend that CBT is not currently accessible by all patients and will require change in policy to allow more widespread uptake. Greater use of publicly funded psychologists will require attention to ensuring an adequate workforce, particularly in outer metropolitan and rural regions.

Mihalopoulos et al. (2005) used a threshold type analysis (i.e. decision-maker may specify an acceptable level of investment or cost-effectiveness ratio) to evaluate the cost-effectiveness of a primary care evidence-based psychological-interventions (PEP) strategy which involves training GPs to deliver specific psychological interventions.¹³ Note that the PEP study is a cluster randomised controlled trial (RCT) in which GPs are allocated to training in CBT strategies using the SPHERE CBT training package, or to a waiting list control. At the time of writing, the RCT was in progress so the authors used secondary analysis to model the potential cost-effectiveness. Threshold analysis suggests that a modest effect size for clinical benefit would be sufficient to provide an acceptable cost-effectiveness ratio. The authors suggest that the sustainability of these approaches depends on a range of factors, including funding, workforce availability, and acceptability to consumers and healthcare providers.

Vos et al. (2005) evaluated the available evidence on costs and benefits of CBT and drugs in the episodic and maintenance treatment of major depression (total of seven interventions).¹⁶ The authors found that all interventions for major depression examined have a favourable ICER: bibliotherapy, group CBT, individual CBT and TCAs all very cost-effective treatment options. The authors suggest that a range of cost-effective interventions for episodes of major depression are currently underutilised with maintenance treatment strategies required to significantly reduce the burden of depression. However, the cost of long-term drug treatment for the large number of depressed people is high if SSRIs are the drug of choice. Key policy issues with regard to expanded provision of CBT concern the availability of suitably trained providers and the funding mechanisms for therapy in primary care. More widespread implementation of CBT could potentially lead to cost offsets: (i) for the PBS because of a reduction in prescription of antidepressant drugs and (ii) for the health system in general because of a decrease in resource usage resulting from a reduction in relapse and severity of depression. These have not been considered in the analyses, but would only have made the findings more favourable toward CBT.

Mihalopoulos et al. (2011) used the ACE-Prevention methodology to examine the population level cost-effectiveness of a brief psychological intervention based on bibliotherapy and a more comprehensive group-based psychological intervention following opportunistic screening for sub-syndromal depression in general practice.⁴⁸ The authors suggest that both psychological interventions, particularly brief bibliotherapy, appear to be good value for money and worthy of further evaluation under routine care circumstances. Acceptability issues associated with such interventions also need to be considered before wide-scale adoption is contemplated. Further evaluation is required to confirm that the interventions truly are effective and the parameters used in the modelling framework are generalisable to the Australian context.

Mihalopoulos et al. (2012) used the ACE-Prevention methodology to examine the population-level cost-effectiveness of a preventive intervention that screens children and adolescents for symptoms of depression in schools and the subsequent provision of a psychological intervention to those showing elevated signs of depression.²⁴ The authors suggest that the intervention is cost-effective and represent good value for money. Further they contend that such an intervention needs to be seriously considered in any national package of preventive health services. Issues around acceptability to providers need to be addressed before widespread adoption.

Depression – UK studies

Bower et al. (2000) compared the cost-effectiveness of non-directive counselling, CBT and routine GP care in the management of depression and mixed anxiety and depression.¹⁸ The results suggest that both brief psychological therapies may be significantly more cost-effective than usual care in the short term, as benefit was gained with no significant difference in cost. There were no significant differences between treatments in either outcomes or costs at 12 months. Authors suggest that given such equivalence, practitioners are in a position to decide on services based on factors other than outcomes and costs, such as staff and patient preferences or staff availability.

Miller et al. (2003) assessed the cost-effectiveness of generic psychological therapy (counselling) with routinely prescribed antidepressant drugs in a naturalistic general practice setting for a follow-up period of 12 months.⁵³ The authors found no significant difference between costs and outcomes. The key findings on cost-effectiveness are confusing and related to the subjective value of how much society values improvement. For a small proportion of patients counselling is a dominant cost-effective strategy but for the larger proportion antidepressants are a dominant cost-effective strategy. For the remaining group of patients, cost-effectiveness depends on the amount decision makers value an additional patient with positive outcome. Authors suggest that further research is required to understand the determinants of cost-effectiveness for specific groups of patients. Counselling and/or antidepressants could then be targeted to maximise the overall efficiency of resources used to manage depression.

Scott et al. (2003) evaluated the cost-effectiveness of CBT in addition to antidepressants and clinical management versus antidepressants and clinical management alone.⁵⁴ The authors found that in individuals with depressive symptoms that are resistant to standard treatment, adjunctive cognitive therapy is more costly but more effective than intensive clinical treatment alone. The authors suggest that structured psychological therapies such as CBT, interpersonal therapy and similar approaches appear to have a major role to play in the treatment of residual depression.

Peveler et al. (2005) evaluated the cost-effectiveness of three classes of antidepressant: TCAs, SSRIs and the TCA-related antidepressant lofepramine as first choice treatments for depression in primary care.¹⁹ Based on an open, pragmatic, controlled trial with three randomised arms and one preference arm, the authors found that there was no significant difference in the clinical

effectiveness of the three classes of medication and the relative cost-effectiveness appeared to be broadly similar. The authors conclude that it is appropriate to base the first choice between these three classes of antidepressant in primary care on doctor and patient preferences.

Wade et al. (2005) conducted a pharmacoeconomic evaluation of escitalopram versus citalopram in the treatment of severe depression in the UK.⁵⁵ The authors found that escitalopram is a cost saving alternative to citalopram for the treatment of severe depression in the UK. From both the NHS and the UK society perspectives, the relative cost savings per treated patient and per successfully treated patient were -7% and -16%, respectively. The authors contend that a possible advantage may exist at the population level in the treatment of severe depression with escitalopram in the UK.

Lam et al. (2005) evaluated the cost-effectiveness of CBT with standard care for individuals with bipolar disorder.⁵⁶ The ICER was determined using the net-benefit approach and found that even with a zero value the probability of CBT being cost-effective is in excess of 0.85 for the first 12 months and 0.80 for the whole study period of 30 months. The authors suggest that CBT is a useful addition to standard treatment of patients with bipolar disorder, at no extra overall cost.

Greenhalgh (2005) conducted a NHS review to establish the cost-effectiveness of ECT for depressive illness, schizophrenia, catatonia and mania.¹¹ Two economic models were developed based on evidence from the clinical effectiveness analysis and limited QOL studies. For depression none of the scenarios had a clear economic benefit over the others. The authors suggest that there is a need for further, high-quality RCTs of the use of ECT in specific subgroups that are most likely to receive this treatment including older people with depression, women with postpartum exacerbation of depression or schizophrenia and people with catatonia.

Kaltenthaler et al. (2006) conducted a systematic review and economic modelling exercise of CCBT for depression and anxiety.³⁰ The review found only one published economic evaluation of CCBT (included in this review under McCrone et al. (2009)). The authors subsequently conducted a series of cost-effectiveness models for the five CCBT products across the three mental health conditions. The depression software packages were most cost-effective. Although the economic modelling was robust, the models had a number of key problems including lack of good quality epidemiological data. The authors suggest that research is needed to compare CCBT with other therapies that reduce therapist time, in particular bibliotherapy and to explore the use of CCBT via the internet.

McKendrick et al. (2007) developed a Markov model to evaluate the cost-effectiveness of olanzapine compared with lithium as maintenance therapy for patients with bipolar I disorder (BP1) in the UK.⁵⁷ The authors suggest that using olanzapine instead of lithium would significantly reduce the rate of acute mood events resulting in reduced hospital costs. It therefore provided value for money.

Kendrick et al. (2009) conducted a RCT to determine the cost-effectiveness of SSRIs plus supportive care, versus supportive care alone, for mild to moderate depression with somatic symptoms in primary care: the THREAD (THREshold for AntiDepressant response) study.¹⁵ The authors found that treatment with an SSRI plus supportive care is more effective than supportive care alone. The additional benefit is relatively small, and may be at least in part a placebo effect, but is probably cost-effective at the level used by NICE to make judgements about recommending treatments within the NHS. The authors list a series of recommendations including more studies of drug and non-drug treatments for mild depression in primary care; more research on the natural history of depression, more economic evaluations and better measures of outcome for depression studies including patient-derived measures need to be developed.

Fajutrao et al. (2009) developed a model to examine the cost-effectiveness of quetiapine versus placebo as an adjunct to mood-stabiliser therapy (lithium or valproate).⁵⁸ The authors developed

a Markov model to simulate the transitions of patients with bipolar I disorder across four possible health states. The authors found that adjunctive quetiapine and mood-stabiliser therapy with lithium or valproate were associated with fewer acute mood events, hospitalisations and lower total costs, thereby improving patient mental health outcomes and minimising impact on payer budgets. Authors note several limitations including lack of good quality epidemiological data, narrow perspective including on only direct costs or combinations of therapy.

Paulden et al. (2009) evaluate the cost-effectiveness of routine screening for postnatal depression in primary care in the UK.⁵⁹ The authors discuss recent clinical guidelines issued by the NICE that recommend the use of brief case finding questions to identify possible postnatal depression. This guidance, however, did not formally consider the cost-effectiveness of such strategies. The author's main findings are that formal identification methods for postnatal depression do not seem to represent value for money and goes against NICE recommendations. The major determinant of cost-effectiveness seems to be the potential additional costs of managing women incorrectly diagnosed as depressed. Further research specifically into the health related QOL of women with postnatal depression would be valuable for future studies. A further issue is the degree to which the QALY is an appropriate measure of health outcome. While the QALY is used throughout the literature on evaluation of health economics, it might be an insensitive measure of outcomes in mental health care.

Generalised anxiety disorder – Australian study

Heuzenroeder et al. (2004) adopted an ACE-MH approach in evaluating the cost-effectiveness of CBT versus SNRIs versus current practice for GAD.¹² The authors find CBT provided by a public psychologist is the most cost-effective intervention (\$12,000/DALY). Treatment with SNRI provides a similar ICER as CBT by other providers (\$30,000/DALY). It is likely ($\geq 73\%$ chance) that the ICERs for all interventions will be below our threshold of A\$50,000 per DALY saved. A key issue identified by authors is workforce capacity associated with advocating CBT and the fact that venlafaxine is not currently available on the PBS.

Generalised anxiety disorder – Canadian studies

Iskedjian et al. (2008) evaluated the cost-effectiveness of escitalopram versus paroxetine for GAD in a primary care setting in Canada.⁶⁰ Using a decision tree model, the authors concluded that escitalopram was more cost-effective than paroxetine, indicating an advantage over paroxetine.

Bereza et al. (2009) conducted a review of economic evaluations related to patients with GAD.³⁷ Five articles reported full economic evaluations – four referenced in this review. The fifth study was not a proper economic evaluation.

Generalised anxiety disorder – UK studies

Guest et al. (2005) evaluated the cost-effectiveness of venlafaxine XL versus diazepam for the treatment of GAD among non-depressed patients. The authors used results from a double-blind RCT and adopted successful treatment as primary outcome measure. The authors reported that starting treatment for GAD with venlafaxine XL compared with diazepam is a cost-effective strategy. They also suggest that more research is required to understand whether better treatment of GAD improves productivity or allows the unemployed or economically inactive to work.

Jørgensen et al. (2006) evaluated the cost-effectiveness of escitalopram and paroxetine in the treatment of GAD in the UK.²¹ Using a decision analytic model the authors find that first-line treatment with escitalopram appears to be cost-effective compared with paroxetine in the management of GAD. Savings were primarily due to fewer days of sick leave and a lower number of discontinuations due to adverse events. In the model, indirect costs accounted for 95% of total costs. Absenteeism costs were derived from expert (healthcare practitioner) opinion.

Mental disorder – Australian studies

Sanderson et al. (2003) calculated the cost-effectiveness of evidence-based healthcare for depression, dysthymia and bipolar disorder in the Australian population.³⁴ Although optimal treatment was not specifically defined, it was considerably more cost-effective than current treatment. The authors suggest that current direct mental health-related healthcare costs for affective disorders in Australia were \$615 million (1997–98 Australian dollars). This treatment averted just under \$30,000 YLDs giving a cost-effectiveness ratio of \$20,633 per YLD. Outcome could be increased by nearly 50% at similar cost with implementation of an evidence-based package of optimal treatment, halving the cost-effectiveness ratio to \$10,737 per YLD.

Vos et al. (2005) summarised ACE-MH cost-effectiveness results for depression, schizophrenia, ADHD and anxiety disorders that have been published in the Australian and New Zealand Journal of Psychiatry.²⁰ The authors suggest that there are cost-effective treatment options for mental disorders that are currently underutilised (e.g. CBT for depression and anxiety, bibliotherapy for depression, family interventions for schizophrenia and clozapine for the worst course of schizophrenia). There are also less cost-effective treatments in current practice (e.g. use of olanzapine and risperidone in the treatment of established schizophrenia and, within those atypicals, a preference for olanzapine over risperidone). The authors suggest that despite considerable uncertainty around key input variables, clear distinctions in cost-effectiveness between mental health interventions (particularly within disorders) are apparent. The results suggest that substantial opportunities exist to improve efficiency within our current mental health resources, if resources were shifted toward more cost-effective interventions. Authors do note however that the results of these cost-effectiveness analyses provide valuable material likely to contribute to future policy deliberations by all service providers in mental health. The recommendations should not be seen as one size fits all. Not all patients respond to any one treatment and patients (and doctors) have their own preferences for treatment, which will inevitably impact on its effectiveness.

Gilbert et al. (2012) evaluated the cost-effectiveness of a self-management intervention delivered as part of routine care in an adult mental health service.⁶¹ The intervention (called the Optimal Health Program) involved nine sessions and aimed to provide education and skills to enable participants to manage their mental health in collaboration with services, carers and others. The intervention was associated with significant improvements in health and social functioning and reduced hospital admissions. The authors translated this into a net cost saving of over \$6000 per participant per year. The authors note several caveats including small sample size, and design issues (in particular self-selection). They do suggest that incorporating a self-management program into routine care to improve the health and social functioning of mental health consumers is cost-effective.

Mihalopoulos et al. (2011) summarised ACE-Prevention cost-effectiveness results of a range of mental interventions for depression and anxiety disorders, mostly psychological in nature, that have been published in other journals.⁴⁰ A number of preventive interventions for mental disorders are cost-effective, have good evidence of effectiveness, and certainly need to be considered in any package of health promotion and illness prevention initiatives. Screening

children/adolescents for symptoms of depression with subsequent provision of psychological therapy deserve special mention. These studies are generally well evaluated and, importantly, have evidence of efficacy and effectiveness—that is, evidence that they work under routine health-service conditions as well as in controlled experimental conditions. The parenting intervention for childhood anxiety prevention is also very cost-effective, although the evidence base—classified as ‘sufficient’ because it is a high quality randomised trial—is an efficacy study, and the effect in routine health service provision needs to be demonstrated. Also recommended for adoption are a number of other cost-effective preventive interventions for mental disorders (e.g. screening for minor depression in adults for the prevention of depression and Post natal depression (PND) and treatment for youth at ultra high risk of psychosis), although these interventions would need to be accompanied by rigorous evaluation to expand the evidence base.

Mental disorder – Canadian studies

Forchuk et al. (2005) conducted a CEA of transitional discharge model (TDM) of care compared to a standard model of discharge care.³¹ A key objective was to assist individuals hospitalised with a persistent mental illness in successful community living. The TDM consisted of overlap of inpatient and community staff in which the inpatient staff continued their relationship with clients, until the clients had a working relationship with a community care provider; and peer support was available to the client for a minimum of one year. The authors found that TDM post-discharge costs and QOL were not significantly improved compared with the control group. TDM subjects were discharged an average of 116 days earlier per person. The authors’ note that with a reduction of psychiatric hospital beds, there is a demand for quality mental health services to be provided within the community. More research like this is required to examine the true cost of shifting patients out of primary healthcare arrangements.

Dewa et al. (2009) examined the cost-effectiveness of a collaborative mental healthcare program (CMHP) compared to usual care in the workplace.²⁵ The intervention was based on collaborative care concepts including psychiatric assessment, short term management by psychiatrist, psychiatric support of management by the primary care physician and availability of psychiatric consultation for non-referred workers. The authors found that with CMHC, for every 100 people there could be an expected \$50,000 in disability benefit savings (\$503 per person x 100 people), along with more people returning to work (n=23), less people transitioning to long term disability leave (n=24) and 1600 more work days (16 less short-term disability days x 100 people). The extra benefits of CMHC outweigh the extra costs. The authors note a key challenge was establishing the relationship between specialist and primary care physician. A wider perspective would provide more accurate costing information.

Myhr et al. (2006) conducted a review of published data on the economic impact of CBT to inform recommendations for current Canadian mental healthcare funding policy.⁴¹ A total of 22 health economic studies were identified (14 from countries relevant to this rapid review) involving CBT for mood, anxiety, psychotic, and somatoform disorders. Across healthcare settings and patient populations, CBT alone or in combination with pharmacotherapy represented acceptable value for health dollars spent, with CBT costs offset by reduced healthcare use. Relevant articles are included in this rapid review under appropriate condition.

Mental disorder – UK studies

Flood et al. (2006) examined the cost-effectiveness of joint crisis plans in addition to usual care.³² The plan establishes the preferences for treatment of those who use the service at a point when they are relatively well, to be applied in any subsequent crisis when the individual may be too

unwell to indicate their preferences. This study found that joint crisis plans produced a nonsignificant decrease in admissions and total costs. Though the cost estimates had wide confidence intervals, the associated uncertainty suggests there is a relatively high probability of the plans being more cost-effective than standardised service information for people with psychotic disorders. The authors suggest that advance statements in the form of joint crisis plans may have the potential to reduce both compulsion and costs.

McCrone et al. (2009) evaluated the cost-effectiveness of assertive community treatment (ACT) versus usual care from community mental health teams in the UK.³³ Data came from the REACT study. The authors suggest that the costs of ACT were not significantly different from usual care. ACT did, however, result in greater levels of client satisfaction and engagement with services and as such may be the preferred community treatment option for patients with long-term serious mental health problems.

Heslin et al. (2011) investigated the cost-effectiveness of IPS in England followed up for two years.²⁸ The intervention involved the linking employment specialists with community mental health teams. Thirty-two (17%) participants out of 190 who were followed up reported having worked, between baseline and the two-year follow-up, in jobs that met the competitive employment criteria. Of those followed up, 11 out of 95 (11%) were from the control group and 21 out of 95 (22%) were from the intervention group. Regression analysis showed a nonsignificant cost difference of £2361 in favour of the intervention. The authors indicated that IPS was seen as dominant but little detail was provided on costs, outcomes or the analysis. The authors also note a problem of communication/interaction between employment agencies and mental health workers and suggest that additional interventions may need to be provided to promote social inclusion for the majority of people with severe mental illness.

Panic disorder – Australian studies

Heuzenroeder et al. (2004) also evaluated the cost-effectiveness of CBT versus SSRIs versus TCA versus current practice.¹² The authors find CBT provided by a public psychologist is the most cost-effective intervention (\$15,000/DALY). TCAs are the second most cost-effective option (\$30,000/DALY) followed by CBT by other providers and SSRIs (A\$78,000/DALY). A key issue identified by authors is workforce capacity associated with advocating CBT and evidence underpinning the modelling.

Mihalopoulos et al. (2005) used the ACE-Prevention methodology to evaluate the cost-effectiveness of an internet-based psychological intervention supported by either GPs or psychologists (Panic Online).¹³ Note that the Panic Online study is a RCT of an internet-based CBT, with the support of either a psychologist or GP, for the treatment of panic disorder within a primary care setting. At the time of writing, the RCT was in progress so the authors used secondary analysis to model the potential cost-effectiveness. The authors reported an ICER when assisted by a psychologist of \$4300/DALY averted and when assisted by a GP of \$3200/DALY averted. Both interventions provided good value for money. The authors suggest that the sustainability of these approaches depends on a range of factors, including funding, workforce availability, and acceptability to consumers and healthcare providers.

Schizophrenia – Australian studies

Mihalopoulos et al. (2004) investigate the ICERs of introducing three types of family interventions, namely: behavioural family management (BFM); behavioural intervention for families (BIF); and multiple family groups (MFG) into current mental health services in Australia.³⁵ A part of the ACE-MH study the authors found that all three interventions would be considered value for money. The

authors note data issues and challenges associated with feasibility and acceptability of introducing such interventions within mental health services in Australia.

Chalamat et al. (2005) conducted a cost-benefit analysis of vocational rehabilitation for schizophrenia and related conditions.²⁶ The authors used an ACE-MH approach to consider the net benefit of introducing individual placement and support (IPS) into current mental health services in Australia. This was a limited analysis that focused on full-time employment and considered benefits from a government's perspective. The authors find that IPS costs are greater than the monetary benefits and state that the evidence base is weak. The major reason why the benefit to cost ratio is not favourable is that the employment rate associated with IPS is low and people do not usually return to full-time work. Further they argue that structural conditions surrounding welfare payments in Australia create disincentives to full-time employment for people with disabilities. The authors contend that more studies of vocational rehabilitation are warranted.

Magnus et al. (2005) used the ACE-MH method to assess the ICER of eight drug treatment scenarios for established schizophrenia.³⁹ The authors found that low-dose typical neuroleptics are indicated as the treatment of choice for established schizophrenia with risperidone being reserved for those experiencing moderate to severe side-effects on typicals. The more expensive olanzapine should only be prescribed when risperidone is not clinically indicated. Earlier introduction of clozapine would be cost-effective. Several problems with the study including a lack of good quality epidemiological data.

Schizophrenia – Canadian studies

Chue et al. (2005) estimate the cost-effectiveness of long-acting risperidone in the treatment of high risk, non-compliant patients with schizophrenia in Canada.⁴⁶ The authors developed a discrete event model based on secondary data. The authors found that after five years, initiating treatment of high risk, non-compliant patients with schizophrenia with long-acting risperidone was the dominant strategy. The positive results were driven by the subpopulation of patients who achieve only partial recovery between relapses. Patients who progressively deteriorate between relapses represent approximately one-half of patients with schizophrenia. Therefore, targeting long-acting risperidone to this patient subgroup may yield the greatest cost-effectiveness.

McIntyre et al. (2010) evaluated the cost-effectiveness of four second-generation antipsychotic agents used in Canada for the treatment of schizophrenia (ziprasidone, olanzapine, quetiapine, risperidone).⁶² The authors note that second-generation antipsychotic agents are first-line pharmacological treatments for individuals with schizophrenia in Canada. The authors found that ziprasidone treatment possesses cost and therapeutic advantages compared with olanzapine and quetiapine. Treating the estimated 234,305 schizophrenia patients in Canada with ziprasidone would cost the Canadian Healthcare System an estimated total of \$5.9bn over the course of five years. This would generate \$764 million in savings compared with using olanzapine and \$218 million compared with using quetiapine. The authors also note that there is limited clinical evidence exists to assist clinicians with choosing long term treatment for individuals with schizophrenia that optimises clinical and functional outcomes.

Schizophrenia – UK studies

Tilden et al. (2002) modelled the cost-effectiveness of quetiapine compared with haloperidol in partial responders with schizophrenia.⁴⁴ Epidemiological data was obtained from the Partial responders international schizophrenia evaluation (PRIZE) clinical trial. The authors suggest that quetiapine has the potential to improve outcomes compared with haloperidol at a slightly lower

total cost with the higher acquisition cost of quetiapine offset by savings in other medical costs. The authors contend that quetiapine could significantly improve the management of this patient group without increasing the economic burden on the health service.

Greenhalgh (2005) conducted a NHS review to establish the cost-effectiveness of ECT for depressive illness, schizophrenia, catatonia and mania.¹¹ Two economic models were developed primarily based on evidence from the clinical effectiveness analysis and limited QOL studies. For the schizophrenia model including ECT the authors find that clozapine is a cost-effective treatment compared with ECT. The authors suggest that there is a need for further, high quality RCTs of the use of ECT in specific subgroups that are most likely to receive this treatment including older people with depression, women with postpartum exacerbation of depression or schizophrenia and people with catatonia.

Lewis et al. (2006) conducted a NHS study to determine the cost-effectiveness of different classes of antipsychotic drug treatment in people with schizophrenia responding inadequately to, or having unacceptable side-effects from, their current medication.⁶³ The authors found that in people with schizophrenia whose medication is being changed because of intolerance or inadequate clinical response, there is an economic advantage in terms of utility, QALYs and costs to changing to a conventional antipsychotic in the first instance. For the second study, for patients changing medication because of narrowly defined treatment resistance, the change to clozapine is not supported by the economic analysis, which suggests that the small improvements in symptoms and QALYs are associated with a high cost, and may not represent value for money. These economic results differ from the overall literature about the cost-effectiveness of clozapine, which suggests that clozapine is cost-effective. However, the majority of these economic comparisons compare clozapine with conventional antipsychotics. The results of this economic evaluation are broadly in line with the economic studies that have compared clozapine with atypical antipsychotics in people with narrowly defined treatment resistance.

Davies et al. (2008) assessed whether clozapine is more cost-effective than other Second-generation antipsychotics (SGAs) in people with schizophrenia.¹⁷ The newer, second generation of atypical antipsychotics include clozapine, risperidone, sertindole, olanzapine, quetiapine, ziprasidone, zotepine, and amisulpride. A RCT designed study which was consistent with NHS protocols. The ICER for clozapine was £33,240/QALY. Results fell under the £35,000 threshold 50% of the time. The authors discuss the interpretation of ICER results and how it links in with policy makers. They also suggest that there is a further need for economic evaluation of clozapine.

Crawford et al. (2012) conducted the MATISSE (Multicentre evaluation of Art Therapy In Schizophrenia: Systematic Evaluation) study that examined the cost-effectiveness of referral to group art therapy plus standard care, compared with referral to an activity group plus standard care and standard care alone, among people with schizophrenia.²⁹ Participants were recruited from four inpatient and community-based mental health and social care services. The authors found no differences in outcomes between trial arms and conclude that art therapy is not a cost-effective intervention. Other creative therapies, including music therapy and body movement therapy, should be evaluated. Evaluation of group art therapy as an adjunctive treatment for inpatients with acute psychosis and for those with recent onset schizophrenia should be evaluated.

Appendix 2: Tabular summary of studies included in this rapid review

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Attention deficit hyperactivity disorder (ADHD)	Donnelly, 2004	Australia	Cost-effective analysis (CEA) (ACE-MH) – secondary modelling	Dexamphetamine (DEX) versus methylphenidate (MPH)	Primary care	Health sector	Cost/DALY	Both stimulants considered value for money – A\$4100/DALY for DEX and A\$15,000/DALY for MPH. DEX is always more cost-effective, as both drugs deliver the same health benefit and the price of MPH is two to three times higher than DEX. Acceptability a key issue - some children may be medicated unnecessarily; others not at all, parents are likely to be uncomfortable with the use of psychostimulants to treat children	Good
ADHD	Cottrell, 2008	UK	CEA - modelling	Atomoxetine compared with current alternatives (MPH (XR and IR), dexamphetamine, and no medication)	Primary care	NHS	Cost/QALY	Improved health outcomes, translated into increased QALYs, are possible with a treatment algorithm including atomoxetine compared with an algorithm without it. The ICER per QALY gained with atomoxetine varied from £11,523 to £15,878	Good
Conduct disorder	Mihalopoulos, 2007	Australia	Threshold analysis - limited CEA (secondary modelling)	Triple P Positive Parenting Program	Primary care	Government as third party funder	Cost/saving	Triple P Positive Parenting Program is a dominant intervention, i.e. it costs less than the amount it saves, until the reduction in prevalence falls below 7% where net costs become positive. Triple P is likely to be a worthwhile use of limited health funds. The economic case is promising, but further research is required to confirm the study results	N/A
Conduct disorder	Muntz, 2004	UK	CEA from RCT	Intensive practice based parenting program versus standard treatment (pilot basis)	Child and adolescent mental health service	Multi-sectoral service perspective	Cost/saving	ICER of £224.00 from changing to the intervention treatment from the control	Average

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Conduct disorder	Edwards, 2007	UK	CEA from RCT	Incredible years basic parenting program	Sure start areas in north and mid Wales	Multi-agency public sector perspective (health, special ed., social)	Cost/improvement	ICER of £71 per one point change in the Eyberg intensity score (£1992.29-£49.14/27.29=£71.20), where £1992.29 is the change in service use costs (including costs of the parenting program) for the intervention group, £49.14 is the change in service use costs for the control group, and 27.29 (27.29-0) is the incremental change in the Eyberg child behaviour index. From a policy perspective, if a cost ceiling of £100 was set, then the intervention would have an 83.9% probability of being cost-effective	Average
Conduct disorder	Charles, 2011	UK	Review of economic evaluation studies	Parenting interventions	N/A	N/A	N/A	Edwards et al. (2007) and Muntz et al. (2004) reviewed in table	N/A
Depression	Haby, 2004	Australia	CEA (ACE-MH) – secondary modelling	CBT versus SSRIs versus current practice	Primary care	Health sector	Cost/DALY	CBT by public psychologists (or other effective providers at a similar salary level) is the most cost-effective at A\$9000 per DALY saved. SSRIs are also a cost-effective intervention both as a first-line treatment and as a second-line treatment. SSRIs are less effective than CBT, resulting in lower total health benefit	Good
Depression	Mihalopoulos, 2005	Australia	Threshold analysis	Primary care evidence-based psychological interventions (PEP) strategy which involves training GPs to deliver specific psychological interventions	Primary care	Health sector	Cost/DALY	The net cost was \$35 million. Threshold analysis of PEP suggests that a modest effect size for clinical benefit would be sufficient to provide an acceptable cost-effectiveness ratio. Workforce issues raised by authors	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Depression	Vos, 2005	Australia	CEA (ACE-MH) - secondary modelling	Seven interventions modelled: For acute symptoms - TCAs versus SSRIs versus CBT (psychologist versus psychiatrist in public versus private service and individuals versus group) versus bibliotherapy; for maintenance treatment - TCAs versus SSRIs versus CBT	Primary care	Health sector	Cost/DALY	All interventions for major depression examined have a favourable ICER. Bibliotherapy is the cheapest option with net cost savings if offered instead of ineffective treatment options. CBT by psychologists on a public salary is the next best option, followed by TCAs, CBT by private providers and SSRIs. As the vast majority of people with depression experience multiple episodes over a lifetime and are particularly prone to relapses, there are strong arguments to treat all depression as a chronic episodic disorder and not just those with three or more episodes as recommended in current treatment guidelines	Good
Depression	Mihalopoulos, 2011	Australia	CEA (ACE-Prevention) - secondary modelling	Brief bibliotherapy versus group-based intervention	Primary care	Health sector	Cost/DALY	Both of these interventions represent potential good value for money. Brief bibliotherapy was cost-effective (\$8,600/DALY) though in 11.5% of the simulations a negative health benefit was modelled. Group-based was also cost-effective (\$23,000/DALY). Evidence of effectiveness is weak	Good
Depression	Mihalopoulos, 2012	Australia	CEA (ACE-Prevention) - secondary modelling	Screening children and adolescents for symptoms of depression in schools and then subsequent provision of a psychological intervention to those showing elevated signs of depression versus do no intervention	Schools and primary care	Health sector	Cost/DALY	After school screening, screening and the psychological intervention represent good value for money with an ICER of \$5400 per DALY averted. Acceptability issues, particularly to intervention providers, including schools and mental health professionals, need to be considered before wide-scale adoption	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Depression	Bower, 2000	UK	CEA from RCT	Usual GP or up to 12 sessions of nondirective counselling or CBT provided by therapists	Primary care	Social	Cost/QALY	At 12 months, there were no significant differences between the three treatments in outcomes or total costs, and thus there was no evidence that psychological therapies were more cost-effective than usual care in the long term. Given such equivalence, commissioners of services are in a position to decide on services based on factors other than outcomes and costs, such as staff and patient preferences or staff availability	Good
Depression	Miller, 2003	UK	CEA from RCT	Counselling versus antidepressants	Primary care	NHS	Cost/global outcome	No significant difference between cost and outcomes at 12 months. For a small proportion of patients with mild to moderate depression, the counselling intervention is a dominant cost-effective strategy. For a larger proportion of patients, the antidepressant intervention is the dominant cost-effective strategy. For the remaining group of patients, cost-effectiveness depends on the amount decision makers value an additional patient with positive outcome.	Good
Depression	Scott, 2003	UK	CEA from clinical study	CBT + antidepressants + clinical management versus antidepressants + clinical management alone	Primary care	NHS	Cost/relapse free day	In individuals with depressive symptoms that are resistant to standard treatment, adjunctive CBT is more costly but more effective than intensive clinical treatment alone. The cost of providing additional therapy is about £12.50 per additional relapse free day - £4,500 per additional relapse prevented.	Good
Depression	Peveler, 2005	UK	CEA from clinical study	TCAs versus SSRIs versus the modified TCA lofepramine	Primary care	NHS	Cost/QALY	TCAs were the least likely to be cost-effective as first choice of antidepressant for most values of a QALY, but these differences were relatively modest. Given the low probability of significant differences in cost-effectiveness, the authors conclude that it is appropriate to base the first choice between these three classes of antidepressant in primary care on doctor and patient preferences.	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Depression	Wade, 2005	UK	Pharmacoeconomic study - probabilistic decision tree	Escitalopram compared with citalopram in patients with severe depression	Primary care	NHS and society	Cost/successful threatened	Escitalopram is a cost saving alternative to citalopram. From both the NHS and the UK society perspectives, the relative cost savings per treated patient and per successfully treated patient were -7% and -16%, respectively, for escitalopram versus citalopram.	Good
Depression	Lam, 2005	UK	CEA - net benefit approach	CBT + standard care versus standard care	Primary care	NHS	Cost/bipolar free day	In first year, those receiving CBT spent 62.3 fewer days with bipolar episodes than the comparison group. Even with a zero value, the probability of CBT being cost-effective is in excess of 0.85 for the first 12 months and 0.80 for the whole study period of 30 months	Good
Depression	Greenhalgh, 2005	UK	Review - CEA modelling	Different scenarios that incorporated ECT as a treatment versus a pharmacological only treatment	Primary care	NHS	Cost/QALY	Depression: none of the scenarios had a clear economic benefit over the others. The main reason for this was the uncertainty surrounding the clinical effectiveness and the QOL utility gains. The clinical evidence underpinning the ECT assumptions in the model is weak and the results should be interpreted with caution	Good
Depression	Kaltenthaler, 2006	UK	Review - CEA modelling using secondary data	CCBT for depression	Primary care	NHS	Cost/QALY	Only one published economic evaluation of CCBT was found (included in this review under McCrone et al. (2009)). The depression software packages were most cost-effective for beating the blues program (£1801/QALY), then Cope (£7139/QALY) and then overcoming depression (£5391/QALY). Authors point to a number of problems including uncertainties around the organisational level for purchasing these products, the lack of evidence on response to therapy, longer-term outcomes and quality of life	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Depression	McKendric, 2007	UK	CEA - Markov model using secondary data	Olanzapine versus current standard (lithium)	Primary care	NHS	Cost/mood event experienced	From a patient perspective, maintenance treatment with olanzapine was estimated to result in 2.6 fewer days with acute symptoms over the one-year period than treatment with lithium. The ICER was negative as olanzapine was estimated to reduce the number of mood episodes and lowered costs. The model findings cannot be generalized to the whole population given selection criteria	Good
Depression	Kendrick, 2009	UK	CEA from RCT	SSRI treatment + supportive care versus supportive care alone	Primary care	NHS	Cost/QALY	ICER suggest that adding an SSRI to supportive care was probably cost-effective - £14,854/QALY gain	Good
Depression	Fajutrao, 2009	UK	Pharmacoeconomic study - Markov modelling	Quetiapine versus placebo as an adjunct to mood-stabiliser therapy (lithium or valproate)	Primary care	NHS	Cost/QALY	The ICER ratios were £506 per additional acute mood event avoided, £4261 per additional acute mood event-related hospitalization prevented and – £7453/QALY gained	Good
Depression	Paulden, 2009	UK	CEA secondary modelling	Routine screening for postnatal depression using decision tree from onset through identification, treatment and possible relapse.	Primary care	NHS	Cost/QALY	The use of formal identification methods for detecting postnatal depression does not represent value for money for the NHS given cost associated with managing false positives	Good
Generalised Anxiety Disorder (GAD)	Heuzenroeder, 2004	Australia	CEA (ACE-MH) - secondary modelling	CBT versus SNRIs versus current practice	Primary care	Health sector	Cost/DALY	CBT provided by a public psychologist is the most cost-effective intervention (\$12,000/DALY). Treatment with SNRI provides a similar ICER as CBT by other providers (\$30,000/DALY). It is likely (≥73% chance) that the ICERs for all interventions will be below our threshold of A\$50,000 per DALY saved. Greater use of publicly funded psychologists will require attention to ensuring an adequate workforce	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
GAD	Iskedjian, 2008	Canada	CEA using decision analytic model	Escitalopram versus paroxetine	Primary care	Health sector	Cost/symptom-free day	Escitalopram had a cost of \$724 and paroxetine \$663. 86.4 symptom-free days for escitalopram and 77.0 symptom-free days for paroxetine. The ICER for escitalopram over paroxetine was \$6.56 per symptom-free day.	Good
GAD	Bereza, 2009	Canada	Review of economic evaluation studies	Generalized Anxiety Disorder	N/A	N/A	N/A	Five articles reported full economic evaluations – four included here	N/A
GAD	Guest, 2005	UK	CEA from RCT	Venlafaxine XL versus diazepam	Primary care	NHS	Cost/saving	Starting treatment for GAD with venlafaxine XL compared with diazepam is cost-effective. The ICER for each additional patient in remission at six months was £380. The ICER for each additional patient in whom relapse was avoided at 6 months was £295	Good
GAD	Jørgensen, 2006	UK	CEA using decision analytic model	Escitalopram versus Paroxetine (both SSRIs)	Primary care	Social (limited to direct and absenteeism)	Cost/saving	Escitalopram had 14.4% more first-line success compared with paroxetine after 36 weeks. The advantages of escitalopram in terms of effectiveness showed savings of £1408 over nine months (£8434 for escitalopram vs. £9843 for paroxetine) from a societal perspective. These savings were primarily due to fewer days of sick leave and a lower number of discontinuations due to adverse events. In the model, indirect costs accounted for 95% of total costs	Average
Mental disorder	Sanderson, 2003	Australia	CEA - modelling	Optimal, evidence-based treatment regime versus current treatment versus no treatment for depression, dysthymia, bipolar	Primary care	Health sector	Cost/YLD	Cost-effectiveness ratios for current treatment were not dissimilar across the three disorders: \$21,442 for depression, \$14,217 for dysthymia, and \$24,031 for bipolar disorder. CER for optimal treatment were \$10,475 for depression, \$3858 for dysthymia, and \$23,934 for bipolar disorder. Population outcome for affective disorders could be increased by nearly 50% with similar direct healthcare costs with implementation of an evidence-based package of optimal care	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Mental disorder	Vos, 2005	Australia	Review of ACE-MH studies	A range of interventions for depression, schizophrenia, attention deficit hyperactivity disorder and anxiety disorders	Primary care	Health sector	Cost/DALY	There are cost-effective treatment options for mental disorders that are currently underutilized (e.g.CBT for depression and anxiety, bibliotherapy for depression, family interventions for schizophrenia and clozapine for the worst course of schizophrenia). There are also less cost-effective treatments in current practice (e.g. use of olanzapine and risperidone in the treatment of established schizophrenia and, within those atypicals, a preference for olanzapine over risperidone)	Good
Mental disorder	Mihalopoulos, 2011	Australia	Review of ACE-Prevention studies	A range of interventions for depression and anxiety disorders, mostly psychological	Primary care	Health sector	Cost/DALY	Cost-effective interventions include: screening children/adolescents for symptoms of depression with subsequent provision of psychological therapy; parenting intervention for childhood anxiety prevention; screening for minor depression in adults for the prevention of depression and post natal depression (PND) and treatment for youth at ultra-high risk of psychosis	Good
Mental disorder	Gilbert, 2012	Australia	CEA alongside a clinical trial	Self-management intervention (optimal health program - OHP) versus routine care	Mental health services	Health service	Cost/saving	The economic analysis based on the percentage of time spent in hospital, suggested that there are significant potential savings associated with the OHP intervention. OHP intervention was estimated to save in excess of \$6000 (95% CI \$744 to \$12,656) per consumer per year. This study shows promising results for incorporating a self-management program into routine care to improve the health and social functioning of mental health consumers.	Average
Mental disorder	Forchuk, 2005	Canada	CEA from RCT	Transitional discharge model (TDM) of care compared with a standard model of discharge care	Psychiatric hospital and community care	Health sector	QOL, costs	TDM post discharge costs and QOL were not significantly improved compared with the control group. TDM subjects were discharged an average of 116 days earlier per person. Based on the hospital per diem rate this would be equivalent to \$12 million hospital costs	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Mental disorder	Dewa, 2009	Canada	CEA - net benefit regression	Collaborative mental health care program (CMHP) versus usual care	Finance company + mental health care providers	Employers perspective	Employment, tax	With CMHP, for every 100 people there could be an expected \$50,000 in disability benefit savings (\$503 per person x 100 people), along with more people returning to work (n=23), less people transitioning to long-term disability leave (n=24) and 1600 more work days (16 less short-term disability days x 100 people). The extra benefits of CMHP outweigh the extra costs.	Good
Mental disorder	Myhr, 2006	Canada	Review of economic evaluation studies	CBT in the treatment of mental disorders	N/A	N/A	N/A	Identified 22 health economic studies involving CBT for mood, anxiety, psychotic, and somatoform disorders. Across healthcare settings and patient populations, CBT alone or in combination with pharmacotherapy represented acceptable value for health dollars spent, with CBT costs offset by reduced healthcare use.	N/A
Mental disorder	Flood, 2006	UK	CEA from RCT	Joint crisis plans in addition to usual care versus standardised service information in addition to usual care	Mental health centres	Service providers - NHS, social, criminal justice system	Cost/ admission to hospital	Use of the Mental Health Act was significantly reduced in the joint crisis plan group, with compulsory admission experienced by 13% compared with 27% in the standardised service information group. Fewer nonsignificant admissions to hospital in the joint crisis plan group. Lower nonsignificant mean total cost per patient in the joint crisis plan group (£7264) than in the control group (£8359). The ICER was – £131 per 1% reduction in the proportion of patients admitted to hospital.	Good
Mental disorder	McCrone, 2009	UK	CEA from REACT study	Assertive community treatment (ACT) versus usual care	Community mental health teams	Health service	Cost/patient satisfaction	The ICER was £3,592/7.6, or £473 per extra unit of satisfaction produced by ACT. If social value of per unit increase of satisfaction was £1,000 there would be a 78% chance that ACT is more cost-effective than usual care.	Poor

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Mental disorder	Heslin, 2011	UK	CEA from SWAN trial	Individual placement and support (IPS) programme focussing on rapid placement with continued follow-up support versus treatment as usual	Community mental health teams	Health service	Employment	There were no significant differences between the intervention and control arm on overall costs, service costs or medication costs over the two year period. Regression analysis showed a no significant cost difference of £2361 in favour of the intervention. Based on the point estimates of costs and outcomes, IPS was seen as dominant - even if a value of £0 is placed on one more person gaining employment, there is still a 90% likelihood that IPS is the most cost-effective option.	Poor
Panic disorder	Mihalopoulos, 2005	Australia	CEA (ACE-MH) - secondary modelling	Internet-based psychological intervention supported by either GPs or psychologists (Panic Online)	Primary care	Health sector	Cost/DALY	Panic online ICER when assisted by a psychologist was \$4300/DALY averted and when assisted by a GP was \$3200/DALY averted.	Good
Panic disorder	Gilbert, 2012	Australia	CEA (ACE-MH) - secondary modelling	CBT versus SSRIs versus TCAs versus current practice	Primary care	Health sector	Cost/DALY	CBT provided by a public psychologist is the most cost-effective intervention (\$15,000/DALY). TCAs are the second most cost-effective option (\$30,000/DALY) followed by CBT by other providers and SSRIs (\$78,000/DALY). Greater use of publicly funded psychologists will require attention to ensuring an adequate workforce	Good
Schizophrenia	Mihalopoulos, 2004	Australia	CEA (ACE-MH) - secondary modelling	Three types of family interventions: behavioural family management (BFM) versus behavioural intervention for families (BIF) versus multiple family groups (MFG)	Primary care	Health sector	Cost/DALY	Behavioural interventions for families is the most cost-effective family intervention (\$9000/DALY), followed by MFG (\$22,000/DALY) and BFM (\$32,000/DALY). Given issues surrounding the levels of evidence, feasibility and acceptability, it is advisable that implementation should be accompanied by collecting local evaluation data to confirm cost-effectiveness	Good
Schizophrenia	Chalamat, 2005	Australia	CEA (ACE-MH) - secondary modelling	Introducing individual placement and support (IPS) services into current mental health services in Australia	Community mental health centres	Government	CBA - employment, welfare payments, tax	The costs of IPS are A10.3 million, the benefits are \$4.7 million, resulting in a negative net benefit of \$5.6 million. The major reason why the benefit to cost ratio is not favourable is that the employment rate associated with IPS is low and people do not usually return to full-time work	Good

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Schizophrenia	Magnus, 2005	Australia	Review - CEA modelling using secondary data	Eight drug treatment scenarios	Primary care	Health sector	Cost/DALY	To change all people taking oral typicals to risperidone has an ICER of \$48,000. To change people taking oral typicals to olanzapine has an ICER of \$92,000. Limiting the change to only those people taking typicals with side-effects yields an ICER of \$20,000 for risperidone and A\$38,000 for olanzapine. The ICER of changing those people currently taking low-dose typicals to risperidone is \$80,000. Changing the people currently taking risperidone to olanzapine has an ICER of \$160,000. Giving clozapine to people with the worst course of the disorder taking typicals, results in an ICER of \$42,000 and \$23,000 depending on their sub-classification in the LPDS on levels of functional deterioration (little or clear), respectively	Good
Schizophrenia	Chue, 2005	Canada	CEA secondary modelling	Long-acting risperidone versus an oral atypical agent versus a long-acting conventional formulation	Primary care	Health sector	Cost/avoided relapse	Initiating treatment of high risk, non-compliant patients with long-acting risperidone was the dominant strategy. Effective treatment intervention early in the course of schizophrenia is associated with a better long-term outcome	Good
Schizophrenia	McIntyre, 2010	Canada	CEA secondary modelling	Four second-generation antipsychotic agents - ziprasidone, olanzapine, quetiapine, risperidone	Primary care	Health sector	Cost/QALY	Both olanzapine and quetiapine were dominated by ziprasidone. ICER of ziprasidone as compared with risperidone was \$218,060/QALY gained. Use of ziprasidone instead of olanzapine and quetiapine would generate savings to the healthcare system that would amount to \$3262 and \$932, respectively, per patient over five years	Good
Schizophrenia	Tilden, 2002	UK	CEA	Quetiapine versus haloperidol	Primary care	NHS	Cost/relapse rate	Quetiapine has the potential to produce improved outcomes at lower cost compared with haloperidol treatment in patients who are partially responsive to conventional antipsychotics. Quetiapine could significantly improve the management of this patient group, who are often difficult to treat adequately, without increasing the economic burden on the health service	Poor

Mental disorder	First author, Yr published	Country	Type of analysis	Intervention(s) evaluated	Study setting	Perspective	Outcome measures	Key findings / recommendations	Quality rating
Schizophrenia	Greenhalgh, 2005	UK	Review - CEA modelling	Clozapine versus haloperidol/chlorpromazine - the model was adapted to incorporate an ECT arm to the decision tree analysis	Primary care	NHS	Cost/QALY	The adapted model including ECT suggests that clozapine is a cost-effective treatment compared with ECT. For patients who fail to respond to clozapine, ECT treatment may be preferred to the comparative treatment of haloperidol/chlorpromazine. However, the clinical evidence underpinning the ECT assumptions in the model is weak and the results should be interpreted with caution	Good
Schizophrenia	Lewis, 2006	UK	CEA from RCT	Older, inexpensive conventional drugs versus new atypical drugs in people whose treatment was being changed because of inadequate clinical response or side-effects; new (non-clozapine) atypical drugs versus clozapine in people whose treatment was being changed due to poor clinical response to two or more antipsychotic drugs	Mental health settings	NHS	Cost/QALY	Conventional antipsychotics are associated with lower costs and higher QALYs than atypical antipsychotics or a cost per QALY gained of less than £5000. The cost per QALY gained by clozapine is high at £80,000	Good
Schizophrenia	Davies, 2008	UK	CEA from RCT	Clozapine versus other second-generation antipsychotics (SGAs)	Primary care	NHS	Cost/QALY	Clozapine was associated with higher costs and higher QALYs than other SGAs - cost-effective more than 50% society willing to pay between £30,000 and £35,000 to gain one QALY. More research is required	Good
Schizophrenia	Crawford, 2012	UK	CEA from RCT	Referral to group art therapy + standard care versus referral to an active control group + standard care versus standard care	Inpatient and mental health and social care services	NHS	Cost/QALY	No differences in primary outcomes were found between trial arms. Although the additional cost of the art and activity group interventions was small compared with the total cost of care provided, there was no evidence to support the cost-effective use of referring people with schizophrenia to group art therapy	Good