# APPENDIX C3 – Economics Report

**Guideline topic**: Home care: delivering personal care and practical support to older people living in their own homes

**Economic priority area**: Care planning approaches

**Review questions**: in particular 3.1 and 3.2, other review questions of relevance were 3.3, 4.3

**This technical report was produced by the Personal Social Services Research Unit at the London School of Economics.**

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## Abbreviations

| | |
|---|---|
| ADL | Activity of Daily Living |
| ASCOT | Adult Social Care Outcomes Toolkit |
| GHQ | General Health Questionnaire |
| IBSEN | Individual Budget Evaluation Network (the term is however used to refer to the Individual Budget pilot programme) |
| LSE | London School of Economics and Political Science |
| NCCSC | NICE Collaborating Centre for Social Care |
| PSSRU | Personal Social Services Research Unit |
| RQ | Review question |

## Contents

# 1 BACKGROUND

## 1.1 About the scope and guideline

This report was produced by the Personal Social Services Research Unit (PSSRU) at the London School of Economics and Political Science (LSE) in the development of the social care guideline ‘Home care: delivering personal care and practical support to older people living in their own homes, and aimed to estimate the cost-effectiveness of different home care planning approaches’. PSSRU (LSE) is an independent research unit and is contracted as a partner of the NICE Collaborating Centre for Social Care (NCCSC) to carry out the economic reviews of evidence and analyses.

NCCSC guidelines provide recommendations in regards to good social care practice, which are informed by evidence including cost-effectiveness evidence. As part of the guideline development, reviews of the economic literature are carried out and additional economic analysis is carried if that it is considered feasible and useful. Feasibility refers to the availability of data, whilst a decision about usefulness is based on the expected ability of additional economic analysis to reduce uncertainty over cost effectiveness and where a recommendation is likely to result in considerable changes in social care outcomes or cost.

The home care guideline considers how home care – defined as personal care, support with activities of daily living and essential domestic tasks – should be planned and delivered in a person-centred manner. This particular guideline covered only older people. Of the areas of review covered in the scope (so called review questions), the following ones were identified to be the most important from an economic perspective.

- What approaches to home care planning and delivery are effective in improving outcomes for people who use services? (RQ 3.1)
- What are the significant features of an effective model of home care? (RQ 3.2)
- Are there any undesired/ harmful effects from certain types of home care approaches? (RQ 3.3)
- What are the effects of approaches to promote safe care? (RQ 4.1).

Economic priority areas were decided during the guidance development in discussion with members of the Guidance Development Group, and considered the following criteria: It was expected that the questions related to the vast majority of the population covered in the scope, that interventions covered by those review questions were likely to have an important impact on costs and outcomes, and that there would be some (although probably limited) data availability.

## 1.2 Evidence review

A first step of the economic work was a focused systematic review of published economic studies to establish if there were any high-quality economic studies that address the review questions and are relevant to the current UK system. The full details of the studies that were identified, including their findings and an assessment of their applicability and quality can be found in Appendix C.1 of the guideline.

In summary, little economic evidence was identified of different care planning approaches applicable to the UK home care context. Studies in the following subdomains could be identified:

- An area which was discussed by the Guideline Committee as being particularly relevant to current home care practice was an *outcomes (versus task) based approach* of commissioning and delivery. However, there was a lack of economic evidence and the review only identified one small economic study which was of poor reporting and methodological quality (Gethin-Jones 2012, Appendix C.1 for full findings).

- Although *case management* approaches are well researched, there was no up-to-date study on the cost-effectiveness of case management relevant to the UK home care context.

- There were two studies of carried by the same group of authors which assessed the cost-effectiveness of different *intensities* of home care. They found that mean optimal provisions ranged from £28/wk. to £51/wk. and from 14 to 20 hours per week depending on the severities of needs (Netten and Forder 2007, Forder et al. 2013, Appendix C.1 for full findings). However, these studies only considered the cost of home care instead of wider resource use and applied new methodological approaches that were still in development. They were of limited applicability to the review questions so that they could not be directly used to inform recommendations.

- One systematic review of *personal assistants* (Montgomery et al 2008, Appendix C.1 for full findings), again of limited applicability to the UK context, was largely inconclusive in regards to cost-effectiveness.

- One high quality UK economic evaluation of individual budgets (Individual Budget pilot programme), which was carried out alongside a multi-site RCT design (Glendinning et al. 2008, Jones et al. 2012, Appendix C.1 for full findings), collected a range of information on costs and outcomes for older people living in their own home who used different types of services including home care. Because the design and focus of the analysis was on the (cost-) effectiveness of individual budgets over more traditional support arrangements rather than on home care provision, they could not be used to inform recommendations on the review questions.

## 2 AIMS

Our aim was to examine the review questions stated in 1.1 with a particular focus on the first two questions, which related to the effectiveness of home care approaches and were also likely to cover aspects of the other two questions.

- What approaches to home care planning and delivery are effective in improving outcomes for people who use services? (RQ 3.1)
- What are the significant features of an effective model of home care? (RQ 3.2)

Based on the lack of economic evidence in this area it was decided that additional economic analysis would be useful if it was possible to identify appropriate data. The aim was to examine the role of home care as part of a care package and approach in explaining differences in costs and outcome of individuals. The only data relevant to the UK context identified during the review process were from the Individual Budget pilot programme study (so called IBSEN study). The study collected detailed data on people eligible for publicly funded social care including data on their use of health and social care, personal characteristics and outcomes of psychological wellbeing (measured via the General Health Questionnaire) and social care-related quality of life (measured via the Adult Social Care Outcomes Toolkit).

The reason for using this particular study was that it included a comprehensive set of outcomes and cost data for a large number of people from different English localities which were randomized into the trial. Study participants were found to be largely representative of people in England whereas this is often not the case with survey data which only represent a selected sample of people who were able and willing to fill in the questionnaire. In the absence of a trial concerned with comparing costs and outcomes of two or more different home care approaches, this was thus considered the best possible data set for the economic analysis.

# 3 METHOD

## 3.1 General approach

It was decided to carry out logistic regression to the sample of older people (65 years and above) in the data set and examine the cost-effectiveness of different publicly funded care packages and approaches that were used by older people who lived in their own homes.

The original sample comprised individuals who had originally been randomised to the intervention group (i.e. those who were offered an individual budget – what would now be called a *personal* budget) as well as the individuals randomized to the comparison group. We combined the two groups for the purposes of new multivariate analyses but retained an indicator (dummy) variable to reflect trial assignment. This was considered necessary as the trial was not blinded and the fact that a person was aware of their allocation to the intervention or control group could have had an influence on their costs or outcomes.

Our analysis covered a wider spectrum of interventions than simply home care and looked at social care services provided to older people living in their own homes including home care. This allowed us to identify the most cost-effective components of the whole care package as well as the care planning approach for different groups of older people who use home care, in particular people with and without cognitive impairment (dementia). The perspective of the economic analysis was the NHS and local authorities in terms of health and social care costs.

## 3.2 About the data source

The IBSEN study is a multi-faceted study including a randomised controlled trial, which was conducted to evaluate the national pilot of individual budgets in a sample of English local authorities. The study was funded by the Department of Health between 2005 and 2007. In this trial, data were collected on a wide range of costs and outcomes for older people who were using home care and other social care services.

Data included those for approximately N=400 older people, which were collected at two time-points: at baseline (i.e. around the time of identification for participation in the study) and then 6 months later. Details of the collected data are summarised in Table 1. Baseline data (denoted t=0) were collected through local authority systems and included information about personal characteristics, needs and the level of publicly funded support. Information on service use, outcomes and needs were collected at 6 months (t=1) in interviews with the older person or – if the older person did not have the capacity to participate – with their unpaid carers. In addition, support plan records for older people who had an individual budget in place provided information about total funding of services and support service use over the 6 month period.

**Table 1: Data descriptions and time/method of data collection**

| Information | Description | Time (and source) of data collection* |
|---|---|---|
| Activities of daily living (ADLs) | Number of activities people were unable to do, including walking up stairs, walking down road, getting around indoors, getting in/out of bed, having a bath/shower, getting dressed | t=0 (LA),<br>t=1 (SR) |
| Client group | Primary need classified by the local authority in these categories: physical or learning disability, dementia, mental illness, sensory impairment and vulnerability | t=0 (LA) |
| Living alone | People who had been recorded as not having the principal unpaid carer living in the same household | t=0 (LA) |
| Cognitive impairment | People with assessed (t=0) or self-reported (t=1) cognitive impairment including dementia | t=0 (LA);<br>t=1 (SR) |
| Personal characteristics | Age, gender and ethnicity; 'ethnicity' referred to person being in the 'White British' group or in a different ethnic group | t=0 (LA) |
| Support package at baseline | Level of support that individuals received before start of the study as indicated by the costs of the support package | t=0 (LA) |
| Social care-related quality of life | Measured with the Adult Social Outcomes Toolkit (ASCOT) | t=1 (SR) |
| Psychological wellbeing | Measured with the General Health Questionnaire (GHQ) | t=1 (SR) |
| Use of health and social care services | Service use in the previous 6 months; collected from questionnaires with service users and support plan records of local authorities | t=1 (LA, SR) |

*LA: From local authority system; SR=Self-reported through interviews

### 3.3 Outcome measures

The IBSEN study employed two standardised outcomes tools at 6 months. The *Adult Social Care Outcomes Tool* (ASCOT; e.g. Forder et al. 2007) measures social care-related quality of life across seven domains, ranging from basic areas (safety; personal care and comfort; home cleanliness and comfort; meals and nutrition) to more aspirational aspects (control over daily life; social participation and involvement; occupation). For each domain, respondents can indicate which of three options best describes their situation, reflecting: no needs, low-level needs or high-level needs. Rather than assuming that each domain and level is of equivalent importance the measure is weighted using population-based preferences (see Burge et al., 2006).The *General Health Questionnaire* (GHQ-12; Goldberg and Williams 1988) is a comprehensive measure of mental health-related wellbeing which explores whether respondents have experienced a particular symptom or behaviour over the past few weeks. Each item is rated on a four-point scale with higher scores indicating worse conditions (less than usual, no more than usual, rather more than usual, or much more than usual). It can be used as a continuous variable by summing scores on the 12 items.

### 3.4 Cost measures (including unit costs)

Costs in our analysis referred to the total costs of the health and social care service utilisation as reported by service users and - for people with individual (personal) budgets - as taken from support plan records held by local authorities. In the original study, unit cost data for social care resources were supplied by the pilot local authorities for people without individual budgets. For health care resources, unit costs had been taken from the PSSRU compendium for health and social care Curtis (2007) and inflated to 2007/8 prices. The data set that a total cost variable has been already created which presented an aggregation of the costs of service utilization per person. This included the frequency and duration multiplied with the unit costs for each service that were used by a person. The total costs were used in this analysis so that costs were priced in the year used by the IBSEN study (i.e. 2007/8); as described later an overall inflation was applied to the results. The unit costs used in the IBSEN study which informed (together with the data on frequency and duration the total costs) the total costs are presented in Table 2.

**Table 2: Unit costs of social and health care services *(taken from Glendinning et al 2008, Tables C.5 and C.6*)**

| **Service** | **Mean unit costs, in 2007/8 prices** |
|---|---|
| *Social care use (unit costs provided by pilot local authorities)* | |
| Home care | £15.54 |
| Day centre | £39.75 |
| Lunch club | £2.76 |
| Meals on wheels | £4.62 |
| *Health care use (from national unit costs from Curtis 2007, inflated)* | |
| Day hospital per visit | £142 |
| District nurse, health visitor, or other kind of nurse<br>(1) Home | £77<br>£55 |

| | |
|---|---|
| (2) Clinic<br>(3) Home and clinic | £68 |
| Occupational therapist, physiotherapist, speech therapist, other type of therapist<br>(1) Home<br>(2) Clinic<br>(3) Home and clinic | £38<br>£29<br>£36 |
| Local authority social worker | £131 |
| General practitioner<br>(1) Surgery<br>(2) Home | <br>£31<br>£50 |
| Hospital accident and emergency department | <br>£32 |
| Chiropodist<br>(1) Home<br>(2) Clinic<br>(3) Home and clinic | <br>£17<br>£9<br>£19 |
| Inpatient service per day | £231 |

## 3.5 Definition of 'intervention'

In this analysis the 'intervention' referred to two aspects of service delivery: social care services provided as part of a care package for people living in their own home and the care planning approach. Services included those that were provided as part of a planned social care package for older people living in their own home (most of which were provided in the person's home) and included home care, personal assistant services, equipment and adaptations, meals on wheels, lunch clubs, day care and telecare. The care planning approach reflected the care management provided by a professional care manager or coordinator, who was usually employed by the local authority or by home care agencies.

## 3.6 Statistical analysis

We carried out statistical analysis using STATA (version 12.1) examining how the 'intervention', the variable of interest, affected outcomes and costs after controlling for other variables that were likely to also influenced costs and outcomes. These other variables are called covariates. The general rule is that the more comprehensively those covariates capture those other influences the more accurate the findings of the analysis are going to be. In this analysis a wide range of information was available covering:

- The level of need for assistance (based on level of disability etc.);
- Personal characteristics in form of age, gender and ethnicity;
- Health service use;
- To which group the person was allocated as part of the original trial design (as mentioned in 3.1 this was necessary because the knowledge of the person to be allocated to one of the two groups might have had an effect on their outcomes).

All variables used in the analysis together with a description are shown in Table 3.

**Table 3: Variables and descriptions used in the economic analysis**

| Variable | Description |
|---|---|
| Outcomes (Q) | Outcomes, measured with ASCOT and GHQ |
| Cost (C) | Total costs of health and social care over the period of 6 month period prior to t=1 |
| The ‘intervention’ i.e. care package and care planning approaches (H) | Indicator variables for the ‘intervention’, as described above: home care, personal assistant services, equipment and adaptations, meals on wheels, lunch clubs, day care and telecare. Variables take value 1 if intervention received; and value 0 if not. |
| Individual budget, allocation (I) | Indicator variable taking value 1 for people who had been offered an individual budget; and value 0 for other individuals. (Note that not everyone who was allocated to this group actually *accepted* an IB, and among those who did, not everyone had received one by t=1.) |
| Direct payments (D) | Indicator variable taking value 1 if the person used direct payments; and value 0 if not. Choosing a direct payment was possible in both the individual budget and comparison arms of the trial |
| Health care services (S) | Health services used by the older person over the 6 month period prior to t=1 |
| Needs (N) | Needs-related variables assessed by the local authority or established in interview:<br>ADLs<br>Client group<br>Cognitive impairment<br>Living alone |
| Personal characteristics (Z) | Age<br>Gender<br>Ethnicity |
| Support plan (P) | Whether or not a support plan was in place at t=1; this referred only to people in the individual budget group; not everyone in this group had a support plan in place at t=1. There was no single variable to measure this factor, and so instead we took a combination of variables which indicated whether the person was purchasing support as part of the individual budget; we also considered inter-correlation with variable I. |

In the model, outcomes and costs were the so called dependent variables i.e. variables which are influenced by a range of factors, which are called independent variables. Independent variables are factors that are assumed to not be affected by other variables. The home care ‘intervention’ is the independent variable of interest and all other independent variables are covariates. As shown in Graph 1 the design of this analysis can be expressed algorithmically; q and c are the estimated regression coefficients which represent the direction and strength of relationship between the dependent variable (costs or outcomes) and the relevant covariate.

**Graph 1: Design of regression analysis**

$$Q = q_0 + q_H H + q_I I + q_D D + q_S S + q_N N + q_Z Z + q_P P$$

$$C = c_0 + c_H H + c_I I + c_D D + c_S S + c_N N + c_Z Z + c_P P$$

Statistical models were run for costs (measured over the 6-month period) and for nine outcome measures at the 6-month point (GHQ, ASCOT score and each of the seven ASCOT domains individually). Costs were modelled with a generalized linear model, while outcomes were modelled using linear regression; the reason for using different types of analysis was that the costs variable was highly skewed whereas the distributions of the outcome variables (and model residuals) were close enough to normal to allow standard linear regression. Additional analysis was conducted to explore some of the interactions between variables that were expected to impact on costs and outcomes.

Missing data are a frequent problem in cost-effectiveness analysis. Multiple imputation was used to limit the number of observations lost due to missing values. The multiple imputation approach creates several plausible data sets for missing values and combines them. Results of the data imputation are shown in Table 4. It shows the number of observations before and after imputation of missing values as well as minimum and maximum values for each variable. Missing values were imputed for five variables only. Most data were imputed for costs (N=193) for which nearly 50% were missing. This was to be expected as costs data are often missing in data sets. For outcome variables measured via the GHQ and ASCOT, 15% of data were imputed. For two covariates, cognitive impairment measured at baseline and whether the person was living alone, less than six per cent of the values were imputed. After imputation data were available for about 400 older people. Whilst multiple imputation aims to increase the validity of the results, it might not always achieve this, for example if data are not missing at random. In this analysis it was assumed that data were missing at random.

**Table 4: Summary of data pre- and post-imputation**

| Variable | Observed | | | Number imputed | After imputation | | |
|---|---|---|---|---|---|---|---|
| | N | min | max | | N | Min | max |
| Costs (C) | 209 | 2.8 | 1655.9 | 193 | 402 | 0 | 1655.9 |
| Outcomes (GHQ), total score | 346 | 1 | 36 | 58 | 404 | 0 | 36 |
| Outcomes (ASCOT), total score | 341 | 0 | 5.0 | 61 | 402 | 0 | 5.7 |
| Age (Z) | 403 | 19 | 102 | 0 | 402 | 19 | 102 |
| Gender (Z) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Ethnicity (Z) | 402 | 0 | 1 | 0 | 402 | 0 | 1 |
| Individual budget allocation (I) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Number of ADLs (t=0) | 404 | 0 | 13 | 0 | 404 | 0 | 19 |
| Number of ADLs (t=1) | 404 | 0 | 9 | 0 | 404 | 0 | 9 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cognitive impairment (t=0) | 379 | 0 | 1 | 23 | 402 | 0 | 1 |
| Cognitive impairment (t=1) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Client group (N) | 402 | 1 | 4 | 0 | 402 | 1 | 4 |
| Living alone (N) | 381 | 0 | 1 | 21 | 402 | 0 | 1 |
| Direct payment (D) | 385 | 0 | 1 | 0 | 385 | 0 | 1 |
| Personal Assistant (H) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Home care (H) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Equipment and adaptations (H) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Day care/meals (H) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |
| Support plan (P) | 404 | 0 | 1 | 0 | 404 | 0 | 1 |

Statistical significance – as indicator of the probability that a result was true and did not occur by chance – was defined as a p-value of 0.05 or smaller; associations were then explored further at a more relaxed significance level (p-value of 1 or smaller).

The goodness-of-fit of each model was assessed based on the F-test and the proportion of variation was explained with R-squared ($R^2$). The F-test is a statistical test typically used when comparing statistical models that have been fitted to a data set, in order to identify the model that best fits the population from which the data were sampled. R-squared is an indicator that measures how well the study data are replicated by the model. It measures the proportion of variability in the observed data that is explained by the model. In general, the higher the R-squared, the better the model fits the data. In this analysis R-squared values were low which is common in mental health and social care, in which outcomes are harder to predict. However, low R-squared values do not affect the interpretation of findings significant variables and thus the analysis still allows for drawing useful conclusions.

Based on the final models, an incremental cost effectiveness ratio (ICER) was calculated. This was done by first estimating the marginal effect on cost of receiving home care and then the marginal effect on outcomes of receiving home care. Total costs to 2012/13 prices using the hospital and community services pay and price index.

# 4 FINDINGS

## 4.1 Impact of the ‘intervention’ on costs

If the significance level was relaxed to p=0.1, other variables could be judged to be influential. In particular, having personal assistant services was linked to higher total costs (p=0.094) as was having a support plan in place at 6 months (p=0.082); the latter finding was likely to be at least partially explained by the additional costs of care management. This confirmed the findings from the original study in which people with allocated individual budgets were more likely to have a support plan in place and to get additional care management.
Whilst the home care variable on its own did not have a significant influence on costs, this changed when the interaction between receipt of home care and whether the

person lived alone was examined: Total costs were found to be significantly higher for those who lived with their spouse or carers and who used home care. This could indicate that spouses or carers were acting as advocates for service users and negotiated greater access to services.

**Table 5: Generalised linear model of factors associated with costs**

| Variable | Coefficient | Standard error | p-value |
|---|---|---|---|
| Age | -0.011 | 0.005 | 0.043 |
| Gender (female) | -0.019 | 0.120 | 0.876 |
| Ethnicity (White) | 0.312 | 0.220 | 0.156 |
| Individual budget, allocation | 0.245 | 0.174 | 0.163 |
| ADLs (number) | 0.024 | 0.019 | 0.228 |
| Cognitive impairment (t=0) | 0.132 | 0.171 | 0.442 |
| Cognitive impairment (t=1) | 0.089 | 0.148 | 0.546 |
| Client group | | | |
| Learning disabilities | -0.236 | 0.311 | 0.449 |
| Mental health | -0.667 | 0.585 | 0.272 |
| Sensory/physical/dementia/other | 0.647 | 1.083 | 0.551 |
| Live alone (t=0) | -0.095 | 0.127 | 0.455 |
| Personal assistant | 0.283 | 0.169 | 0.094 |
| Home care | 0.162 | 0.125 | 0.194 |
| Equipment and adaptations | 0.199 | 0.135 | 0.144 |
| Day care or meals on wheels | 0.100 | 0.137 | 0.464 |
| Support plan | -0.329 | 0.186 | 0.082 |
| Constant | 5.505 | 0.470 | 0.001 |
| N | 400 | | |
| Distributional family | Gamma | | |
| Link function | Log | | |
| (Pseudo) R-squared | 0.11 | | |

## 4.2 Impact of the ‘intervention’ on mental wellbeing (measured via GHQ)

In regards to the ‘*intervention’*, the following associations were found, in each case after controlling for other factors including personal characteristics and needs: Using home care was associated with significantly higher scores on the psychological wellbeing scale (p=0.021), implying that people using home care had higher psychological wellbeing than those with otherwise similar characteristics and needs who did not use home care. The variable ‘equipment or adaptations’ was linked to significantly lower psychological wellbeing (p=0.025) controlling for other variables including needs (measured via ADLs), which implied that people who used equipment and adaptations tended to report lower psychological wellbeing than people with otherwise similar characteristics and needs.

**Table 6: Ordinary least squares regression model of factors associated with total General Health Questionnaire score**

| Variable | Coefficient | Standard error | p-value |
|---|---|---|---|
| Age | -0.030 | 0.030 | 0.314 |
| Gender (female) | -0.212 | 0.685 | 0.757 |
| Ethnicity (White) | -1.891 | 1.363 | 0.168 |
| Individual budgets, allocation | -0.547 | 1.087 | 0.615 |
| ADLs (t=0) | -0.016 | 0.125 | 0.900 |
| ADLs (t=1) | 0.277 | 0.163 | 0.091 |
| Cognitive impairment (t=0) | 1.517 | 0.825 | 0.067 |
| Cognitive impairment (t=1) | 1.134 | 0.862 | 0.189 |
| Client group | | | |
| Learning disabilities | -6.609 | 1.646 | 0.001 |
| Mental health | 2.163 | 2.344 | 0.357 |
| Sensory/physical/vulnerable | -1.877 | 6.377 | 0.769 |
| Live alone (t=0) | 0.148 | 0.779 | 0.849 |
| Direct Payment | 0.242 | 1.170 | 0.836 |
| Individual Budget (t=1) | -0.084 | 1.176 | 0.943 |
| Personal assistant | -0.805 | 1.015 | 0.428 |
| Home care | -2.172 | 0.938 | 0.021 |
| Equipment and adaptations | 1.635 | 0.728 | 0.025 |
| Day care or meals on wheels | 0.504 | 0.776 | 0.516 |
| Support plan | 0.786 | 1.131 | 0.488 |
| Home care * Support plan | 2.374 | 1.518 | 0.119 |
| Constant | 16.990 | 2.705 | 0.001 |
| N | 381 | | |
| F test | 0.0001 | | |
| R-squared | 0.16 | | |

## 4.3 Impact of the ‘intervention’ on social care-related quality of life (measured via ASCOT)

### 4.3.1 Overall ASCOT score

People with cognitive impairment at follow-up were significantly more likely to report worse overall social care-related quality of life (p=0.027) than people who were otherwise similar. No other variables had a significant influence on the overall ASCOT score based on p-value of less than 0.05. When looking at relationships with higher p-values of between 0.05 to 0.1, people using home care had significantly higher unmet needs in terms of overall social care-related quality of life than their otherwise equal counterparts (p=0.058). Individuals using equipment and adaptations had significantly lower scores on the overall ASCOT, indicating higher unmet needs (p=0.097). Full details of findings of the regression analysis are shown in Table 7. Because findings on the impact of the home care on social care-related quality of life were mixed and not robust enough, it was not possible to construct an ICER on the ASCOT.

**Table 7: Ordinary least squares regression model of factors associated with total ASCOT score**

| Variable | Coefficient | Standard error | p-value |
|---|---|---|---|
| Costs | 0.000 | 0.000 | 0.991 |
| Age | -0.004 | 0.003 | 0.164 |
| Gender (female) | 0.048 | 0.091 | 0.598 |
| Ethnicity (White) | 0.385 | 0.162 | 0.018 |
| Individual budget, allocation | -0.024 | 0.139 | 0.863 |
| ADLs (t=0) | -0.021 | 0.014 | 0.119 |
| Cognitive impairment (t=0) | -0.052 | 0.106 | 0.622 |
| Cognitive impairment (t=1) | -0.248 | 0.111 | 0.027 |
| Live alone (t=0) | -0.110 | 0.098 | 0.267 |
| Direct Payment | -0.001 | 0.154 | 0.994 |
| Individual Budget (t=1) | -0.120 | 0.155 | 0.440 |
| Personal assistant | -0.076 | 0.134 | 0.572 |
| Home care | -0.222 | 0.117 | 0.058 |
| Equipment and adaptations | -0.156 | 0.093 | 0.097 |
| Day care or meals on wheels | -0.077 | 0.103 | 0.457 |
| Support plan | -0.095 | 0.155 | 0.543 |
| Home care * support plan | 0.196 | 0.197 | 0.321 |
| Constant | 4.153 | 0.273 | 0.001 |
| N | 383 | | |
| F test p-value | 0.0086 | | |
| R-squared | 0.09 | | |

### 4.3.2 Individual domains of ASCOT

For individual domains of the ASCOT scale the following associations were identified in regards to the *'intervention*':

- Participants using home care were more likely to feel in 'control over (their) daily lives' (p=0.01), and less likely to feel their 'accommodation cleanliness and comfort' needs were met (p=0.013); at the same time they were more likely to report higher unmet needs in terms of 'social participation and involvement' (p=0.081) although this was only significant at the relaxed cut off of p between 0.05 and 0.1.

- Individuals using personal assistant services were significantly more likely to report higher unmet 'meals and nutrition' needs (p=0.014); and people moving from home care to personal assistant services were significantly more likely to report that they felt less safe (p=0.018) although this referred to a very small group (less than 10 people) so that findings need to be interpreted with caution.

- People who used equipment and adaptations were significantly more likely to report that they felt less safe (p=0.026); those who used home care as well as equipment and adaptations were more likely to report unmet 'meals and nutrition' (p=0.004); this could be, for example, because the time in which home care was provided was spent addressing needs that related to the equipment or adaptations.

- Individuals who used direct payments reported significantly higher unmet 'accommodation cleanliness and comfort' needs (p=0.01).

In terms of social care-related quality of life (measured via the ASCOT), individuals using home care seemed to have reduced unmet needs in some domains and increased unmet needs in other domains.

### 4.4 Impact of 'intervention' on cost-effectiveness

The marginal cost of receiving home care was estimated as £95. That is, total health and social care costs were £95 greater for those using home care compared with those who did not use home care, after controlling for other factors. This cost relates to the 6-month period over which costs (and outcomes) were measured, and are valued at 2007/08 prices. The value in 2012/13 prices was £107[1]. Receipt of home care was associated with a 2.1 point difference in score on the GHQ scale i.e. people using home care had on average a 2.1 point higher score than people who did not use home care controlling for all other factors, which reflects a 6% difference on the overall scale. The estimated incremental cost effectiveness ratio (ICER) for GHQ (i.e. cost per unit changes measured on the mean GHQ score) was 45, which means that it was costing £45 (equivalent to £51 in 2012/13 prices) to achieve an additional one-point difference in psychological wellbeing[2].

The ICER for home care on the overall ASCOT score was not calculated as these findings were less robust.

### 4.5 Impact of other variables on costs and mental wellbeing

Some personal characteristics influenced the relationship on costs and outcomes.

- Age was found to have a significant inverse relationship with costs (p=0.043), indicating that the costs of care packages decreased with age. This is consistent with findings from the original study which showed that older people tended to receive fewer services compared to other client groups indicating that this group might be underserved (Jones *et al.,* 2012, Appendix C.1). This applied to home care as well as other health and social care services.

- People with learning disabilities reported significantly higher psychological wellbeing (p<0.001). It was unlikely that this was because the reporting was done on behalf of service users by carers or family members (who tend to overestimate outcomes) as only 7 per cent of responses for people with learning disabilities were proxy responses on their behalf.  No other variables were significantly linked to psychological wellbeing when p of 0.05 was used as the cut-off.

- People with cognitive impairment assessed at baseline were more likely to report worse psychological wellbeing (p=0.067) although this reached significance only at a relaxed threshold for p.

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[1] Calculation was based on the Hospital and community health services (HCHS) Pay and prices index

[2] The cost per unit change was based on the regression models which allow for an estimate of change at the mean but do not allow for identifying point of diminishing returns.

- A higher number of ADLs as reported by older people at follow-up appeared to be linked to lower psychological wellbeing scores (p=0.091); ADLs assessed by the local authority at baseline did not impact on this outcome so that the relationship between ADLs and psychological wellbeing could not be confirmed.

- Individuals living alone reported significantly more unmet needs in the ASCOT domains 'personal care/comfort' (p=0.005) and social participation and involvement (p=0.032).

- Individuals assessed by the council with cognitive impairment at baseline (t=0) were significantly more likely to report feeling less in control over daily life (p<0.001) whilst those with (self-) reported cognitive impairment at follow-up were significantly more likely to have higher unmet needs in terms of occupational activities (p=0.006).

The results showed that certain sub-groups of older people – in particular those with cognitive impairment and those living alone – were less likely to benefit from the care package. They reported worse psychological wellbeing and/or higher unmet needs in regards to the social care package they used in their homes (including home care) than people with otherwise similar characteristics and needs. Older people were found to be an underserved group of recipients of home care as well as other public services.

# 5 DISCUSSION

## 5.1 Strengths and limitations

Some of the findings of the analysis are not easy to interpret in the context of a cost-effective care package and care management approach, partly because of how data had been collected. For example, outcomes were only assessed at one point in time; and cost and needs data collected from a variety of different sources. Those data restrictions are typical in the field of social care which deals with vulnerable populations and complex interventions. The choice for this data set was made in the absence of a robust study that investigated the cost-effectiveness of different approaches to home care. The data used for this analysis had the advantage that they covered detailed information about costs and outcomes of older people using home care and other support services. Using those data allowed generating findings on the cost-effectiveness of the delivery of home care in a naturalistic context that included other service provision whilst at the same time ensuring that the sample was representative of the English population. Positively, the study captured a wide range of covariates and thus increased the likelihood that results were accurate.

Two particular limitations were inherited in the data: Most results did not reach the stricter significance level of 1.0 and for the interpretation of the results it was thus decided to relax the significance level. This was appropriate given the modest sample size and exploratory nature of the analysis but also made it more difficult to derive recommendations. Secondly, because findings on the impact of the home care on social care-related quality of life (measured via the ASCOT) were mixed and not robust enough, it was not possible to construct an ICER on the ASCOT. This, again, made it more difficult to derive meaningful recommendation for the guideline.

## 5.2 Conclusions

The results of the analysis suggest that among the different components that were part of a wider home care package - such as personal assistant services, telecare, care management and meals on wheels – the home care component had a significant effect on costs and a range of outcomes for older people (controlling for all other factors). In particular, older people using home care were more likely to have higher psychological wellbeing scores at a relatively low cost per unit increase.

In terms of social care-related quality of life (measured via the ASCOT), findings were more difficult to interpret as older people using home care seemed to have lower unmet needs in some domains and higher unmet needs in other domains when compared to older people not using home care (controlling for all other factors). Those findings need to be interpreted in the context of a service that – at least when publicly funded – is often focused on meeting the most pressing and substantial needs of a group of people who might potentially have a relatively low capacity to benefit. In this situation and particularly under budget constraints, the primary aim of social care (and particularly home care) might arguably be to prevent the exacerbation of ill-health rather than meeting a comprehensive set of social care needs.

In addition, the findings suggest that commissioners and providers of home care need to ensure that certain sub-groups of older people are getting the support they need in order to achieve the same outcomes than their otherwise equal counterparts. This includes in particular people with cognitive impairment and those living alone – were more likely to report worse psychological wellbeing and/or higher unmet needs in regards to the social care package they used in their homes (including home care) than people with otherwise similar characteristics and needs.

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