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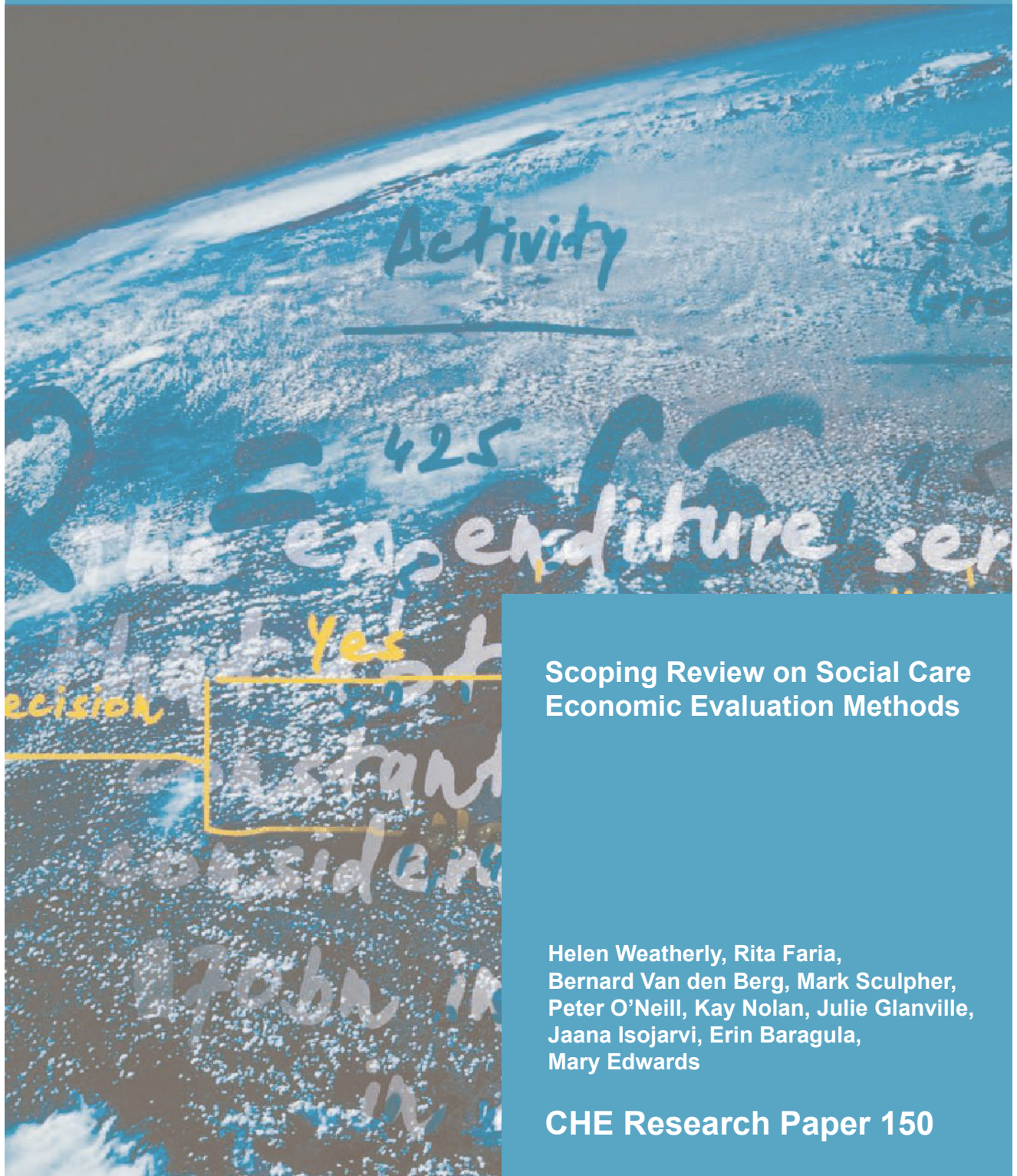
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## Scoping Review on Social Care Economic Evaluation Methods

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**CHE Research Paper 150**

## Scoping review on social care economic evaluation methods

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## Abstract

**Background:** In the UK and internationally there is widespread acceptance of the value of economic evaluations to inform decisions about health care interventions. The general methods of economic evaluation of health care interventions are now well established. By contrast, approaches to social care economic evaluation are substantially less well developed. There is considerable uncertainty and disagreement about which methods to apply, and diversity in methodological practices. This makes it hard for decision makers to interpret the findings of different studies and make comparisons of value for money between different interventions evaluated using different methods. Despite previous attempts to co-ordinate methods in this area by providing guidelines (NICE, 2013, NICE, 2014), there remains considerable methodological uncertainty. NICE commissioned this scoping review to support developing a long-term strategy for how to consider social care economics in guidelines.

**Aims:** The project aims to inform NICE on the methods available and the methods in development for use in undertaking economic evaluation of social care interventions. A further aim of the scoping review is to assess how well these methods address current methodological priorities for NICE in social care economic evaluation, and to identify gaps that the work will not address. On this basis, another aim is to provide recommendations to NICE on work required to address identified gaps in the future.

**Methods:** A systematic review of the published literature and a survey of experts were undertaken to identify key methods used to undertake recent economic evaluations of social care interventions. Each study was assessed in terms of the key requirements for economic evaluation. Data were extracted on: the perspective of the analysis, the interventions compared, the evidence used on costs and effects, opportunity cost, uncertainty, and equity. Expert advisors commented on the findings of the review and this informed the results that were drawn from the studies. Recommendations were made to improve the conduct and reporting of studies, and areas of further research were identified.

**Results:** Thirty social care economic evaluations were identified for review. Findings were reported on key requirements for economic evaluation comprising: the perspective of relevance to the decision maker, an evaluation comparing all relevant alternative interventions, use of all available evidence on costs and effects of relevance to the decision, analysis of whether the benefits of an intervention were greater than the forgone benefits of displaced interventions, assessment of the uncertainty associated with the decision, and exploration of the equity implications of the decision.

**Conclusions:** Methods guidance for the economic evaluation of social care interventions needs to reflect what is feasible given the available evidence and what is appropriate for social care. A more developed evidence base is required in order to undertake economic evaluation of social care interventions. This should include undertaking primary studies where the evidence is not sufficient. Studies based on decision models and secondary evidence should be used where there is sufficient evidence available to do so. Investment in applied economic evaluations of social care interventions will support more informed recommendations and also develop research capacity in social care.

Further methodological research is required to improve the way economic evaluations are undertaken in this field. This includes:

- agreement on the objectives of social care and the appropriate outcome measures
- development of cost-effectiveness threshold in social care given the agreed outcome measures
- how to account for costs and benefits falling on different sectors
- accounting for informal care
- equity-informative economic evaluations of social care interventions
- better scoping of economic evaluations
- application of evidence synthesis, decision modelling and expert elicitation
- application of value of information methods.

NICE should consider these priorities in their discussions with the MRC Methodology Research Programme, to establish whether it can commission research on some or all of these areas.

## Introduction

Approaches to social care economic evaluation are substantially less well developed than in health. The general methods of economic evaluation of health care interventions are now well established (Drummond et al., 2015). By contrast, approaches to social care economic evaluation are substantially less well developed. There is considerable uncertainty and disagreement about which methods to apply, and diversity in methodological practices. This makes it hard for decision makers to interpret the findings of different studies and make comparisons of value for money between different interventions evaluated using different methods. Despite previous attempts to co-ordinate methods in this area by providing guidelines (NICE, 2013, National Institute for Health and Clinical Excellence, 2014), there remains considerable methodological uncertainty. NICE commissioned this scoping review to support developing a long-term strategy for how to consider social care economics in guidelines.

Economic evaluation offers a systematic and transparent framework for informing decision makers about the costs and effects of the range of mutually exclusive courses of action. In the UK health care setting this has typically involved a focus on providing information about which option will maximise health outcomes, in the form of a quality-adjusted life year (QALY), subject to the health sector budget constraint.

Increasingly economic evaluation is applied to social care interventions. The National Institute of Health and Care Excellence (NICE) provides national guidance on the promotion of good health and the prevention and treatment of ill health. In making recommendations, it is required to consider evidence on effectiveness and cost-effectiveness of interventions. Under the Health and Social Care Act 2012 NICE was given responsibility to develop guidance and quality standards for social care. A reference case for the economic evaluation of interventions with a social care focus is available (NICE, 2013, National Institute for Health and Clinical Excellence, 2014).

Social care is defined as the provision of social work, personal care, protection or social support services to children or adults in need or at risk, or adults with needs arising from illness, disability, old age or poverty. In jurisdictions beyond the UK, a more commonly used term is 'long-term care'. A number of the interventions and cost-effectiveness studies that are conducted in this area include health services, for example an intervention to support the mental health of family carers of people with dementia was delivered in health care settings (Knapp et al., 2013b) and the focus is on social care rather than a health care focus on 'treatment'. Social care in the UK is changing and much of it is increasingly being delivered by voluntary sector workers, aids, personal assistants and also health care workers (including nurses and occupational therapists) rather than just social workers, home care workers and residential care staff. This has implications for what sector resource use falls in.

Table 1 reports NICE's economic evaluation reference case for interventions with a social care focus in the right hand column <https://www.nice.org.uk/media/default/about/what-we-do/our-programmes/developing-nice-guidelines-the-manual.pdf>. Developing NICE guidelines: the manual (PMG20)(National Institute for Health and Clinical Excellence, 2014) covers all NICE guidelines, including social care topics, *"bring(ing) together methods and processes for developing guidelines on the whole range of topics, with the aim of achieving consistency of approach, and rationalising differences where appropriate"* (National Institute for Health and Clinical Excellence, 2014). The reference case specifies the methods considered by NICE to be the most appropriate for estimating cost effectiveness (and clinical effectiveness) when developing guidance and they are consistent with the NHS objective of maximising health gain from limited resources.

**Table 1: Description of NICE methods for social care economic evaluation**

Element of assessment	Interventions with health outcomes in NHS settings	Interventions with health and non-health outcomes in public sector and other settings	Interventions with a social care focus
Defining decision problem	The scope developed by NICE		
Comparator	Interventions routinely used in NHS	Interventions routinely used in the public sector	Interventions routinely delivered in the public and non-public social care sector <sup>1</sup>
Perspective on costs	NHS and Personal Social Services (PSS)	Public sector, often reducing to local government Societal perspective (where appropriate) Other (where appropriate) e.g. employer	
Perspective on outcomes	All direct health effects on users of the intervention or others when relevant (family, informal carers)	All health effects on individuals. For local governments and other settings, non-health benefits may be included	Effects on people for whom services are delivered (users, carers) <sup>2</sup>
Type of economic evaluation	CUA	Cost-utility analysis (CUA): the benefits are assessed in terms of both quality and duration of life, and expressed as quality-adjusted life years (QALYs). Cost-effectiveness analysis (CEA): the benefits are expressed in non-monetary terms related to health, such as life years saved, life satisfaction or unit improvement in wellbeing based on the General Health Questionnaire Cost-consequence analysis (CCA): the costs and consequences of an intervention are compared with those of an appropriate alternative. Outcomes data are not aggregated and so the decision maker is left to determine whether the treatment is worth investing in. Cost-benefit analysis (CBA): the costs and benefits are measured using monetary units to see whether the benefits exceed the costs. The benefits reflect utility maximisation. Cost-minimisation analysis (CMA): comparison of the costs of different interventions that provide the same benefits.	
Synthesis of evidence on outcomes	Based on systematic review		
Time horizon	Long enough to reflect all important differences between costs and outcomes of interventions being compared		
Measuring and valuing health effects	Quality-Adjusted Life Years (QALYs) with EQ-5D as preferred health-related quality of life HRQoL measure		
Measure of non-health benefits	Not applicable	Where appropriate to be decided on a case by case basis	Capability measures where an intervention results in capability & health/social care outcomes
Source of data for measurement of QoL	Reported directly by users &/or carers		
Source of preference data for valuation of changes in HRQoL	Representative sample of UK public		

<b>Discount rate</b>	Annual rate of 3.5%, costs and health effects
<b>Equity position</b>	A QALY has same weight, regardless of other characteristics of individuals receiving health benefit. Equity considerations relevant to specific topics and how these were addressed in economic evaluation must be reported
<b>Evidence on resource use and costs</b>	Costs to relate to perspective used & should be valued using prices relevant to that perspective. Costs borne by users & value of informal care may be included if they contribute to outcomes
<sup>1</sup> Social care costs are the costs of interventions which have been commissioned or paid for in full, or in part by non-NHS organisations <sup>2</sup> The guidance also says that the perspective may be widened to include those sectors that do not bear the cost of an intervention but receive some kind of benefit from it.	

This reference case shares many elements of assessment in common with health care interventions as seen in the similarity of the reference case for interventions with health outcomes in NHS settings and interventions with health and non-health outcomes in public sector and other settings. For example, the QALY remains the preferred measure of health in adults. NICE uses economic evaluation to compare the health benefits expected to be gained by using an intervention with the health that is likely to be forgone due to additional costs falling on the health care budget and displacing other activities that improve health. This approach to informing decisions will be appropriate if the social objective is to improve health, the measure of health is adequate and the budget for health care can reasonably be regarded as fixed. This is unlikely to be the case in terms of interventions with a social care focus and where there is a social care budget. To date, there is no accepted social care equivalent of the health care QALY. In addition, a threshold for social care has not yet been established and NICE recommends that a judgment must be made about this based on the economic evidence provided to guideline committees. NICE also says that *decisions about whether to recommend interventions should not be based on cost effectiveness alone...[and] should take into account other factors, such as the need to prevent discrimination and promote equality.*

Under the NICE reference case, social care interventions are those interventions that have a clear focus on social care outcomes, with the perspective on outcomes considering effects on people for whom services are delivered, such as people using services and/or carers. Measurement of non-health benefits are considered appropriate when the intended outcomes of interventions are broader than improvements in health status. Measures suggested include the Adult Social Care Outcome Toolkit (ASCOT) instruments (Netten et al., 2012) and those measuring capability such as the Investigating Choice Experiments for the Preferences of Older People – CAPability (ICECAP-O)(Coast et al., 2008b, Coast et al., 2008c, Coast et al., 2008a).

Many economic evaluations in social care need to take into account the value of the informal care that is associated with the interventions under evaluation. NICE recognises that there is no widely accepted method for valuing informal care. The reference case states that the *“Economic evaluation in social care should take account of the value of informal care associated with the services or interventions under evaluation”*, however the methods for undertaking this are not specified. NICE recognises that the impact of interventions on users and carers may not always coincide and that a CCA is useful to present multiple outcomes. NICE states *“It is recognised that there is no widely accepted method for valuing informal care, so any methods used should be justified and agreed with NICE ... and consideration must be given to the sensitivity of the results to the use of alternative methods.”*(NICE, 2013) It notes that *“there is the potential for costs to be shifted inappropriately from the public sector to families and informal carers”*(National Institute for Health and Clinical Excellence, 2014).

Currently there is no agreement on a social care QALY approach or equivalent, and no empirical estimate of a cost-effectiveness threshold for decision-making in social care is available, but this

remains a key methodological priority for NICE. NICE commissioned this review to support developing a long-term strategy for how to consider social care economics in guidelines. The project aims to inform NICE on the methods recently applied in the economic evaluation of social care interventions, the methods available currently, and the methods in development for use in undertaking economic evaluation of social care interventions. The project also aims to assess how well these methods address current methodological priorities for NICE in social care economic evaluation, and to identify gaps that the work will not address. On this basis, another aim is to provide recommendations to NICE on work required to address identified gaps in the future and to prioritise areas for further methods research.

## Methods

A systematic review of applied economic evaluations of social care interventions and a survey of experts were undertaken to identify key methods used for the economic evaluation of social care interventions. The aim was to identify the methods currently applied, to identify current and ongoing research seeking to address relevant methods gaps, to identify key methods gaps remaining and to prioritise areas for further methods research.

**Search strategy:** The search strategy aimed to identify economic evaluations of social care interventions, and various search strategies were used specific to the subject of the databases being searched (see Appendix 1 for full details). A wide range of databases indexing research in the fields of social care and economics were searched. The search strategies were devised using a combination of subject indexing terms (where available), and free text search terms in the title and abstract.

Eight social care and economic bibliographic databases were searched (Table 2). The Research Councils UK (RCUK) Gateway to Research (<http://gtr.rcuk.ac.uk/>) was also searched to identify any UK-specific research ongoing in the field of economic evaluation of social care interventions. RCUK was chosen to access methods research commissioned by UK research councils in all disciplines including health and social sciences. Methods research on economic evaluations in social care commissioned from UK universities are recorded on this site. Broad search strategies were used, including cost and/or economic terms. These were necessarily quite general and unspecific because the economic terms cannot be well focused and social care is rather a wide topic. Given the focus of the research on current methods applied to the economic evaluation of social care interventions, and to make screening the records manageable, the searches were restricted to the English language and to publications from 2010 onwards. Given time and resource constraints, the review focused on articles that were retrieved directly through these searches, as well as via expert advisors to the project.

**Table 2: Resources searched to identify studies of social care economics**

	Database / information source	Interface / URL
1	Social Policy & Practice (OvidSP)	OvidSP
2	Social Services Abstracts	ProQuest
3	Econlit	OvidSP
4	Research Papers in Economics (REPEC)	<a href="http://repec.org">http://repec.org</a>
5	Social Care Online	<a href="http://www.scie-socialcareonline.org.uk/">http://www.scie-socialcareonline.org.uk/</a>
6	Applied Social Sciences Index & Abstracts (ASSIA)	ProQuest
7	PsycINFO	OvidSP
8	NHS Economic Evaluation Database (NHS EED)	Cochrane Library, Wiley
9	Research Councils UK Gateway to research	<a href="http://gtr.rcuk.ac.uk/">http://gtr.rcuk.ac.uk/</a>

**Study selection:** Two reviewers (HW, RF) were involved in screening the abstracts and full texts. Any disagreements were resolved through discussion between them and a third reviewer (MJS).

**Study inclusion and exclusion criteria:** To identify methods used for the economic evaluation of social care interventions published, peer-reviewed empirical studies were reviewed. Studies needed to include a full economic evaluation comparing costs and outcomes of two or more options, and focus on adults, as there are many nuances in applying general methods to specific populations such as children (Ungar, 2010). Economic evaluations specifically focusing on health services, and medications and people at the end of life, as well as systematic reviews were excluded. No specific search for methodological studies was implemented as the aim was to review the state of the

applied literature to identify what methods had been used and challenges encountered, however, experts in the field were asked to suggest relevant methods research.

**Box 1: Requirements for economic evaluation**

Principle	Statement	Explanation
(i) Perspective	An evaluation should take the perspective relevant to the decision-maker.	An evaluation to inform a decision about which alternative to fund; hence the perspective should reflect the institution making this decision (the decision-maker). The outcomes and costs included in the evaluation should reflect those relevant to the decision-maker as indicated by its perspective.
(ii) Comparators	An evaluation should compare the next best alternative, where known.	The relevant alternatives are the possible courses of action known to address the problem under evaluation for the population of interest. The cost-effectiveness of an intervention depends on the alternatives it is compared against.
(iii) Evidence	An evaluation should include all available evidence relevant to the decision.	Relevant evidence includes all information on the costs and benefits of the alternatives over the relevant time horizon.
(iv) Opportunity costs	An evaluation should compare the additional benefits to their opportunity cost.	The opportunity cost refers to the value of what is given up as a consequence of choosing a particular alternative. As resources are finite, investment in an intervention necessarily means that other interventions are no longer funded. An intervention is cost-effective if its benefits are greater than the forgone benefits of displaced interventions.
(v) Uncertainty	An evaluation should characterise the uncertainty associated with the decision.	Uncertainty relates to the inputs or parameters on costs and benefits, or the assumptions required to link different pieces of evidence. The evaluation should acknowledge the uncertainty, explore how the findings would change under alternative assumptions or parameters, and aim to quantify the costs and consequences of this uncertainty. Ideally, an evaluation should assess the potential value of acquiring additional evidence, indicate what type of evidence is required, and inform whether the choice to adopt the decision should be delayed until the additional evidence is available.
(vi) Equity	An evaluation should explore the equity implications of the decision.	To date, few economic evaluation studies have incorporated the importance of the distribution of costs and consequences among users into the analysis. There may, however, be subgroups with different levels of need, capacity to benefit and access to care, that are relevant to the decision-maker.

**Data extraction:** Based on Drummond et al (Drummond et al., 2015), key methods requirements for economic evaluation comprise the perspective of the analysis, comparison of all relevant alternatives, inclusion of all relevant evidence, consideration of opportunity costs, assessing the impact of uncertainty and equity issues as reported in Box 1. These methods categories were used to group the data extraction fields which are explained in the right hand column. To understand the methods applied to the economic evaluation of social care interventions in the recent past and to collect data systematically, a data extraction form was compiled (Table 3).

**Table 3: Data extraction**

Methods area	Details
Perspective	<ul style="list-style-type: none"> <li>• Perspective/s</li> <li>• Perspective clearly stated</li> <li>• Decision maker, funder and provider of the interventions being evaluated stated</li> <li>• Economic evaluation undertaken from more than one perspective</li> <li>• Consistency between stated and inferred perspective on the basis of costs reported</li> <li>• Where studies were undertaken</li> <li>• Reference to any relevant methods guidelines</li> </ul>
Comparators	<ul style="list-style-type: none"> <li>• Description of interventions</li> <li>• Types of interventions</li> <li>• Number of interventions evaluated</li> <li>• Rationale for selection of interventions compared</li> </ul>
Evidence	
Study design and types of data	<ul style="list-style-type: none"> <li>• Source of data</li> <li>• Use of decision analytic modelling</li> <li>• Ensuring comparability of individuals across comparators</li> <li>• Sample size</li> <li>• Duration of intervention and time horizon of the economic evaluation</li> </ul>
Outcomes data	<ul style="list-style-type: none"> <li>• Primary outcome</li> <li>• Other outcomes</li> <li>• Use of QALYs</li> <li>• Included carer and care recipient outcomes</li> <li>• Proxy measurement and valuation of outcomes</li> <li>• Use of outcomes across sectors</li> </ul>
Informal care outcomes	<ul style="list-style-type: none"> <li>• Informal care outcomes measured</li> <li>• Informal care outcomes valued</li> <li>• Rationale for methods used</li> </ul>
Resource use and cost data	<ul style="list-style-type: none"> <li>• Unit costs reported separately from resource use</li> <li>• Resource use data collection</li> <li>• Costs reported by sector</li> <li>• Cross sector costs included</li> <li>• Total costs reported</li> <li>• Report financial year for costs</li> <li>• Discounting</li> </ul>
Opportunity cost/s	<ul style="list-style-type: none"> <li>• Study results</li> <li>• Number of economic evaluations per study</li> <li>• Cost-effectiveness analysis (CEA) use of incremental cost-effectiveness ratio (ICER)</li> <li>• Cost-effectiveness decision rules</li> <li>• Cost-benefit analysis results</li> </ul>
Uncertainty	<ul style="list-style-type: none"> <li>• Use of basic statistics</li> <li>• Uncertainty analysis</li> <li>• Generalisability</li> <li>• Examination of heterogeneity or sub-groups</li> <li>• Time horizon</li> <li>• Missing data</li> </ul>
Equity issues	<ul style="list-style-type: none"> <li>• Reporting equity issues</li> <li>• Equity analysis</li> </ul>

**Methods review analysis and synthesis:** A narrative synthesis of the results was undertaken.

**Expert advice:** A Virtual Expert Advisory Group was convened consisting of expert researchers in the field of economic evaluation of social care interventions. Researchers were identified from personal contacts, through key authors of the studies included in the literature review and from searching the internet.

The Advisory Group was contacted three times, (i) via email to invite them to participate in the review and to suggest additional empirical or methodological studies for inclusion in the review, (ii) via e-survey to review the methods issues suggested on the basis of the systematic literature review, to identify additional methods issues beyond those identified in the review, to indicate methods gaps where research is already ongoing, and to prioritise which are the most influential areas for further research investment, and (iii) via email to review the draft report.

## Results

**Search results:** Figure 1 presents the PRISMA flow chart and the study selection process. The initial search obtained around 4,000 unique references which were screened for inclusion. Thirty studies were included in the review. This included 22 studies obtained from searching bibliographic databases and 8 studies either found on the internet by the research team or suggested to us by the Virtual Expert Advisory Group.

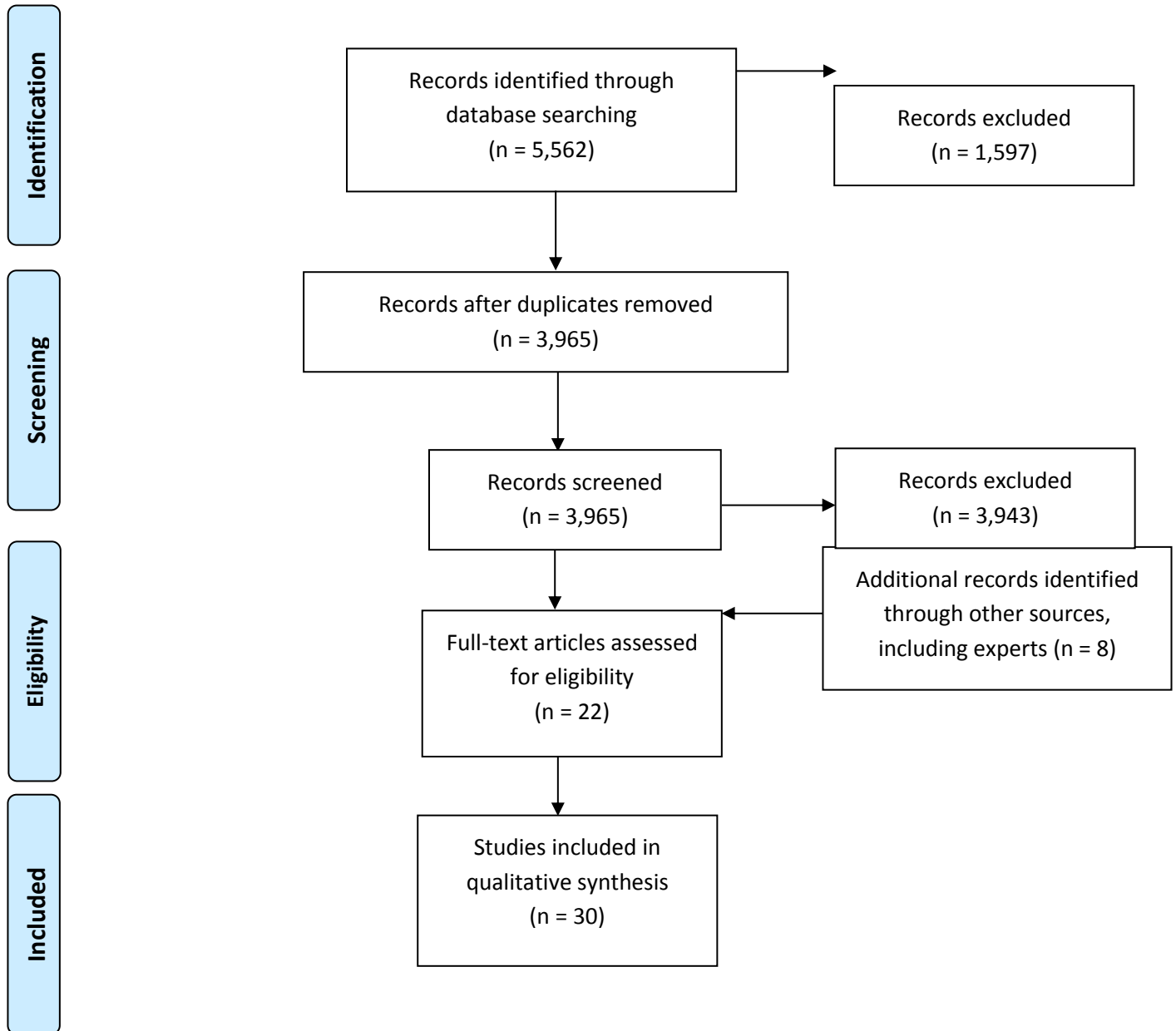
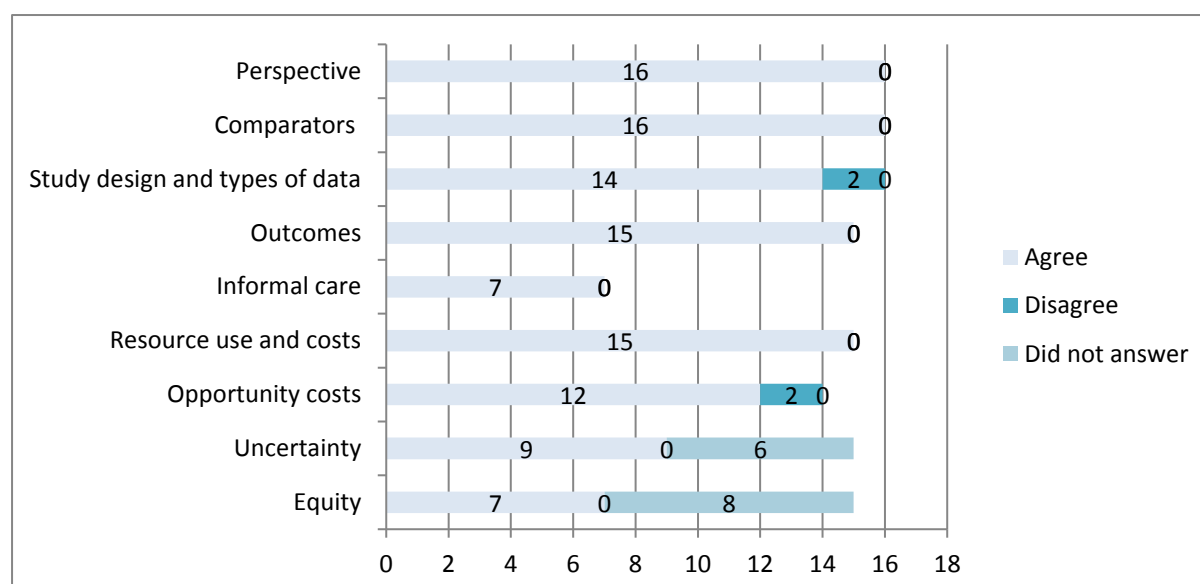


Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram

**Virtual Expert Advisory Group input:** Thirty-nine experts were originally invited to participate in the review, 23 experts accepted the invitation and participated in the first survey to suggest further references, 16 experts participated in the second survey on current methods priorities in social care economic evaluation and 11 experts reviewed the draft report.

**Review of the methodological literature:** Thirty economic evaluations of social care interventions were reviewed (Appendix, Table I). Detailed results on each of these methods are reported next. These incorporate feedback from the Virtual Expert Advisory Group. Sixteen experts responded to the second survey in which they were asked to review the methods issues suggested on the basis of the systematic literature review, to identify additional methods issues beyond those identified in the review, to indicate methods gaps where research is already ongoing, and to prioritise which are the most influential areas for further research investment. The experts agreed with the majority of the messages that were drawn from the review but not all. The level of agreement is presented in Figure 2. The bars represent the number of experts that agreed with the messages drawn from the review on each of the methods requirements for economic evaluation. Not all respondents who participated said whether they agreed or not on every methods issue.



**Figure 2: Experts saying ‘yes’ they agreed with the messages drawn on each of the methods issues noted**

**General characteristics:** Of the thirty studies reviewed most were UK based (19, 63%)(Knapp et al., 2013a, Knapp et al., 2013b, Bauer et al., 2011, Bauer et al., 2017, Jones et al., 2013, Perry et al., 2013, Glendinning et al., 2010, Henderson et al., 2014, Henderson et al., 2013, Clarkson et al., 2013a, Clarkson et al., 2013b, Clarkson et al., 2010, Forster et al., 2013, Forder et al., 2014, Dixon et al., 2014, Woods et al., 2012, Lemmi et al., 2016, Baumker et al., 2011, Stephen et al., 2014); others were based in Australia (2) (Lewin et al., 2014, Lewin et al., 2013), Denmark (1) (Søgaard et al., 2014), Finland (1)(Kehusmaa et al., 2010), the Netherlands (3) (Kok et al., 2015, MacNeil et al., 2012, Makai et al., 2015), Norway (1) (Kjerstad and Kristin, 2016) and Taiwan (1)(Kuo et al., 2010) and the United States of America (2)(Gitlin et al., 2010, Jutkowitz et al., 2012). Few studies were national evaluations, with most relating to resource use and costs from a particular area of a country. No studies were multi-national. There was limited reporting of the decision-maker the study was intended to inform, and the funder and the provider of the interventions being evaluated.

Interventions assessed included: a multi-disciplinary integrated care model (MacNeil et al., 2012, Makai et al., 2015), support/training/psychosocial intervention for carers and care recipients (Knapp et al., 2013b, Forster et al., 2013, Gitlin et al., 2010, Woods et al., 2012, Søgaard et al., 2014), home

care and home help (Bauer et al., 2017, Forder et al., 2014, Dixon et al., 2014, Jutkowitz et al., 2012, Kok et al., 2015, Kuo et al., 2010), specialist extra care housing (Baumker et al., 2011), personal health budgets (Jones et al., 2013), institutional care (Perry et al., 2013, Kok et al., 2015, Woods et al., 2012, Lemmi et al., 2016), re-ablement (Glendinning et al., 2010, Lewin et al., 2014, Lewin et al., 2013, Kjerstad and Kristin, 2016), rehabilitation (Kehusmaa et al., 2010), telecare (Henderson et al., 2014, Stephen et al., 2014), telehealth (Henderson et al., 2013), signposting service (Clarkson et al., 2013a, Clarkson et al., 2013b, Clarkson et al., 2010) and community projects (Bauer et al., 2011, Knapp et al., 2013a).

A broad range of types of economic evaluations were described in the review. Eight (27%) studies included more than one type (Jones et al., 2013, Knapp et al., 2013b, MacNeil et al., 2012, Glendinning et al., 2010, Henderson et al., 2013, Forster et al., 2013, Makai et al., 2015, Woods et al., 2012) and not all studies reported the type of economic evaluation they had undertaken. Cost-effectiveness analysis (CEA) using measures of effect specific to the interventions under evaluation was the most common approach (16, 53%) followed by CEA based on Quality-Adjusted Life Years (QALYs) (10, 33%) (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013, Makai et al., 2015, Woods et al., 2012, Sogaard et al., 2014) and cost-consequence analysis (CCA) (n=9, 30%) (Bauer et al., 2017, Clarkson et al., 2010, Perry et al., 2013, Lewin et al., 2014, Dixon et al., 2014, Kok et al., 2015, Kuo et al., 2010, Lewin et al., 2013, Lemmi et al., 2016). Three studies were classified as cost benefit analysis (CBA); however, only one of these studies included outcomes that were monetised reflecting individual preferences (Stephen et al., 2014), the other two (Bauer et al., 2011, Knapp et al., 2013a) expressed outcomes in monetary units by multiplying the health-related quality of life preference weight (Glendinning et al., 2010) by the cost-effectiveness threshold of £20,000 typically used by NICE, to derive an estimate of net benefit.

A number of studies referred to methods guidelines from UK's NICE (<https://www.nice.org.uk/>), the Dutch manual (Oostenbrink et al., 2002), the Gold Panel (Gold et al., 1996, Neumann et al., 2017) (now updated <http://2ndcep.hsrd.ucsd.edu/>) and Drummond et al (2015).

*(i) Perspective:* As outlined above (Box 1) the perspective of the study should define the costs and benefits of relevance to the decision maker(s) who will be using (or who are expected to use) the analysis to inform their decisions. In the UK, social care can be funded by the local authority or the person themselves, or in combination.

Twenty-four (80%) studies stated the perspective of the analysis. Analyses were undertaken from more than one perspective in a few studies. Perspectives stated included a societal perspective (9, 30%) (MacNeil et al., 2012, Bauer et al., 2017, Perry et al., 2013, Forster et al., 2013, Dixon et al., 2014, Kehusmaa et al., 2010, Makai et al., 2015, Sogaard et al., 2014, Bauer et al., 2011), health and social care perspective (6, 20%) (Knapp et al., 2013b, Glendinning et al., 2010, Lewin et al., 2014, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013), the public payer perspective (6, 20%) (Forder et al., 2014, Bauer et al., 2011, Woods et al., 2012, Lemmi et al., 2016, Knapp et al., 2013a, Clarkson et al., 2013a), the carer perspective (2, 7%) (Gitlin et al., 2010, Stephen et al., 2014), the social care perspective (1, 3%) (Clarkson et al., 2010) and the home agency perspective (1, 3%) (Jutkowitz et al., 2012). In 14 (47%) studies, either the perspective was not clearly stated or it did not appear to be consistent with the inferred perspective, based on the costs that were included in the evaluation (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Perry et al., 2013, Forster et al., 2013, Bauer et al., 2011, Dixon et al., 2014, Kehusmaa et al., 2010, Lewin et al., 2013, Kuo et al., 2010, Makai et al., 2015, Baumker et al., 2011, Sogaard et al., 2014, Clarkson et al., 2013b).

All studies evaluated interventions which were thought by the authors to impact across multiple parts of the public sector and the broader economy. In some studies health and social care were considered as one and the same sector (Lewin et al., 2013, Kjerstad and Kristin, 2016) which may reflect the financial and organisational arrangements in their settings. Sixteen (53%) studies included multiple outcomes which could be argued to fall on more than one sector (Bauer et al., 2017, Bauer et al., 2011, Jones et al., 2013, Perry et al., 2013, Glendinning et al., 2010, Lewin et al., 2014, Henderson et al., 2014, Henderson et al., 2013, Forster et al., 2013, Dixon et al., 2014, Kok et al., 2015, Kuo et al., 2010, Makai et al., 2015, Woods et al., 2012, Baumker et al., 2011, Knapp et al., 2013a). For example, QALYs and ASCOT (Jones et al., 2013), QALYs and quality of care (MacNeil et al., 2012), and QALYs and ICECAP-O (Henderson et al., 2013). Many studies (17, 57%) measured multiple outcomes within sector, although these were not necessarily included in the economic evaluation.

Of the studies that were set in the UK, one study evaluated an intervention (help-at-home) where some users were self-funded (Bauer et al., 2017). None of the UK based studies evaluated an intervention that relied entirely on self-funding. Two studies included an element of self-funding in terms of provision, in that part of the intervention was delivered using volunteers in the community (Knapp et al., 2013a, Dixon et al., 2014). A number of studies included informal carer contributions (as discussed in (i) below) and in at least one study equipment to support activities of daily living was purchased privately as a consequence of the intervention (e.g. telecare); however this was not costed given the health and social care perspective of the analysis (Henderson et al., 2014).

*(ii) Comparators:* To inform a decision, the full range of relevant alternative courses of action for a particular client group should be considered, including all those alternatives that might be considered worthwhile. In the absence of this, there is a possibility that a new intervention is considered to be worthwhile because it has been compared to an alternative that is less cost-effective than other available alternatives. All studies in the review evaluated two interventions only. A clear rationale was rarely provided for the selection of the interventions to be compared. A few studies compared existing services to a new intervention which was being rolled out nationally (Clarkson et al., 2013a, Glendinning et al., 2010, Jones et al., 2013). It was not always clear that all relevant options had been considered in the analysis, and existing services might include a number of quite different approaches to service provision. Most studies were set up in terms of an 'intervention', i.e. one that was new/novel/or additional to usual care, and one comparator based on usual care in the setting of the primary study. The intervention tended to be described better than the comparator. It was not always clear if the intervention was used in addition to usual care, although in 6 (20%) studies this was stated to be the case (Knapp et al., 2013b, Forder et al., 2014, Henderson et al., 2014, Lewin et al., 2013, Woods et al., 2012, Lemmi et al., 2016).

Commonly a rationale was provided for the intervention assessed, focusing on what the intervention was expected to change. It was much less common to offer a rationale for what the comparator(s) was expected to change, although it may have been assumed that, as comparators, they had the same objectives. Rationales for choosing the intervention/comparator included: better managing an expanding population of users with complex and long term care needs, improving a range of outcomes e.g. the quality of care and health-related/social care-related/quality of life and wellbeing/happiness of users, reducing or saving resource use and cost.

*(iii) Evidence on (a) study design and types of data, (b) outcome data, (c) informal care impact, (d) resource use and cost data:* To undertake an economic evaluation all available evidence relating to the question, that is the consequences of the alternative courses of action, should be considered.

*(iiia) Study design and types of data:* The majority of analyses were based on primary studies (27, 90%) collecting individual client level data (ILD) for the effectiveness analysis, and 3 (10%) studies used mainly survey data (Forder et al., 2014, Kok et al., 2015, Lewin et al., 2013). Based on resource use, 7 (23%) studies used large survey ILD datasets (Jones et al., 2013, Lewin et al., 2014, Forder et al., 2014, Kok et al., 2015, Lewin et al., 2013, Baumker et al., 2011, Søggaard et al., 2014).

Fourteen (47%) studies were based on randomised controlled trials (RCTs) (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Lewin et al., 2014, Henderson et al., 2014, Henderson et al., 2013, Clarkson et al., 2010, Forster, 2010, Gitlin et al., 2010, Jutkowitz et al., 2012, Kehusmaa et al., 2010, Kjerstad and Kristin, 2016, Woods et al., 2012, Søggaard et al., 2014). The remaining studies were based on large scale observational survey data, quasi-experimental study designs or decision modelling using a mixture of data from the literature and data direct from the services they were evaluating. Non-RCT studies attempted to select similar individuals across alternative options based on methods such as propensity score matching and multivariable regression (e.g. difference-in-differences analysis). The average study sample size was around 580 for the intervention group and 400 for the control group, and ranged from 5 to 8,036 (note that these figures are indicative and approximate). Four (13%) studies included informal carer-care recipient dyads (Forster et al., 2013, Gitlin et al., 2010, Kuo et al., 2010, Søggaard et al., 2014). Five (17%) studies included a simple decision model based on secondary evidence (Bauer et al., 2017, Knapp et al., 2013a, Bauer et al., 2011, Dixon et al., 2014, Gitlin et al., 2010). Data for the models were obtained from a number of sources including data from experts, the literature, national data, information from relevant organisations and government departments. A rapid review of the existing evidence base was undertaken in order to inform decision makers in a timely manner.

The duration over which the intervention was provided was not always stated but ranged from a one off intervention, through from 6 weeks to 15 months or ongoing. Most studies used a 'within trial analysis' whereby the time horizon for the economic evaluation was the same as the duration of follow-up. Rarely did studies make it clear about the expected duration of the impacts on resource use/cost and effects of the options being compared, or the rationale for the time horizon of the economic evaluation study. The use of multiple sources of evidence that were formally synthesised using meta-analysis, for example, was not a feature of any study and a number of studies stated that the economic evaluation of the intervention was the first undertaken.

*(iiib) Outcome data findings:* QALYs were calculated for use in a CEA in 10 (33%) studies (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013, Makai et al., 2015, Woods et al., 2012, Søggaard et al., 2014) and were the primary outcome in 8 (27%) of these studies (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Makai et al., 2015, Søggaard et al., 2014). Note that some studies had more than one joint primary outcome (MacNeil et al., 2012) and sometimes the studies indicated which was the primary outcome, but not always. In MacNeil et al (MacNeil et al., 2012), clinical outcomes included the primary outcome 32 risk-adjusted quality-of-care indicators, as well as the functional health as measured by COOP WONCA and the SF12 to generate QALYs using utility scores estimated by the SF6D tariff. All these outcomes were used in a cost-effectiveness analysis. Not surprisingly, perhaps, there was variation in clinical outcomes when multiple outcomes were used within a single study. For example, in Jones et al (Jones et al., 2013) the intervention group reported statistically significantly improved care-related quality of life using ASCOT and psychological wellbeing based on GHQ-12 compared to the control group; however there was no statistically significant difference for health care-related quality of life based on the EQ-5D or subjective wellbeing.

In 1 study, outcomes related to the informal carer only, but the intervention (the Tailored Activity Program) was for individuals with dementia and family caregivers. Outcomes for the person with dementia were assessed and reported separately and statistically significant and large effects sizes were found. These were not included in the economic evaluation which means that the cost-effectiveness analysis was not able to account for the impact on the person with dementia (Gitlin et al., 2010). In 3 (10%) studies outcomes were measured in the informal carer and the care recipient. In these studies, several outcomes were evaluated, but one primary outcome was used for the informal carer and one for the care recipient (Forster et al., 2013, Sjøgaard et al., 2014, Woods et al., 2012). In the Sjøgaard et al study (Sjøgaard et al., 2014) QALYs for the patient and the informal carer were also combined.

Social care-related quality of life was estimated in 6 (20%) studies, with 4 (13%) studies using ASCOT (Bauer et al., 2017, Jones et al., 2013, Glendinning et al., 2010, Forder et al., 2014) and 2 (7%) of studies using ICECAP (Henderson et al., 2013, Makai et al., 2015). Other outcomes included process outcomes (e.g. quality of care or assessment satisfaction), resource-related outcomes (e.g. carer time), mortality outcomes (e.g. life years saved), outcomes focusing on function (e.g. Barthel Index or ADL), outcomes measuring anxiety and depression (e.g. HAD or GHQ) and broad outcomes (e.g. happiness and subjective wellbeing). One study undertook direct valuation using willingness to pay monetary valuation of outcomes perceived by the carer (Stephen et al., 2014). In 8 (27%) studies, outcome measurement was undertaken by proxy where e.g. the client had cognitive impairment, or the provider typically assessed the outcome (MacNeil et al., 2012, Perry et al., 2013, Henderson et al., 2013, Forster et al., 2013, Kuo et al., 2010, Woods et al., 2012, Lemmi et al., 2016, Sjøgaard et al., 2014). In 2 (7%) studies including decision models, the intervention was assumed to change quality of life and this outcome was monetised by linking a change in quality of life to a change in service use on the basis of a single study for each effect found in the literature. The value of quality of life improvements were monetised by linking NICE's cost-effectiveness threshold of £20,000 per QALY to a change in quality of life (Bauer et al., 2011, Knapp et al., 2013a).

*(iiic) Informal carer impact:* Informal carer contribution was quantified in 10 (33%) studies (MacNeil et al., 2012, Bauer et al., 2017, Forster et al., 2013, Gitlin et al., 2010, Forder et al., 2014, Dixon et al., 2014, Kok et al., 2015, Kuo et al., 2010, Makai et al., 2015, Sjøgaard et al., 2014). It was measured in terms of informal carer hours and valued using various approaches: the proxy good method, the opportunity cost method, carer burden and subjective wellbeing. Approaches to collecting the data included asking direct questions at interview or via self-completed questionnaire. Data collection tools included the Client Service Receipt Inventory (CSRI) (Beecham and Knapp, 2001), the Resource Utilization in Dementia questionnaire (RUD (Wimo and Nordberg, 2007)), via a study specific questionnaire or via a survey. Of the studies that costed informal carer time, 2 undertook an analysis with and without informal carer costs to explore the impact on the findings of the study (Bauer et al., 2017, Sjøgaard et al., 2014). The rationale for the approach taken to valuing informal care was reported in only one (Makai et al., 2015) and this study referred to the Dutch methods guidelines (Tan et al., 2012). One study quantified outcomes from the Caregiver Vigilance Scale as time spent caregiving, or more specifically, as caregiver hours per day "doing things" and hours per day "being on duty" (Gitlin et al., 2010). This was used as the denominator in a cost-effectiveness analysis.

*(iiid) Resource use and cost data findings:* Most studies (19, 63%) reported unit costs separately from resource use although not all reported a full set of unit costs (possibly due to word count restrictions) prior to calculating total costs, and 25 (83%) detailed the financial year the costs related to. Where the analysis extended beyond one year, costs were discounted and the discount rate was justified by e.g. referring to specific methods guidelines or country-specific discount rates. It was not clear from the studies how long the interventions were expected to impact on costs. Two issues may explain this: first, the duration of the intervention was often not made explicit; second, whether the

intervention was expected to have an effect beyond its duration was not discussed. In 27 (90%) studies, resource use and costs falling on more than one sector were evaluated. Twenty-seven (90%) studies reported health care sector costs with primary care costs being more commonly reported than secondary care sector costs. Occasionally authors said that a societal perspective was taken but it was not always clear that the full range of costs included reflected this and sometimes voluntary sector, informal care and private care costs may have been omitted. This is difficult to ascertain since this depends on the intervention and the setting. Typically costs falling on different sectors were reported separately and disaggregated by sector and all reported a total cost across all the sectors included in the analysis. Resource use data were collected from the user in most studies, although in a number of studies the data were obtained from the professional delivering the service or the care recipient's carer or family, particularly if the person had cognitive impairment.

*(iv) Opportunity cost:* In a few studies, no conclusion was offered as to whether one alternative was cost-effective (i.e. generated greater benefits than opportunity costs – positive net benefit); as expected, based on the methods used, this was always the case for the 10 CCA studies. As expected, the CEAs reported an incremental cost and effects, and an incremental cost-effectiveness ratio (ICER). Typically the ICER included aggregated costs across sectors despite the fact that costs (savings) falling on different sectors/budgets are likely to generate different opportunity costs (benefits) as a result of the separate financial arrangements within each sector (Drummond et al., 2015). Net benefits were reported for the three studies labelled CBA. In one study (Stephen et al., 2014) the cost of the intervention was subtracted from the WTP for the intervention (there was no comparator intervention involved) to calculate overall welfare gain/loss. The other two studies (Knapp et al., 2013a, Bauer et al., 2011) did not consider opportunity costs imposed by budgetary arrangements. Instead they calculated a 'net benefit economic value' by subtracting the economic consequences of the intervention from the costs of the intervention. Most of the CEA studies used more than one outcome measure to analyse cost-effectiveness, and most of these studies undertook more than one CEA within the evaluation thus estimating several ICERs/net benefits.

A range of approaches was undertaken to examine cost-effectiveness and these involved different decision rules. Of the 10 CEA QALY studies (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013, Makai et al., 2015, Woods et al., 2012, Sogaard et al., 2014), 8 reported the cost-effectiveness threshold (Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013, Makai et al., 2015, Sogaard et al., 2014), in 6 studies the NICE threshold was referred to and used to reflect opportunity cost (Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013).

The 15 (50%) CEA (no QALY) used a variety of methods to decide which was the cost-effective intervention. These included a range of hypothetical threshold values or the results were compared to the results of other published cost-effectiveness studies by way of a benchmark, or applied a range of thresholds for a minimally clinically difference in effect that was available in the literature, or reporting the threshold at which the intervention might be considered cost-effective.

Some studies used statistical inference (e.g. p values) to explore whether an intervention was cost-effective (Perry et al., 2013, Woods et al., 2012, Baumker et al., 2011) and one study relied on this despite the expected (mean) difference suggesting the intervention was more costly and more effective for the person with dementia (although not for the carer) (Woods et al., 2012).

In 2 (7%) studies, outcomes were expressed in monetary terms by taking the change in HRQoL preference weight associated with the intervention and multiplying it by the NICE threshold of £20,000 per QALY (Knapp et al., 2013a, Bauer et al., 2011). An assumption underlying this approach

is that the change in HRQoL is equivalent to a change in QALY, although this is only the case if the change was over 1 year and no deaths occurred, and that the NICE threshold is supposed (partially at least) to reflect opportunity costs imposed on the NHS/other public sector budgets. One study used net benefit analysis by subtracting the carer's WTP for the intervention from the cost of the intervention (Stephen et al., 2014). The use of the carer's WTP was perhaps intended to reflect the carer's opportunity costs (in terms of forgone consumption), but there was no consideration of the opportunity costs relating to social care or health care budgets.

(v) *Uncertainty*: In order for decision makers to draw on the results of economic evaluation studies it is important to inform them about whether the existing evidence on the cost-effectiveness of interventions is sufficient to justify investing in the intervention. Analysts need to quantify and represent uncertainty in estimates of cost-effectiveness. Assessments of uncertainty and the value of additional evidence may be used to inform these issues.

Primary studies reported basic statistics to compare, for example, the baseline socio-demographics of the individuals involved in the study, as well as a comparison of the differences in costs and outcomes across interventions. A few studies considered potential bias associated for example with the use of non-randomised studies to estimate intervention effects in their uncertainty analysis and used sensitivity analysis to explore this (Makai et al., 2015, Jones et al., 2013, Glendinning et al., 2010). A few studies seemed to rely on inference and p values to explore uncertainty. Probabilistic sensitivity analysis (PSA) which enables the uncertainty associated with parameters to be simultaneously reflected in the results of the model was not implemented in any of the simple decision analyses. Fifteen (83%) CEA studies (whether based on QALYs or not) calculated cost-effectiveness acceptability curves, (MacNeil et al., 2012, Knapp et al., 2013b, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013, Gitlin et al., 2010, Jutkowitz et al., 2012, Kehusmaa et al., 2010, Kjerstad and Kristin, 2016, Makai et al., 2015, Baumker et al., 2011, Sogaard et al., 2014, Clarkson et al., 2013a, Clarkson et al., 2013b), 14 (78%) undertook univariate sensitivity analyses (MacNeil et al., 2012, Knapp et al., 2013b, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2013, Henderson et al., 2014, Forster et al., 2013, Gitlin et al., 2010, Forder et al., 2014, Jutkowitz et al., 2012, Kjerstad and Kristin, 2016, Makai et al., 2015, Sogaard et al., 2014, Clarkson et al., 2013a). No studies discussed sources of structural uncertainty. No studies undertook value of information analysis to establish whether the value of undertaking additional research might be expected to outweigh its costs, and to assess the implications of this for funding and resource prioritisation decisions.

Generalisability of the results was considered in a few of the studies. Typically authors suggested that the study findings had restricted relevance due to their specific context and heterogeneity of the intervention e.g. that there were different models of a service, which might not be easily replicable or reflect current practice elsewhere. There was very little discussion about whether the findings might generalise to the other services/localities within the jurisdiction in which the study was undertaken. In a small number of studies it was suggested that the cost-effectiveness findings might differ if the intervention was evaluated in a particular e.g. more complex sub-group of clients, i.e. heterogeneity in cost-effectiveness between sub-groups was anticipated, but this was not formally assessed. In a few studies the authors suggested that results might be different if the follow-up of users was extended suggesting that the time horizon of the economic analysis may have been insufficient. Questions remain for a number of the studies about what constitutes a sufficient duration of follow up in relation to the time horizon of the economic analysis, and this relates to expected effect, resource use and cost profiles of the interventions but this was rarely made clear. Multiple imputation was used in eight (27%) studies to impute missing data (MacNeil et al., 2012, Jones et al., 2013, Glendinning et al., 2010, Henderson et al., 2014, Henderson et al., 2013,

Kehusmaa et al., 2010, Makai et al., 2015, Sogaard et al., 2014) but other approaches were also used including complete case analysis and available case analysis.

(vi) *Equity*: Whilst some interventions targeted vulnerable groups, none of the studies examined the equity implications associated with the interventions evaluated. The assumption (always implicit) was that a unit of benefit (e.g. QALY) was of equal social value, no matter who received them, which is consistent with NICE health and social care and technology assessment reference cases (NICE, 2013).

**Methods research and ongoing research:** Experts from the Virtual Expert Advisory Group offered information on projects that they are currently seeking funding for and/or currently undertaking, including methods research in relevant areas, and these are reported in Table 4. Additional research that was found in the course of undertaking this review is also reported.

**Table 4: Methods research and publications recommended by the Virtual Expert Advisory Group**

Methods area	Details
Perspective	<ul style="list-style-type: none"> <li>Karl Claxton et al consider appropriate perspectives for health care decisions and these principles could be carried forward beyond health care. (Claxton et al., 2010) Also chapter 4 on principles of economic evaluation in Drummond et al, 2015 (Drummond et al., 2015)</li> <li>Jennifer Francis and Sarah Byford make methods recommendations for the economic evaluation of social care interventions (Francis and Byford, 2011)</li> <li>Tom Sefton et al consider the issues associated with undertaking economic evaluation in the social welfare field (Sefton et al., 2002)</li> </ul>
Comparators	<ul style="list-style-type: none"> <li>Mike Drummond et al (2015) discuss the principles of economic evaluation in chapter 4, and the use of decision-analytic modelling in chapter 9 (Drummond et al., 2015)</li> <li>Don Husereau et al offer reporting guidelines for economic evaluations in the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement (Husereau et al., 2013)</li> </ul>
Evidence	
Design of primary studies and types of evidence	<ul style="list-style-type: none"> <li>Joshua Angrist et al develop methods for causal analysis using econometrics (Angrist et al., 1996)</li> <li>Julien Forder et al support the use of observational data as a relevant alternative design to using RCTs (Forder et al., 2014)</li> <li>Laura Gitlin and Sara Czaja consider design, evaluation and implementation aspects involved in behavioural intervention research (Gitlin and Czaja, 2016)</li> <li>Hazel Squires and Paul Tappenden's report on mathematical modelling and its application to social care considered the use of modelling methods within the field of social care (Squires and Tappenden, 2011)</li> </ul>
Outcomes data	<ul style="list-style-type: none"> <li>Hareth Al-Janabi et al have research under review that examines the use of HRQoL measures (EQ-5D and SF-6D) with carers and family members. Additionally they have collected data from around 600 carers in dementia, stroke and mental health to assess the relative validity and responsiveness of HRQoL, care-related QoL (Carer Experience Scale, CarerQoL, ASCOT), and wellbeing (ICECAP) measures with carers. They are also examining ways of aggregating outcomes that are in different units in an economic evaluation that is estimating a summary measure of benefit for patients and carers when their outcomes are in different units. Research findings will be available in 2018.</li> <li>John Brazier et al are developing a new quality of life measure suitable for economic evaluation across health and social care based in response to the MRC highlight notice around improving cross-sector comparisons: <a href="https://www.mrc.ac.uk/documents/pdf/improving-cross-sector-comparisons-using-qalys-and-other-measures-a-review-of-alternative-approaches-and-future-">https://www.mrc.ac.uk/documents/pdf/improving-cross-sector-comparisons-using-qalys-and-other-measures-a-review-of-alternative-approaches-and-future-</a></li> </ul>

	<p>research/ This involves collaboration between the University of Sheffield, NICE, the EuroQol group, the University of Kent and the Office of Health Economics. This research aims to develop a measure that captures broad quality of life rather than focusing on HRQoL, extending the QALY. The 'Extending the QALY' project will be exploring extending measures used in the evaluation of health-care treatments into areas of social care and public health, and looking at the importance of non-health aspects, such as social and emotional wellbeing, in addition to physical and mental health.</p> <ul style="list-style-type: none"> <li>• Jo Coast et al have developed a capability approach in the ICECAP measures. (Coast et al., 2008c, Coast et al., 2008b, Coast et al., 2008a, Flynn et al., 2007, Coast et al., 2015) <a href="http://www.birmingham.ac.uk/research/activity/mds/projects/HaPS/HE/ICECAP/key-references.aspx">http://www.birmingham.ac.uk/research/activity/mds/projects/HaPS/HE/ICECAP/key-references.aspx</a></li> <li>• Nancy Devlin et al consider the use of delivering digital health and wellbeing at scale as part of the DALLAS project (Devlin et al., 2015)</li> <li>• Julien Forder and Jose-Luis Fernandez offer a discussion paper on using a wellbeing cost-effectiveness approach to improve resource allocation in social care (Forder and Fernandez, 2015)</li> <li>• Phil Kinghorn, University of Birmingham, has an MRC award to look at the WTP for (ICECAP) capability gains</li> <li>• Catherine Mihalopoulos et al compared five multi-attribute instruments with two disease specific outcome measures to develop 'crosswalk' transformation algorithms between the measures. These algorithms can be used to determine cost-effectiveness of services or interventions where utility measures are not collected (Mihalopoulos et al., 2014)</li> <li>• Ann Netten et al develop a social care-related quality of life instrument (SCRQoL) to reflect the particular characteristics of social care (Netten, 2011)</li> <li>• Hannah Penton at University of Sheffield is undertaking a PhD on outcome measures in social care</li> <li>• Julie Ratcliffe et al are currently seeking funding to develop a new measure of quality of life/wellbeing for older people for application across aged care and sub-acute health care sectors. Pilot work for this is published (Ratcliffe et al., 2017, Milte et al., 2014)</li> <li>• Katherine Stevens et al compared ASCOT and EQ-5D, assessing the exchange rate between the two outcome instruments (Stevens et al., 2015)</li> <li>• John Wildman et al propose a common metric for use across a range of outcomes. They examine options for converting multiple outcomes to a common (QALY) metric. They suggest that when there are multiple outcomes it is possible to measure the outcomes outside of health using money and then convert QALYs to money – or to convert the money outcomes to QALYs. (Wildman et al., 2016, Briggs, 2016)</li> </ul>
Informal care outcomes	<ul style="list-style-type: none"> <li>• Hareth Al-Janabi et al have estimated a preference-based Carer Experience Scale (Al-Janabi et al., 2011). Hareth Al-Janabi et al are developing methods to incorporate carer outcomes in economic evaluations. They are exploring measuring health spillovers, that is the impact of the intervention on the health of the users' family networks, for economic evaluation. They provide a method to incorporate health spillovers through the estimation of two multiplier effects relating to (i) health benefits generated and (ii) health benefits displaced by a new intervention (Al-Janabi et al., 2016a, Al-Janabi et al., 2016b). This method offers a way to adjust users' health outcomes for the health spillover to the family. Conceptually this approach could be applied to different outcomes and costs. One area of ongoing investigation in the University of Birmingham group is double counting - i.e. to what extent does including carer costs and outcomes double count</li> <li>• Sarah Byford et al have tested a time-diary approach to the measurement of informal care (provided by parents to children with autism). This is currently a</li> </ul>

	<p>draft paper so no reference as yet, but it is part of the Preschool Autism Communication Trial (Green et al., 2010) and an extension of the associated economic evaluation (Byford et al., 2015)</p> <ul style="list-style-type: none"> <li>• Renske Hoefman et al discuss how to include informal care in economic evaluation (Hoefman et al., 2013)</li> <li>• Martin Knapp et al are undertaking the MODEM (Modelling the Outcome and Cost Impacts of Interventions for Dementia) project. This research provides a comprehensive web tool bringing together scientific evidence on dementia care and treatment has been developed by researchers at LSE's Personal Social Services Research Unit (PSSRU). The research is funded by both the ESRC and the NIHR as part of their Improving Dementia Care Initiative. <a href="http://www.lse.ac.uk/website-archive/newsAndMedia/news/archives/2016/08/Dementia-toolkit.aspx">http://www.lse.ac.uk/website-archive/newsAndMedia/news/archives/2016/08/Dementia-toolkit.aspx</a></li> <li>• Carl Koopmans et al views about including informal care in economic evaluations are stated in a new Dutch guideline for cost benefit analysis in health and other social areas. Currently it's only available in Dutch.(Koopmans et al., 2016, Neumann et al., 2017)</li> <li>• The 2<sup>nd</sup> US Panel (2017) recommend principles on quantifying time contributed by informal carers and appropriate unit costs</li> <li>• Bernard van den Berg wrote an overview of economic evaluation of informal care methods and applications. (Van den Berg et al., 2004) and a more recent review (Weatherly et al., 2014)</li> </ul>
Resource use and cost data	<ul style="list-style-type: none"> <li>• The 2nd US panel report (2017) suggest an impact inventory which may offer a step forward in encouraging the systematic consideration of wider societal impacts (Neumann et al., 2017)</li> </ul>
Decision rules and opportunity cost/s	<ul style="list-style-type: none"> <li>• Karl Claxton et al research on the NHS threshold as this has implications for the methods that could be used in social care (Claxton et al., 2015)</li> <li>• Mike Drummond et al discuss decision rules and opportunity costs in their chapter 4 on principles of economic evaluation (Drummond et al., 2015)</li> <li>• Julien Forder et al research on the marginal productivity of social care to explore estimating social care opportunity cost and this study was included in the review (Forder et al., 2014)</li> <li>• Eric Jutkowitz and colleagues evaluate willingness-to-pay thresholds for dementia caregiving interventions (Jutkowitz et al., 2010)</li> <li>• Paul Mitchell et al discuss methods on decision rules which might be used alongside capability in economic evaluation. (Mitchell et al., 2015)</li> <li>• Mark Sculpher et al discuss a value framework to reflect the opportunity cost of funding decisions (Sculpher et al., 2017)</li> </ul>
Uncertainty	<ul style="list-style-type: none"> <li>• Karl Claxton and colleagues HTA report on the principles of reflecting uncertainty in adoption and research decisions for medical technologies have the potential to apply to social care (Claxton et al., 2012, Claxton et al., 2016)</li> <li>• Mike Drummond et al discuss characterizing, reporting and interpreting uncertainty in chapter 11 (Drummond et al., 2015)</li> </ul>
Equity issues	<ul style="list-style-type: none"> <li>• Richard Cookson, Miqdad Asaria and Susan Griffin and colleagues have developed methods to implement distributional cost-effectiveness analysis of health care programmes which might also be applied to social care interventions in the future (Cookson et al., 2016, Asaria et al., 2016a, Asaria et al., 2016b). Susan Griffin and James Love-Koh and others are currently undertaking work to plot interventions from NICE public health guidelines on to the health equity impact plane and this could be adapted for use in social care, however, the challenges of doing so in a social care context are larger for both data availability and conceptual reasons.</li> <li>• Considerable work has been undertaken and is being undertaken by PSSRU in collaboration with others on equity issues in the financing of care and support (Fernandez and Forder, 2010)</li> </ul>

## Discussion

This section reports the feedback and messages that were drawn from the literature review combined with the feedback from the Virtual Expert Advisory Group. The format follows the requirements for economic evaluation (Drummond et al., 2015) used above. It discusses the methods applied within recent economic evaluations of social care interventions, the issues raised, and learnings from ongoing research, as well as presenting a summary of recommendations and suggested areas of future research at the end of the report.

Overall, the feedback that was received from the experts suggests that a range of views exist on a number of different methods issues in the economic evaluation of social care. Many decisions remain about which methods approaches to use. Within the constraints of this research, it has not been possible to give full expression to the ongoing debates. In order to continue to benefit from expert contributions, it seems appropriate to continue the dialogue. Further interaction amongst experts in the economic evaluation of social care can give fuller articulation to the debates about which methods approaches to use and what further research might be undertaken to resolve methods issues and other related issues of debate. This is appropriate in order to more clearly inform the decision maker about the value for money of social care interventions.

### ***(i) Perspective***

*Reporting:* Clarity in reporting would assist the reader to understand the perspective(s) of the analysis, who the economic evaluation is intended to inform, who funds the interventions and who provides the interventions. It is important that analysts offer a rationale for the approach undertaken to economic evaluation and to be clear on the decision that the evaluation is aiming to inform to see whether the evaluation can actually inform the decision. It was suggested that use of a checklist such as the Consolidated Health Economic Evaluation Reporting Standards Statement (CHEERS) may be useful although this would need review and adaptation to ensure suitability to the nuances associated with social care evaluation (Husereau et al., 2013). Having this information would enhance readers' ability to critically appraise the study and to assess the generalisability of the study findings for possible use in other settings. This information would be useful to contextualise the studies and to improve the consistency and reporting of methods, particularly given that the way social care services are organised, provided and financed vary across jurisdictions, and sometimes within them.

*Implications of the perspective for costs and consequences:* Studies should identify the relevant costs and consequences according to the chosen perspective(s). If this fails then there might be an unsystematic approach to identifying the main costs and benefits that need to be included in the analysis and some impacts might be over looked. A number of experts recommended that economic evaluations of social care interventions should adopt multiple perspectives examining the costs and outcomes of interventions accruing to different decision makers who allocate resources. In undertaking analyses from a range of perspectives, this could assist in detecting potential cost shifting between sectors, and possible perverse incentives. If an intervention is cost-effective from a public sector perspective but shifts costs on to service users and/or unpaid carers, this cost shift should be clearly stated alongside the conclusion of the evaluation. This is a major consideration in the context of social care and social care guideline development, particularly where social care services, informal carers or volunteers provide support which may impact on mainstream statutory services such as the health care sector through reductions in hospitalisations etc.

*Single vs multiple perspectives:* Although the system of provision is very different in the US, the new guidance from the 2<sup>nd</sup> US Panel's suggestion on including a payer perspective (which would typically be the government/public sector/statutory sector in the UK setting) and a societal perspective may

have virtues when applied to the UK setting (Sanders et al., 2016). However, it can also be argued that presenting analyses from a range of perspectives rather than an aggregated 'societal perspective' is more helpful for those considering resource allocation decisions given that there is no 'societal' decision maker in social care (or public policy more generally) and there are numerous ways of aggregating costs and effects into a 'societal' perspective. The limitation of adopting multiple perspectives is in the trade-off between costs and benefits accruing in different sectors, which have different objectives and budget constraints. That is, how to trade-off an improvement in one outcome measure with a reduction in another, and how to trade-off an additional cost in one sector with a saving in another. Although the unit of measurement is the same (money), different sectors are able to generate outcomes at different levels of efficiency. Therefore, the same amount can have different consequences depending on the sector considered.

*Cross-sector perspectives:* Clarity on the scope of any perspectives chosen would be useful to enhance the consistency of the approaches applied. One expert noted that, at a minimum, analysts should explain whether there are wider costs and consequences, beyond those included in the analysis, and on whom they fall. Although outside the perspective, these costs and consequences may be a factor in the decision of whether to adopt the intervention.

Adopting the same principles of evaluation across health and social care economic evaluations would aid comparability when drawing lessons across studies, whether they were assessing social care, health and social care, or health care interventions. Questions that emerge from this in terms of the UK context are: what interventions can be classed as social care interventions or interventions with a social care focus, and can we treat interventions with a social care element in the same way as health care interventions?

## **(ii) Comparators**

*Reporting:* Studies should provide a rationale for the choice of options being compared, and describe all the alternatives evaluated in sufficient detail. In principle, the intervention should be compared to the next best alternative. In practice, it is not always known which is the next best alternative, hence the evaluation of the full range of relevant comparators including all those mutually exclusive interventions being provided across the locality of interest for a particular client group. If an intervention is compared to an inferior intervention it will be inappropriately advantaged, appearing more cost-effective than would be the case if compared to a highly worthwhile intervention. Clarity in reporting would assist the reader to understand the relevance and appropriateness of the interventions included in the analysis. A rationale would need to be provided for any relevant options that were omitted from the analysis.

*Scoping:* In the case of novel social care interventions, comparators are not always clear. For within-trial evaluations however, typically the comparison would be the arms of the trial but RCTs rarely include all competing interventions. It is worth noting that the configuration of care is changing, sometimes rapidly, and in the current UK context typically resources are being cut with implications for how care is being provided, including usual care. In contrast to the health care context, pathways for social care are not clearly defined, so that users might not be clear on what to expect, when and for how long.

A number of studies evaluated an intervention which was additional to usual care. One advisor said, in practice, social care interventions are often 'additive' interventions, and these can be added on to enhance outcomes if care as usual is perceived as insufficient. In developing a new intervention, it is relevant to explore what are the barriers and issues faced by usual care. In identifying the comparator(s), we should confirm that these are indeed an alternative to the intervention, in that the comparator(s) aim to improve the same outcomes.

**(iii) Evidence***Study design and types of data*

Generally, economic evaluation of social care interventions are undertaken ‘within trial’ or based on other primary studies and, occasionally based on secondary data sources. Given the lack of cost-effectiveness evidence that is currently available on many social care interventions, it is not surprising to find that most studies are based on primary data sources.

A few studies used decision analytic models and secondary data sources, and they begin to demonstrate the possibilities for evaluation using this approach in social care. In contrast, evidence synthesis and decision analysis are widely used in health technology assessment. The scope for greater use of these methods in social care evaluation depends on factors such as whether sufficient sources of evidence currently exist on the effects of options and their costs and benefits, and whether the follow-up periods of primary studies are shorter than an appropriate time horizon for an economic evaluation. Studies were not always clear about these considerations.

*Challenges in data collection in social care:* There is a dearth of evidence about costs and benefits in social care and building up the evidence base of primary studies on the cost-effectiveness of social care interventions is likely to be a priority, and those that are undertaken are of good quality based on robust study designs.

Collecting data as part of primary studies can be challenging. In the UK currently, the social care sector is under considerable financial pressure, it is often difficult for staff to be available for research, and there is no direct infrastructure to support research activity in the way that there is in the NHS. Furthermore, there are no financial rewards for social care organisations (such as local authorities) to recruit and take part in studies of social care evaluations. There needs to be investment in infrastructure, and incentives to participate in research, as well as training as part of continuing professional development activity, to support quality primary data collection and to help social care professionals better understand the value of this research. In addition, the opportunities for using observational studies based on secondary data should be maximised and such data can offer better estimates of long run treatment effects and heterogeneity in treatment effects. However, obtaining secondary data has challenges of its own, including gaining access to data, informed consent, and ensuring comparability between intervention groups.

Conducting RCTs in social care is often challenging and ethically very difficult to administer. RCTs are considered to be the gold standard study design in the hierarchy of evidence and it is possible to undertake high quality RCTs in the social care field. Conducting RCTs in social care can, nevertheless, be practically and ethically very difficult to administer. Factors to support high quality RCTs, such as users blinded to the intervention received, are not always feasible and sometimes undermined. In addition, single primary studies might not represent the full evidence available on the intervention and all relevant comparators, nor cover the appropriate time horizon/s – hence the call for evidence synthesis and modelling.

*Decision modelling and evidence synthesis:* Use of decision analysis (rare in the review) and value of information methods (absent in the review) is potentially a means of demonstrating the value of additional primary studies (Briggs et al., 2006). Most evaluations in the review relied on a single primary study for outcome and resource use data. This might be because no other data were available. Whilst these data are important, particularly when an intervention has not yet been evaluated, a single primary study rarely compares the full range of alternative options over the appropriate time horizon, and usually fails to include all the relevant evidence available. In focussing on a single primary study, other potentially relevant sources of evidence may be ignored. Decision

modelling and evidence synthesis methods can help bridge the gap between a single primary study and the evidence required to inform decision making (Welton et al., 2009).

There are substantial challenges in developing a decision model and conducting value of information where data are non-existent or of poor quality. One expert pointed out that there is often not enough data to populate a good quality value of information analysis. Consequently, in these situations, research efforts may be more valuable in data generation through primary studies. Expert elicitation may also offer a way forward. In expert elicitation, experts are asked for the estimates and associated uncertainty of specific parameters. The use of expert elicitation in health care is limited and still under development, but future research could explore its application to social care.

Decision modelling and evidence synthesis might have particular relevance when considering complex social care interventions. Many social care interventions might be considered as complex interventions with multiple elements, some of which might interact with each other. The MRC has offered guidance on the evaluation of complex interventions generally (Craig et al., 2008, Craig et al., 2013) and, whilst there is a small literature on the economic evaluation of complex interventions exists (Byford and Sefton, 2003) which might be reviewed and assessed further, research on the evaluation of complex interventions and use of evidence synthesis approaches as it relates to economic evaluation of social care is required.

*Outcome data:* To date, most health economic evaluations have focused on the primacy of health as an outcome of value. The primacy of health is being challenged in the area of social care which may have broader outcomes and wider implications more generally. In line with this, a wide range of outcome measures have been used to date. The objectives of adult social care, and responsibilities of local authorities in respect of social care, are set out in the Care Act 2014 (2014), therefore these should be used as the objectives of social care. Debate is required about how to operationalise this in practice.

ASCOT and ICECAP have been developed recently and it is anticipated that their use will increase over time based on the assumption that they better reflect the perspective of those who use the services, and their carers', and the objectives of decision making, than other outcome measures. Research is ongoing about how far one unit change in HRQoL compares with a one unit change in social care-related quality of life (SCRQoL), and the degree to which ASCOT and/or ICECAP reflect SCRQoL (Stevens et al., 2015). Stevens et al used a value based mapping approach, involving preferences to value the measures on a common scale, to estimate the exchange rate between the EQ-5D 3L and ASCOT. Reporting these alongside each other would enable the research community to build up a library of examples about whether these different metrics are usually similar or systematically different, as well as in exploring how to move between generic and condition specific measures in health and social care.

In principle, the choice of outcome measure should reflect the objective of the decision-maker, hence, for example, QALYs for health care. Adopting a broader perspective raises the question of which outcome measure to use to reflect the social care perspective. The Care Act 2014 sets out the objectives of adult social care for use as a basis for these discussions, advocating a broad wellbeing approach and the promotion of wellbeing as noted in chapter one of the statutory guidance. One approach is for an outcome measure to reflect the objectives of the decision-maker across sectors. Some expert advisors to the project are researching into improving cross-sector comparisons (<https://www.mrc.ac.uk/documents/pdf/improving-cross-sector-comparisons-using-qalys-and-other-measures-a-review-of-alternative-approaches-and-future-research/>). The aim of this project is to capture broad quality of life rather than only health-related quality of life, hence the project is

known as 'Extending the QALY' to reflect this. This new measure would be the same as a QALY measure like EQ-5D, using an extended quality of life rather than HRQoL descriptor. The measure could reflect the objectives of decision-makers across sectors, and therefore facilitate the adoption of a broader perspective. It should be noted that, because of the different funding levels, and efficiency and activities in different sectors, the opportunity cost of resources may well differ even if outcomes are reflected in a common measure. Another option is to use various outcome measures that together reflect the objectives of the decision-makers across the various sectors. A possible issue then becomes about how to trade-off improvements across sectors if different measures are used. In the case of an intervention that improves HRQoL but reduces SCRQoL, if the analyst is to compare one with the other, it is necessary to make an assessment of whether overall the intervention is beneficial.

Commonly used quality of life measures should be validated in social care populations to check that they perform in a robust way that is relevant to this population. The use of some other measures (e.g. extended QALY) may be appropriate to inform decisions, particularly if the social care perspective is considered to be too narrow, and many interventions that were assessed were argued to have implications for outcomes across sectors including within as well as beyond health. In some studies more than one primary outcome measure was chosen, which may suggest that the outcomes were considered to be of equal importance to inform decision making. In this situation there is always the possibility that an intervention is cost-effective based on one approach, and not on the other, and this raises issues about how to deal with such a scenario. Interventions can impact (in terms of outcomes (and costs)) across more than one sector of the economy. This can have consequences for the outcomes selected to measure the impacts, and the need for the analysis to consider different opportunity costs across different budgets (see opportunity cost section). One expert noted that some interventions are thought to be good in and of themselves i.e. they have intrinsic benefits (autonomy, person-centred care etc) and/or they help people realise benefits that are self-defined and are therefore variable across users, or offer multiple benefits, often with no agreement on what outcomes are most important.

Aside from the challenge of deciding how outcomes are measured, it is important to consider whose values are measured and these could be those of the general public, users, patients, carers and families, all of whom might be users but also beneficiaries (or individuals who are adversely affected) by the intervention.

A range of economic evaluation approaches were taken to assess cost-effectiveness and this may reflect that the methods guidance is not prescriptive on this issue. One expert noted that a CEA rather than a CBA approach should be undertaken to evaluation of social care interventions given that the methods limitations of CBA had not let it become the main method of economic evaluation in health, whilst another suggested that it may be more appropriate to think about evaluation in terms of CBA. It might be more helpful to focus on how to assess, in any analysis, its appropriateness to support decision making given the objectives and constraints of the decision maker(s), and move away from the CEA and CBA labels. In practice, studies can incorporate features of each, or label themselves as one type of study whilst actually performing another.

*Informal care:* Informal care, termed by some as unpaid care, is an important issue in social care. Informal carers make a substantial contribution, enabling care recipients to continue living in the community. Many methods are available to value this contribution taking a monetary or a non-monetary approach for use in an economic evaluation framework. Informal carer impact can be accounted for on either the cost or benefit side, but it is also important in this case to avoid double-counting of impacts on carers. It is informative to quantify costs/benefits falling on the carer as a result of an intervention, particularly to quantify where costs might shift across sectors, such as the

public sector to families and informal carers. Valuation of informal carer contributions is essential when the intervention being evaluated is directly for the informal carer, but it can also be informative if the intervention is for the care recipient when there is an impact on the carer, or when access to care is being considered. Across studies reviewed, there was variation in the methods used to measure and value informal care time which undermines comparability across studies. There is a lack of debate about the methods for use in valuing informal care and further investigation is required.

#### *Resource use and cost data findings*

The methods used to obtain and report on resource use and cost data reflected standard good practice where this is available (Drummond et al., 2015, Gold et al., 1996, Neumann et al., 2017). Most studies included the costs of multiple services and many of the UK based ones relied on unit costs from the PSSRU unit cost volume (Curtis and Burns, 2016). There is, however, ongoing debate about other aspects of costing e.g. the inclusion of unrelated care costs (Morton et al., 2016, van Baal et al., 2016). NICE guidance does not require that these costs are included, whilst in the US, recommendations from the second panel on cost-effectiveness in health and medicine do require them.

*Reporting:* More clarity is needed in reporting on which sectors/budgets the costs fall and ensuring these are reported in a disaggregated way, by option compared. It is recognised that budgets and funding arrangements are designed differently across jurisdictions, but greater disaggregation in resource use and cost estimates can enhance interpretability and generalizability.

#### **(iv) Opportunity cost**

In economic evaluation, there are two broad schools of thought about the use of opportunity cost. One is that economic evaluation should compare the benefits gained to the benefits forgone due to the opportunity cost, therefore that the cost-effectiveness threshold should represent the opportunity cost. The other is that the relevant metric is the monetary value of the outcome, hence the cost-effectiveness threshold should represent the willingness to pay for a unit of outcome. In a budget constrained system, such as the UK social care, the opportunity cost is the forgone benefit of social care interventions that will not be funded to allow for other social care interventions to be funded. Therefore, in order to choose between competing options to be funded from a social care budget, the evaluation should compare the benefits with the forgone benefits due to the opportunity costs. In principle, it involves comparing the benefits of the intervention with the benefits of interventions that will not be funded. In practice, it is difficult to know which intervention will no longer be funded, and instead the cost-effectiveness threshold, if available, can be used. The cost-effectiveness threshold represents the marginal productivity of the system in generating benefits from additional expenditure at the margin. An empirical assessment of these opportunity costs by sector is key to informing decisions, whether these are defined as 'cost-effectiveness thresholds' or not.

There is inconsistency across studies in the approaches undertaken to examine cost-effectiveness. Currently, no empirical estimate of the cost-effectiveness threshold (reflecting opportunity costs) for decision-making in social care is available, although exploratory research is underway (Forder et al., 2014). The NICE threshold has no empirical basis but in using it analysts assume that it reflects the opportunity cost in the health care sector. Forder et al (2014) are the first researchers to undertake methods research to produce a threshold value for use in social care in the UK. This work is specifically focussed on home care services (Forder et al., 2014). Claxton et al's (2012) research to derive an empirical estimate of the NHS threshold also offers an approach which might be applied in social care, however, further research is required to consider how these methods might be applied in social care.

Most studies in the review used the NICE threshold. The NICE threshold is an assumed range for the opportunity cost on UK health and personal social services, and may not reflect the true opportunity cost falling on the UK NHS or on local authority funded care. It would be helpful to know what personal social services includes and how it aligns with budget responsibilities of specific organisations. Given that no appropriate threshold value currently exists, studies tended to use a range of hypothetical cost-effectiveness thresholds, leaving the decision maker to judge the cost-effectiveness of the interventions. Such evaluations do not explicitly quantify the benefits forgone or the opportunity costs falling on the specific sectors included in the evaluation and therefore, as for CCA studies, no conclusion can be offered on cost-effectiveness. Research is needed on the opportunity costs falling on local authority funded social care and on possible approaches to identify such opportunity costs until such estimates are available.

Besides deriving appropriate thresholds for relevant statutory sectors, it might also be appropriate to consider the other decision makers involved in allocating resources. This includes the private domain involving the opportunity cost to the service user, their family and informal carers. One expert suggested that the opportunity cost to the service user, their family and informal carers should be considered. If implemented, the implication would be that the additional costs imposed to the service user should be considered and this would reflect the perspective which would be that of the service user. If this approach were taken, an issue would arise as to how to aggregate the costs across sectors and to consider trading-off costs falling on the health care service, for example, with costs falling on the carer. Further discussion and research is required in this area as to what this might mean and its implications. Research is currently underway, funded by the Public Health Research Consortium through the Department of Health Policy Research Programme, to develop a framework for evaluating interventions with costs and effects impacting different sectors ([http://phrc.lshtm.ac.uk/project\\_2011-2019\\_021.html](http://phrc.lshtm.ac.uk/project_2011-2019_021.html)).

*Reporting:* More clarity is needed in reporting on which sectors/budgets the costs fall and ensuring these are reported in a disaggregated way, by option compared. Although the unit of measurement is the same (money) across sectors, different sectors operate at different levels of marginal productivity for the generation of a particular outcome. In other words, there are likely to be different levels of opportunity costs between different sectors. Therefore, even if we had an appropriate outcome measure for all sectors, aggregating costs across sectors may not be appropriate. By way of example, assume that health and social care have their outcomes measured in QALYs, and consider an intervention that saves £1,000 in health care costs for an additional £1000 in social care. A saving of £1000 in health care generates a certain quantity of QALYs. The additional costs in social care will displace another amount of QALYs. The same QALYs are displaced in health and social care only if social care has the same marginal productivity as health care in generating QALYs. If this is not the case, one should compare the benefits forgone from the additional cost in social care with the additional benefits from the cost saving in health care.

#### **(v) Uncertainty**

In most studies uncertainty was explored quantitatively to assess the impact of potential sources of bias and uncertainty on the results, however the uncertainty was drawn out in more detail in the text. Parameter uncertainty was considered well as univariate and probabilistic sensitivity analysis. No study explicitly mentioned structural uncertainty arising from the assumptions made. Structural uncertainty can arise from the assumptions made to structure decision models, but also from the assumptions made for the statistical analysis of ILD data. Importantly, using a single source of data assumes that the study is the only source of evidence, that it includes all relevant comparators, and it pertains to the relevant time horizon. More research is required on methods to explore the impact of structural uncertainty, particularly on how to express structural uncertainty quantitatively.

This is relevant not only to social care but also the health technology assessment more generally. No studies looked at how measures of uncertainty should impact on decisions (adoption and research) in the way Claxton et al, 2012 and Sculpher et al 2017 did for HTA (Claxton et al., 2012, Sculpher et al., 2017).

The development of a robust economic model is a resource intensive exercise requiring significant skills and expertise. Furthermore, models should be populated with high quality data and the limitations and impact of poor quality data can be explored in economic models. This makes decision modelling a considerable undertaking, which may not be possible in all situations. Economic evaluations are implemented to inform a decision, and decisions are made regardless of the quality of available data. It can be argued, therefore, that it is probably better to use poor data in a quantitative way such as in a decision model and to explore the impact of uncertainty, than not undertake an evaluation.

#### **(vi) Equity**

None of the studies explicitly considered equity implications. In the UK, the NICE guidance and Article 3 of the European Convention of Human Rights which the UK has a commitment to uphold ([http://www.echr.coe.int/Documents/Convention\\_ENG.pdf](http://www.echr.coe.int/Documents/Convention_ENG.pdf)) state that this should be done. Typically evaluations provide information on how to maximise user outcomes within a given budget, without explicit reference or assessment of the equity implications of resource allocation decisions. In economic evaluations of social care interventions, methods are needed which illustrate who benefits and who loses from any gains in outcome. Given the relevance of equity to social care, research in this area should explore its applicability to social care.

Current equity-informative research applied to health economic evaluation is underway (Cookson et al., 2017, Asaria et al., 2016b, Cookson et al., 2016) which might be applied to the social care field in the future. The aim of this research is to start producing distributional analyses of how the costs and benefits of interventions vary by social group to help give health care and public health policy makers a better understanding of who gains and who loses from their priority setting decisions. To apply this in the social care field, firstly data is required to produce breakdowns of social care costs and benefits by social group. Following this, methods are required to aggregate this information for use to inform decision making. This might involve calculating an estimate of the social distribution of "net" benefits (benefits minus costs), then by aggregating this distribution to estimate a summary measure of overall equity impact to place on the equity impact plane, and finally by aggregating equity and cost-effectiveness sides to estimate overall social welfare impact and analyse trade-offs between cost-effectiveness and equity impact.

Further research is needed to adapt methods of equity-informative health economic evaluation to the social care field to start producing distributional analyses of how the costs and benefits of social care interventions vary by social group. It is likely that the challenges of undertaking equity analysis in a social care context are larger for both data availability and conceptual reasons as compared to the health care context. Data on the socioeconomic characteristics of intervention and comparator recipients are rarely if ever collected and reported. Research is needed to adapt methods of equity-informative health economic evaluation to the social care field, and start producing distributional analyses of how the costs and benefits of social care interventions vary by social group to report who gains and who loses most from new social care interventions.

## Summary

Based on the review and comments from the Virtual Expert Advisory Group, the following feedback and priorities were identified for NICE in how it considers economic evaluation in social care guidelines.

- To date, relatively few economic evaluations have been conducted in adult social care. Further evaluations are required now, more than ever, given the financial constraints faced by the social care sector. Investment in applied economic evaluations should be implemented in order to improve the evidence base and to inform guidelines in social care. This requires additional funding, training and research infrastructure to support organisations' participation in research.
- Methods guidance for the economic evaluation of social care interventions needs to reflect what is feasible given the available evidence and what is appropriate for social care. Further guidance on methods for the economic evaluation of social care will enhance comparison across evaluations.
- Methodological research is required to improve the way economic evaluations are undertaken in this field. This includes: agreement on the objectives of social care and the appropriate outcome measures, development of cost-effectiveness threshold in social care given the agreed outcome measures, how to account for costs and benefits falling on different sectors, accounting for informal care, better scoping of economic evaluations, application of evidence synthesis, decision modelling and expert elicitation, and application of value of information methods.
- NICE should consider these priorities in their discussions with the MRC Methodology Research Programme, to establish whether it can commission research on some or all of these areas. Such investment will not only allow for better informed recommendations but also develop the research capacity in social care. NICE could organise a process by which the most appropriate approach to methods is undertaken now, prior to methods research being undertaken, and this may involve working groups and further discussion with experts in the field. This is appropriate in order to more clearly inform the decision maker about the value for money of social care interventions.

## Recommendations and areas of future research

A summary of recommendations and areas for future research that have emerged from this review are reported in Table 5.

**Table 5: Recommendations and areas for future research**

Principle	Statement	Recommendations	Areas for further research
Perspective	An evaluation should take the perspective relevant to the decision-maker.	Clarity in reporting who is the decision-maker that the evaluation is intended to inform, their objectives and relevant costs.	There is debate about the appropriate perspective(s). This has implications for the choice of outcome measures, costs, and opportunity costs. Research is currently underway to develop a framework for evaluating interventions with costs and effects impacting different sectors. Future research should explore the application and implications of this framework to social care interventions.
Comparators	An evaluation should include all relevant alternatives.	Clarity on the rationale for the choice of alternatives under evaluation is required, as well as sufficient description of the interventions for comparison.	Research could inform better guidance on how to identify the relevant alternatives and better scope an economic evaluation.
Evidence	An evaluation should include all available evidence relevant to the decision.	<p>Data collection in social care can be a challenge, primarily as a result of lack of investment and research infrastructure. Thoughtful study design is recommended.</p> <p>Additional support may be warranted over and above evaluations in health care.</p> <p>Development of the research capacity of the social care sector should be a priority.</p> <p>Clarity is required in reporting on which sectors/budgets the costs fall and how this relates to the study perspective.</p>	<p>There is a dearth of good quality evidence on social care interventions. Data is scarce and often precludes formal quantitative analysis such as decision modelling and evidence synthesis. Expert elicitation may offer a possible way forward in situations where none or little data exists.</p> <p>Primary research in social care interventions should ensure good quality standards in design, conduct and reporting. This will also be useful so that data can be re-used and synthesised for other studies.</p> <p>Evidence generation is required. Decision modelling and evidence synthesis can help bridge the gap between a single primary study and the evidence required to inform decision making. Research can inform the use of these methods in social care evaluations.</p> <p>Outcome measures specific for social care (e.g. ASCOT, ICECAP) have recently been developed. There is limited understanding of their properties and comparability with HRQoL measures. Broader quality of life measurement methods for cross sectoral comparisons such as an extended QALY is currently</p>

			<p>under development and may also prove useful. More extensive use of these measures in unison will facilitate research on use and comparability of measures.</p> <p>There is lack of agreement about how to account for informal care as well as the impact on care recipients they care for, in an economic evaluation. There is an issue about how to aggregate costs and benefits whilst avoiding double counting. Research on the assumptions and implications of different approaches are required to examine these issues. The methodologies proposed need to be scrutinised for quality and this may help resolve this issue.</p>
Opportunity costs	An evaluation should compare the additional benefits to their opportunity cost.	Evaluations should indicate the cost-effective intervention given the benefits and opportunity costs of all interventions under evaluation. Cost-effectiveness thresholds should only be used if they are relevant for the sectors included in the evaluation.	In principle, an evaluation should compare the benefits of the intervention to the forgone benefits of the displaced interventions. In practice, it is difficult for evaluations to identify the interventions that will be displaced. Research is needed on the opportunity costs falling on local authority funded social care in the form of a cost-effectiveness threshold, and on possible approaches to identify such opportunity costs until estimates of the threshold are available.
Uncertainty	An evaluation should characterise the uncertainty associated with the decision.	Uncertainty arises from the parameter inputs and from the assumptions made about how evidence relates to each other and to the decision. Evaluations should use the available methods e.g. sensitivity analysis including probabilistic sensitivity analysis to explore the impact of uncertainty on the decisions.	Recent methodological advancements in the area of uncertainty, namely value of information, have had limited use in social care evaluations currently. The use of decision analysis and value of information methods provides a means of assessing the value of, and prioritising, de novo primary studies. More research in implementing these methods in the social care context may be warranted in the future.
Equity	An evaluation should explore the equity implications of the decision.	More consideration is needed on the equity implications of the decisions under evaluation.	Research is underway on how to account for equity considerations in a quantitative way. Given the relevance of equity to social care, research in this area should explore its applicability to social care. First and foremost, data is required to produce social breakdowns of the benefits and costs of publicly funded social care interventions of the kind recommended by NICE.

## Appendix 1: Search methodology

The search strategy aimed to identify economic evaluations of social care interventions using various approaches specific to the subject of the databases being searched:

- In economics databases, such as NHS EED, we searched only for the concept of social care interventions and settings.
- In social care databases, such as Social Policy and Practice, we searched only for the concept of economic evaluation.
- In multidisciplinary databases, we searched for records which contained both concepts: social care settings/interventions AND economic evaluations.

We searched a wide range of databases indexing research in the fields of social care and economics. The search strategies were devised using a combination of subject indexing terms (where available), and free text search terms in the title and abstract.

Search results were limited to studies published in English between 2010 and 2016.

Full strategies including search dates for all sources searched are reported next. The retrieved records were loaded into EndNote bibliographic management software and de-duplicated using several algorithms.

### A1. Social Policy and Practice <201610>

Interface / URL: OvidSP

Database coverage dates:

Search date: 16 November 2016

Records retrieved: 1176

Search strategy:

- ```

1  (economic$ adj3 model$).ti,ab. (161) Economic models
2  ((econom$ or cost or costs or costing or price or pricing) adj2 (analysis or analyses or
evaluation$1 or study or studies)).ti,ab. (1126)
3  (value adj3 money).ti,ab. (1121)
4  ((economic$ or cost or costs or value) adj4 (decision$1 or threshold$)).ti,ab. (147)
5  value for money.de. (674)
6  cost-benefit analysis.de. (246)
7  (cost adj3 (effect$ or utility or benefit)).ti,ab. (2656)
8  or/1-7 (4936)
9  limit 8 to yr="2010-current" (1216)
10 remove duplicates from 9 (1176)

```

### A2. NHS Economic Evaluation Database (NHS EED)

Interface / URL: Cochrane Library (Wiley)

Database coverage dates: Issue 2 of 4, April 2015

Search date: 16 November 2016

Records retrieved: 415 (line #28 shows the results for the whole Cochrane Library)

## Search strategy:

```

-----
1      MeSH descriptor: [Social Welfare] explode all trees      826
#2     MeSH descriptor: [Social Work] explode all trees235
#3     social near/3 (care* or work* or welfare* or service*):ti,ab,kw  3586
#4     child* near/3 (care* or work* or welfare* or service*):ti,ab,kw  5088
#5     (elderly or aged or old age or pensioner* or senior* or older people or older person*)
near/3 (care* or work* or welfare* or service*):ti,ab,kw      6523
#6     (disabled or handicap* or disabilit* or community) near/3 (care* or work* or welfare* or
service*):ti,ab,kw      6421
#7     (disabilit* or child* or unemployment or unemployed) near/3 benefit*:ti,ab,kw  941
#8     MeSH descriptor: [Social Security] this term only      29
#9     MeSH descriptor: [Housing] 2 tree(s) exploded  337
#10    MeSH descriptor: [Housing for the Elderly] this term only      41
#11    MeSH descriptor: [Homes for the Aged] this term only  568
#12    MeSH descriptor: [Nursing Homes] this term only      1139
#13    MeSH descriptor: [Assisted Living Facilities] this term only      43
#14    (residential near/3 (home or homes or care)):ti,ab,kw  559
#15    "sheltered housing":ti,ab,kw  14
#16    nursing next home*:ti,ab,kw  2576
#17    care next home*:ti,ab,kw  455
#18    (re-ablement or reablement):ti,ab,kw  12
#19    MeSH descriptor: [Home Care Services] this term only  1777
#20    (home care or homecare):ti,ab,kw  9990
#21    "integrated care":ti,ab,kw  273
#22    "hospital at home":ti,ab,kw  84
#23    (help or helping) near/4 (home or homes):ti,ab,kw  115
#24    befriending:ti,ab,kw  51
#25    tailored next activity next program*:ti,ab,kw  8
#26    personal next health next budget*:ti,ab,kw  2
#27    MeSH descriptor: [Community Health Services] this term only  1030
#28    #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15
or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 Publication Year
from 2010 to 2016      14055

```

**A3. PsycINFO <2002 to November Week 1 2016>**

Interface / URL: OvidSP

Database coverage dates: 2002 to November week 1 2016

Search date: 16 November 2016

Records retrieved: 1280

## Search Strategy:

```

-----
1  community welfare services/ (1039)
2  exp social casework/ (10786)
3  (social adj3 (care$ or work$ or welfare$ or service$)).ti,ab,hw. (43363)
4  (child* adj3 (care$ or work$ or welfare$ or service$)).ti,ab,hw. (36539)
5  ((elderly or aged or old age or pensioner$ or senior$ or older people or older person$) adj3
(care$ or work$ or welfare$ or service$)).ti,ab,hw. (7429)

```

- 6 ((disabled or handicap\$ or disabilit\$ or community) adj3 (care\$ or work\$ or welfare\$ or service\$)).ti,ab,hw. (27472)
- 7 ((disabilit\$ or child\$ or unemployment or unemployed) adj3 benefit\$).ti,ab,hw. (2843)
- 8 social security/ (696)
- 9 exp social services/ (22291)
- 10 exp housing/ (4615)
- 11 nursing homes/ (4320)
- 12 residential care institutions/ (4345)
- 13 assisted living/ (572)
- 14 independent living programs/ (174)
- 15 Retirement Communities/ (218)
- 16 (residential adj3 (home or homes or care)).ti,ab,hw. (5601)
- 17 sheltered housing.ti,ab,hw. (53)
- 18 nursing home\$.ti,ab,hw. (6550)
- 19 care home\$.ti,ab,hw. (1040)
- 20 (re-ablement or reablement).ti,ab,hw. (9)
- 21 Home Care/ (3872)
- 22 Home Visiting Programs/ (827)
- 23 (home care or homecare).ti,ab,hw. (5664)
- 24 integrated care.ti,ab,hw. (947)
- 25 hospital at home.ti,ab,hw. (29)
- 26 ((help or helping) adj4 (home or homes)).ti,ab,hw. (456)
- 27 befriending.ti,ab,hw. (139)
- 28 tailored activity program\$.ti,ab,hw. (6)
- 29 personal health budget\$.ti,ab,hw. (3)
- 30 community health service\$.ti,ab,hw. (145)
- 31 or/1-30 (126407)
- 32 (economic\$ adj3 model\$).ti,ab,hw. (1244)
- 33 ((econom\$ or cost or costs or costing or price or pricing) adj2 (analysis or analyses or evaluation\$1 or study or studies)).ti,ab,hw. (13649)
- 34 (value adj3 money).ti,ab,hw. (397)
- 35 ((economic\$ or cost or costs or value) adj4 (decision\$1 or threshold\$)).ti,ab,hw. (2801)
- 36 (cost adj3 (effect\$ or utility or benefit)).ti,ab,hw. (11854)
- 37 "costs and cost analysis"/ (9864)
- 38 health care economics/ (593)
- 39 or/32-38 (24901)
- 40 31 and 39 (2293)
- 41 limit 40 to yr="2010-current" (1280)
- 42 remove duplicates from 41 (1280)

#### **A4. Econlit <1886 to October 2016>**

Interface / URL: OvidSP

Database coverage dates: 1886 to October 1 2016

Search date: 16 November 2016

Records retrieved: 852

Search Strategy:

- 
- 1 (social adj3 (care\$ or work\$ or welfare\$ or service\$)).ti,ab,kw. (9754)
  - 2 (child\* adj3 (care\$ or work\$ or welfare\$ or service\$)).ti,ab,kw. (3421)

- 3 ((elderly or aged or old age or pensioner\$ or senior\$ or older people or older person\$) adj3 (care\$ or work\$ or welfare\$ or service\$)).ti,ab,kw. (1444)
- 4 ((disabled or handicap\$ or disabilit\$ or community) adj3 (care\$ or work\$ or welfare\$ or service\$)).ti,ab,kw. (1647)
- 5 ((disabilit\$ or child\$ or unemployment or unemployed) adj3 benefit\$).ti,ab,kw. (2542)
- 6 social security.ti,ab,kw. (7522)
- 7 ((community or social) adj3 housing).ti,ab,kw. (815)
- 8 assisted living.ti,ab,kw. (44)
- 9 (retirement adj3 (home or homes)).ti,ab,kw. (32)
- 10 (residential adj3 (home or homes or care)).ti,ab,kw. (408)
- 11 sheltered housing.ti,ab,kw. (2)
- 12 nursing home\$.ti,ab,kw. (490)
- 13 care home\$.ti,ab,kw. (51)
- 14 (re-ablement or reablement).ti,ab,kw. (0)
- 15 (home care or homecare).ti,ab,kw. (329)
- 16 integrated care.ti,ab,kw. (23)
- 17 hospital at home.ti,ab,kw. (4)
- 18 ((help or helping) adj4 (home or homes)).ti,ab,kw. (52)
- 19 befriending.ti,ab,kw. (1)
- 20 tailored activity program\$.ti,ab,kw. (0)
- 21 personal health budget\$.ti,ab,kw. (0)
- 22 community health service\$.ti,ab,kw. (13)
- 23 community care\$.ti,ab,kw. (64)
- 24 or/1-23 (26194)
- 25 (economic\$ adj3 model\$).ti,ab,kw,hw. (15564)
- 26 ((econom\$ or cost or costs or costing or price or pricing) adj2 (analysis or analyses or evaluation\$1 or study or studies)).ti,ab,kw,hw. (106135)
- 27 (value adj3 money).ti,ab,kw,hw. (758)
- 28 ((economic\$ or cost or costs or value) adj4 (decision\$1 or threshold\$)).ti,ab,kw,hw. (6314)
- 29 (cost adj3 (effect\$ or utility or benefit)).ti,ab,kw,hw. (14774)
- 30 or/25-29 (131886)
- 31 24 and 30 (2104)
- 32 limit 31 to yr="2010-current" (853)
- 33 remove duplicates from 32 (852)

## A5. Social Sciences Abstracts

Interface/URL: ProQuest

Database coverage dates: 1979-current

Search date: 17 November 2016

Records retrieved: 207

Search strategy:

((TI,AB(economic\* PRE/3 model\*) OR TI,AB((econom\* or cost or costs or costing or price or pricing) NEAR/2 (analysis or analyses or evaluation\* or study or studies)) OR TI,AB(value NEAR/3 money) OR TI,AB((economic\* or cost or costs or value) NEAR/4 (decision\* or threshold\*)) OR TI,AB(cost NEAR/3 (effect\* or utility or benefit))) AND (SU.EXACT("Social Work Cases") OR TI,AB(social NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR (TI,AB(child\* NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB(elderly NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB(aged NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB(old age NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR

TI,AB(pensioner\* NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB(senior\* NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB(older people NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB(older person\* NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB((disabled OR handicap\* OR disabilit\* OR community) NEAR/3 (care\* OR work\* OR welfare\* OR service\*)) OR TI,AB((disabilit\* OR child\* OR unemployment OR unemployed) NEAR/3 benefit\*) OR SU.EXACT("Social Security") OR SU.EXACT("Social Services") OR SU.EXACT("Housing") OR SU.EXACT("Nursing Homes") OR TI,AB(assisted living OR independent living) OR TI,AB(residential NEAR/3 (home OR homes OR care)) OR TI,AB(sheltered housing) OR TI,AB(nursing home\*) OR TI,AB(care home\*) OR TI,AB(re-babblement OR rebabblement) OR SU.EXACT("Home Care") OR SU.EXACT("Independent Living") OR SU.EXACT("Shelters") OR TI,AB(home care OR homebake) OR TI,AB("integrated care") OR TI,AB("hospital at home") OR TI,AB((help OR helping) NEAR/4 (home OR homes)) OR TI,AB(befriending) OR TI,AB(tailored activity program\*) OR TI,AB(personal health budget\*)) AND pd(20100101-20161117)))

## A6. Applied Social Sciences Index & Abstracts (ASSIA)

Interface/URL: ProQuest

Database coverage dates: 1987 - current

Search date: 17 November 2016

Records retrieved: 437

Search strategy:

(SU.EXACT("Economic models") OR TI,AB(economic\* NEAR/3 model\*) OR TI,AB((econom\* or cost or costs or costing or price or pricing) NEAR/2 (analysis or analyses or evaluation\* or study or studies)) OR TI,AB(value NEAR/3 money) OR TI,AB((economic\* or cost or costs or value) NEAR/4 (decision\* or threshold\*)) OR TI,AB(cost NEAR/3 (effect\* or utility or benefit)) OR (SU.EXACT("Costs-Benefits") OR SU.EXACT("Cost benefit analysis"))) AND (SU.EXACT("Social welfare") OR (SU.EXACT("Social casework") OR SU.EXACT("Community work"))) OR TI,AB(social near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(child\* near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(elderly near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(aged near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(old age near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(senior near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(pensioner\* near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(older people near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB(older person\* near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB((disabled or handicap\* or disabilit\* or community) near/3 (care\* or work\* or welfare\* or service\*)) OR TI,AB((disabilit\* or child\* or unemployment or unemployed) near/3 benefit\*) OR (SU.EXACT("Welfare benefits") OR SU.EXACT("Housing benefits") OR SU.EXACT("Unemployment benefit") OR SU.EXACT("Child benefit")) OR SU.EXACT("Social security") OR SU.EXACT("Housing") OR SU.EXACT("Sheltered housing") OR SU.EXACT("Elderly housing assistance programmes") OR SU.EXACT("Elderly housing assistance programmes") OR SU.EXACT("Service-assisted housing") OR SU.EXACT("Nursing homes") OR TI,AB(residential near/3 (home or homes or care)) OR TI,AB("sheltered housing") OR TI,AB(nursing home\* or care home\*) OR TI,AB(re-ablement or reablement) OR SU.EXACT("Home care") OR TI,AB("home care" or homecare) OR TI,AB("integrated care") OR TI,AB("hospital at home") OR TI,AB((help or helping) near/4 (home or homes)) OR TI,AB(befriending) OR TI,AB(tailored pre activity pre program\*) OR TI,AB(personal pre health pre budget\*) OR SU.EXACT("Community health services")))Limits applied

Narrowed by: Entered date: 2010-01-01 - 2016-11-17

## A7. Research Papers in Economics (REPEC)

Interface/URL: <https://ideas.repec.org/search.html>

Database coverage dates: 1997 - current

Search date: 18 November 2016

Records retrieved: 9

Search strategy:

The term combinations below were searched separately using Advanced search mode in whole records. All publication types were searched. The result sets were browsed and economic evaluations were downloaded.

("social care" | "social work" | "social welfare" | "social service") + (economic\* | cost benefit | cost utility | cost effective\*) 60

("child care" | "child\* work" | "child welfare" | "child\* service") + (economic\* | cost benefit | cost utility | cost effective\*) 10

(elderly | aged | old age | pensioner\* | senior\* | older people | older person\*) + (care | work\* | welfare\* | service\*) + (economic\* | cost benefit | cost utility | cost effective\*) 21

(disabled | handicap\* | disabilit\* | community) + (care | work\* | welfare\* | service\*) + (economic\* | cost benefit | cost utility | cost effective\*) 49

(sheltered hous\* | nursing home\* | care home\* | residential care | residential home\* | assisted living) + (economic\* | cost benefit | cost utility | cost effective\*) 195

(home care | homecare | "integrated care" | "hospital at home") + (economic\* | cost benefit | cost utility | cost effective\*) 76

(re-ablement | reablement) + (economic\* | cost benefit | cost utility | cost effective\*) 1

(home\* help\*) + (economic\* | cost benefit | cost utility | cost effective\*) 52

(befriend\*) + (economic\* | cost benefit | cost utility | cost effective\*) no records

(tailored activity program\*) + (economic\* | cost benefit | cost utility | cost effective\*) 8 records

(personal health budget\*) + (economic\* | cost benefit | cost utility | cost effective\*) 21 records

## A8. Social care online (SCIE)

Interface/URL: <http://www.scie-socialcareonline.org.uk/>

Database coverage dates: 1980-current

Search date: 18 November 2016

Records retrieved: 1185

Search strategy:

The term combinations below were searched separately using Advanced Search option, All fields. The interface appears to use automatic truncation.

"social care" OR "social work" OR "social welfare" OR "social service" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

436

"disabled" OR "disability" OR "unemployed" OR "unemployment" OR "child" OR "children" OR "elderly" OR "aged" OR "old age" OR "pensioner" OR "senior" OR "older people" OR "older person" AND "care" OR "work" OR "welfare" OR "service" " AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

486

"sheltered housing" OR "nursing home" OR "care home" OR "residential care" OR "residential home" OR "assisted living" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

104

"home care" OR "homecare" OR "integrated care" OR "hospital at home" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

104

"re-ablement" OR "reablement" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

34

"home help" or "help at home" or "home helping" or "helping at home" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

7

"befriending" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

7

"tailored activity" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

2

"personal health budget" AND "cost benefit" OR "cost effective" OR "cost utility" OR "economic evaluation" OR "economic model" AND Publication year 2010-2016

5

## **A9. Research Councils UK Gateway to Research**

Interface/URL: <http://gtr.rcuk.ac.uk/>

Database coverage dates: n/a

Search date: 18 November 2016

Records retrieved: 2

### **Search strategy:**

Only single terms can be used. Phrases were entered using quotation marks. Boolean operators were not allowed. Truncation appears to be automatic.

The following most specific terms were searched separately. Results were browsed for relevant economic evaluations.

reablement

"tailored activity"

"personal health budget"

"home help"

"help at home"

"home care"

"integrated care"

"hospital at home"

"sheltered housing"

"nursing home"

"care home"

"assisted living"

"residential care"

"residential home"

**Table I: Studies included in the empirical review**

| <b>References</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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