

# DRAFT FOR CONSULTATION

## Appendix C3

**Guideline topic:** Transition between inpatient hospital settings and community or care settings for adults with social care needs (Trans HHCH)

**Economic priority area:** Assessment and care planning at admission to inpatient hospital settings from community or care home settings

**Review questions:** 5. How do different approaches to care planning and assessment affect the process of admission to inpatient hospital settings from community or care home settings?

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

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### Abbreviations

CI	Confidence interval
LSE	London School of Economics and Political Science
NCCSC	NICE Collaborating Centre for Social Care
OR	Odds ratio
P	P-value
PSSRU	Personal Social Services Research Unit
RR	Relative risk
SMD	Standardised mean difference

# 1 BACKGROUND

## 1.1 Economic work as part of guideline development

This report was produced for the NCCSC guideline *Transition between inpatient hospital settings and community care or care home settings for adults with social care needs*. 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. The review of economic evidence is presented in the long version of the guideline, which also demonstrates how it has been use to inform the review questions identified in the scope and the recommendations drawn from it by the Guideline Committee.

Additional economic analysis is carried out in areas where 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 results and where a recommendation is likely to result in considerable changes in social care outcomes or cost.

## 1.2 Economic analysis for this guideline

It was decided that additional economic analysis would be carried out for review question 5 because it had important economic implications and an area for which relevant economic evidence was identified. Additional analysis was thought to be able to address the gaps in knowledge about cost-effectiveness.

*How do different approaches to care planning and assessment affect the process of admission to inpatient hospital settings from community or care home settings?*

For the other areas covered by the scope, there was either sufficient economic evidence to answer the review question<sup>1</sup> and additional economic analysis was not considered able to add value; or there was a lack of economic evidence and additional analysis was not considered feasible<sup>2</sup>.

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<sup>1</sup> This was the case for review questions 6, 7 and 9.

<sup>2</sup> This was the case for review questions 1 to 4, 8 and 10.

1 An exception to this was review question 11 which looked at support for  
2 families and unpaid carers during admission to or discharge from hospital.  
3 Two good quality studies were identified, which evaluated the costs and  
4 outcomes of a specific training intervention for carers of people with stroke at  
5 hospital discharge (Patel et al 2004; Forster et al 2013). Findings of a more  
6 recent larger trial did not suggest that this particular intervention was cost-  
7 effective. The authors concluded that a different type of intervention might be  
8 more appropriate, one which supported carers in a more comprehensive  
9 manner and in the community. It was also likely that practice had improved  
10 and that the comparison group was receiving appropriate support in a less  
11 formalised way. Based on the findings the Guideline Committee decided that  
12 this type of intervention was not sufficiently relevant to carry out further  
13 analysis.

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15 Detail on the economic evidence that was identified for each review question  
16 and economic considerations is provided in the long guideline.

### 19 **1.3 Evidence review for this economic analysis**

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21 The review of the literature for review question 5 identified two studies that  
22 met the inclusion criteria. Both were meta-analyses (combined with  
23 systematic reviews) which found that comprehensive geriatric assessment  
24 and care provided in hospital led to a reduction in the risk of care home  
25 admission (Ellis et al 2011) and in the length of the initial hospital stay (Fox et  
26 al 2012). In addition, comprehensive geriatric assessment and care led to  
27 improvements to individuals' health, measured in reduced deterioration (Ellis  
28 et al 2011)<sup>3</sup>, improved cognitive function<sup>4</sup>, fewer falls (Fox et al 2012)<sup>5</sup>, less  
29 delirium<sup>6</sup> and less functional decline<sup>7</sup>.

30  
31 Comprehensive geriatric assessment and care referred to the provision of  
32 specialist care in a unit for older people above 65 years who were admitted to  
33 hospital on an emergency basis. Usual care involved the admission to a  
34 general medical ward under non-specialist care.

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36 During the critical appraisal process, both studies were assessed as being of  
37 good quality, although as economic studies they both had limitations.  
38 Although the Ellis study specifically included economic evaluations, it's values  
39 were unable to be synthesised, since studies varied highly in terms of the

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3 OR=0.76; P=0.001

4 SMD 0.08, P=0.02

5 RR=0.51, 95% CI=0.29-0.88

6 RR=0.73, 95% CI=0.61-0.88

7 RR = 0.87, 95% CI

1 types of costs they collected and the level of detail that they reported. Fox et  
2 al (2012) only evaluated service use outcomes and not costs. Both studies  
3 had limitations because they referred mainly to evidence from the US and the  
4 reviewed studies did not measure the wider impact on community health and  
5 social care. In addition, the impact on unpaid care was not reflected. A full list  
6 of information that was extracted from those studies in addition to the critical  
7 appraisal can be found in the economic evidence table and methods  
8 checklists in Appendix C1 of the guideline.

## 11 **2 AIMS**

13 The aim of the additional economic analysis was to examine review question  
14 5 of the guideline. Based on the identified economic evidence this was  
15 narrowed down to comprehensive geriatric assessment and care.

17 The question subject to additional analysis was:

19 *“Is hospital based comprehensive geriatric assessment and care likely to be  
20 cost-effective or -saving in the context of the English care system?”*

22 Comprehensive geriatric assessment and care referred to specialist unit  
23 provision in hospital. The comparison involved the admission to a general  
24 medical ward under non-specialist care. Members of the Guideline Committee  
25 agreed that both the intervention and usual care were applicable and of high  
26 relevance to the English care system.

28 The population was older people of 65 years and above who had been  
29 admitted to hospital on an emergency basis.

31 Since the economic evidence review showed that the intervention was likely  
32 to lead to improved individual outcomes (but those has not been measured on  
33 a standardised scale), the economic question was focused on whether  
34 improved outcomes were likely to lead to cost savings, based on the two main  
35 service use outcomes measured in those identified studies.

### 3 GENERAL APPROACH

The analysis was carried out with one-way sensitivity analysis in Microsoft Excel 2010 (function: data table) and involved the following steps:

- Relative effect sizes for service use outcomes were transformed into absolute effect sizes applicable to the UK context;
- Expected cost savings linked to those effects on service use outcomes were estimated; this primarily involved attaching appropriate unit cost information to the change in units of service use outcomes;
- Thresholds were examined by comparing potential cost savings against the average costs of community health and social care for older people similar to the population examined;
- Those thresholds were examined also if cost estimates for unpaid care were included i.e. the likely average cost of unpaid care provided for older people similar to the population examined

The main step was the threshold analysis, but in order to perform the analysis some steps needed to be carried out first. Threshold analysis was considered the most appropriate method as it was able to estimate how much the costs of community services – as the largest unknown cost - could increase, before potential cost savings linked to the identified reductions in hospital length of stay and residential care admission would be zero and turn from savings into expenditure. Together with information about the average costs of community care services used by older people, this analysis could then provide some helpful indication of whether comprehensive geriatric assessment and care was likely to be cost-effective.

The steps are explained with additional detail below and presented together with the results of each step.

### 4 DETAILED METHOD & FINDINGS

#### 4.1 Estimating costs: care home admission and hospital

First, the relative effect sizes for the two service use outcomes - admission to a care home and hospital length of stay - as available from the two meta-

1 analyses needed to be applied to appropriate baseline probabilities<sup>8</sup>. This  
2 step generated absolute effect sizes applicable to the English care system.

3  
4 A meta-analysis uses statistical methods to identify and combine shared  
5 patterns in the results of different studies that evaluate the same type of  
6 intervention. Meta-analysis produces a weighted average of the included  
7 study results that can be generalised to other populations. In the two meta-  
8 analyses used for the analyses effect sizes were expressed as relative  
9 measures which meant they measured the change in outcomes between the  
10 intervention and comparison groups proportionally to one another.

11  
12 For the purpose of this analysis, those relative measures needed to be  
13 transformed to absolute effects applicable to the context of the English care  
14 system. The system of residential care and hospital provision are different in  
15 the US than in the UK, therefore it could not be assumed that the absolute  
16 effect size was the same. For example, the point at which an older person  
17 gets admitted to a residential care home and the length of hospital stay will be  
18 different. For this reason it was necessary to apply the relative effect (between  
19 intervention and comparison) to the expected baseline probability of care  
20 home admission and hospital length based on English data.

#### 21 22 23 **4.1.1 Care home costs**

24  
25 Ellis et al (2011) measured the relative effect of the intervention on *admission*  
26 *to care home* in form of odds ratios<sup>9</sup>. The mean odds ratio from the meta-  
27 analysis by Ellis et al (2011) for a reduction in admission to residential care  
28 was 0.73 ( $p < 0.001$ ).

29  
30 In order to transform the odds ratio in the Ellis study to the English context, a  
31 suitable baseline probability needed to be identified. During the economic  
32 review two English-based studies were identified which were considered  
33 suitable to provide such estimates. They evaluated interventions provided to a  
34 similar population of older people admitted to and discharged from hospital  
35 over a 12 month period, and collected data on care home admission rates.  
36 Because the baseline probability needed to refer to a probability of care home  
37 admission without a particular intervention taking place, the rates found in the  
38 comparison groups of those studies were taken.

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8 This referred to the expected probability of an event under provision of usual care i.e. without the occurrence of a particular intervention.

9 The odds ratio is a statistical measure which quantifies the strength of association between the exposure (here: to the intervention) and the outcome (here: residential care home admission).

1 Using a standard formula<sup>10</sup> the rates in the studies were converted into annual  
2 probabilities and a midpoint probability of 20.1% was derived. This probability  
3 was transformed into odds<sup>11</sup> so that it could be multiplied with the odds ratio  
4 from the Ellis study. The absolute difference in risk measured in percentage  
5 points could then be calculated<sup>12</sup>. A reduction by half was applied to the  
6 annual risk assuming that the event of care home admission happened half  
7 way through the year. This resulted in a risk difference of 3.4pp which was  
8 used the value used for the threshold analysis.

9  
10 Next, unit costs of care home stays were applied. Personal Social Services  
11 data for England showed that average unit cost for residential care and  
12 nursing care on supporting older people was £538 per week in 2013/14  
13 (Health and Social Care Information Centre 2014).

14  
15 The expected average reduction in expenditure for a reduced risk in  
16 admission to a care home associated with the intervention was £951.

#### 17 18 19 **4.1.2 Hospital costs**<sup>13</sup>

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21 For studies that also evaluated hospital costs, Ellis et al (2011) reported that  
22 the majority of studies that evaluated hospital costs found lower costs in the  
23 intervention group and that was linked to a reduction in the index hospital  
24 length of stay. In their review, out of nine trials that measured costs only two  
25 trials reported greater costs in the treatment group. Similarly, the review by  
26 Fox et al (2012) found a reduction in length of hospital stay although this did  
27 not reach statistical significance.

28  
29 In Fox et al (2012), the weighted mean difference was just above half a day (-  
30 0.61; 95% CI = -1.16 to -0.05). This finding needed to be interpreted with  
31 greater caution as it did not reach significance. And - although this is highly  
32 dependent on the type of hospital - lengths of stay can be longer in the US.  
33 So for the analysis it was assumed that this figure was reduced by 50 per  
34 cent. A unit cost of £275 was applied taking the average costs of an excess  
35 bed day from NHS Reference costs 2013/14.

36  
37 The expected average reduction in expenditure for reduction in hospital length  
38 of stay associated with the intervention was £84.

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<sup>10</sup> probability= 1-EXP (-rate); e.g. Welton et al 2012, p51

<sup>11</sup> odds= probability/ (1-probability)

<sup>12</sup> odds x odds ratio - odds

<sup>13</sup> This referred to total hospital costs including the costs of the intervention.

1 The reduced length of stay in hospital meant that the person was an  
2 equivalent amount of time using community services and the additional costs  
3 of community services were considered in the threshold analysis (4.3).

#### 7 **4.2 Estimating the costs of unpaid care**

9 Although reductions in the use of residential care can lead to cost-savings for  
10 the public purse, supporting people for longer in the community often  
11 increases the inputs by informal ('unpaid') carers. Unpaid care is typically  
12 valued using either the replacement cost approach, which assigns the unit  
13 cost of a professional carer, or the opportunity cost approach, which assigns a  
14 costs for the value of activity forgone by caring for someone (such as  
15 employment or leisure).

17 The most accurate and recent UK unit cost estimates for unpaid care were  
18 found to be the ones produced by Prince et al (2014). It referred to people  
19 with dementia. Values related to carers of people with mild dementia were  
20 likely to be applicable to the population in our study of older people with  
21 geriatric needs including dementia. Positively, the study by Prince et al (2014)  
22 adopted both of the two approaches (opportunity and replacement cost  
23 approach). Furthermore, estimates were based on information about the types  
24 of activities that were provided by carers and included data of both, co-  
25 resident and non-co-resident, carers. The study used a wide range of  
26 information about carer characteristics and circumstances. Estimates for  
27 hours of unpaid care came from questions about time that carers reported  
28 they spent on caring or – in case of co-resident carers – time they could  
29 spend away from the person they cared for.

31 The expected estimates based on this source for the annual costs of unpaid  
32 care for older people with dementia were £19,714 (which referred to a person  
33 cared for in the community) and £1,067 (which referred to a person cared for  
34 a care home). The cost difference between the two values was £18,647.

36 The potential changes in the costs of unpaid care linked to comprehensive  
37 geriatric assessment and care were then estimated by applying the previously  
38 calculated reduced risk of admission to residential care of 3.4pp to the  
39 difference in annual costs for a person living at home versus in residential  
40 care. As before, it was assumed that the admission to residential care  
41 happened half way through the year and this was reflected in the adjusted risk  
42 difference.



1 The expected average increase in expenditure for an increase in unpaid care  
2 provision associated with the intervention was £634.

### 6 4.3 Threshold values

8 For the threshold analysis the following equations for total cost (savings)  
9 linked to comprehensive geriatric assessment and care were used.

$$12 C_{T\ PS} = RD_{Res} * (-C_{Res} + C_{HSC}) + WMD_{Hosp\ LOS} * (-C_{Hosp} + C_{HSC})$$

$$15 C_{T\ S} = RD_{Res} * (-C_{Res} + C_{HSC}) + RD_{Res} * (C_{UC\ Res} - C_{UC\ Com}) + WMD_{Hosp\ LOS} * \\ 16 (-C_{Hosp} + C_{HSC})$$

19  $C_{T\ PS}$  Total costs from a public sector perspective

20  $C_{T\ S}$  Total costs from a societal perspective

21  $RD_{Res}$  Risk difference reduction in residential care linked to intervention

22  $C_{Res}$  Costs of residential care

23  $C_{HSC}$  Costs of community health and care

24  $C_{UC\ Res}$  Costs of unpaid care per person cared for in residential care

25  $C_{UC\ Com}$  Costs of unpaid care per person cared for in the community

26  $WMD_{Hosp\ LOS}$  Weighted mean difference hospital length of stay

27  $C_{Hosp}$  Costs of hospital

28  $C_{HSC}$  Costs of community based health and social care

31 The first equation reflected the costs of health and social care from a public  
32 sector perspective. The second equation additionally included the costs of  
33 unpaid care reflecting a wider, societal perspective.

36 In threshold analysis the impact of different values for the unknown costs of  
37 community based health and social care was explored. Costs currently not  
38 captured in the model could increase about £30,000 before the net effect was  
39 negative i.e. being linked to additional expenditure. If the model included  
40 unpaid care then the respective value was about £12,000.

42 The unit costs that informed the analysis are shown in Table 1.

1 Table 1: Unit costs used in the analysis in 2013/14 prices

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Service	Price and unit	Description and source
Care home	£538 per week	Personal Social Services data for England, Health and Social Care Information Centre (2014)
Hospital	£275 per day	Costs of an excess bed day, NHS Reference costs 2013/14
Unpaid care – For a person being cared for at home – For a person being cared for in a care home	£19,714 per year  £1,067 per year	Prince et al 2014; estimates referred to people with different severities of dementia; for this analysis values for people with mild dementia were taken

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## 1 **5 DISCUSSION**

### 3 **5.1 Summary and interpretation of findings**

5 The analysis indicated that comprehensive geriatric assessment and care  
6 provided in hospital achieved some potential reductions in the costs of care  
7 home (£951) and to a much lesser extent hospital costs (£84) over the period  
8 of the year. At the same time there were additional costs of unpaid care linked  
9 to the intervention of £634.

11 In order to derive conclusions about the likelihood that comprehensive  
12 geriatric assessment and care provided in hospital was likely to be offsetting  
13 costs and thus be cost-effective, an estimate was needed for any potential  
14 additional costs not incorporated in the analysis. This referred primarily to the  
15 impact on the use of community based health and social care.

17 A suitable source that provided expected costs of community care for this  
18 population was Glendinning et al 2008. This study evaluated in detail– among  
19 other service use – the health and social care use of 518 older people living in  
20 the community and presented costs in 2007/08 prices. Table 2 presents the  
21 unit costs of community health and social care from this source uprated to  
22 2013/14 prices with the Hospital and Community Health Services Price  
23 (HCHS) index and the Personal Social Services (PSS) for adult services price  
24 index. The total expected costs for community based health and social care  
25 were £11,658 per year. This was 2.5 fold the potential savings estimated from  
26 a public sector perspective. From a societal perspective (including unpaid  
27 care), the costs for community based health and social care could be slightly  
28 above the ones expected without that total costs increased.

30 Based on this analysis comprehensive geriatric assessment and care was  
31 likely to lead to cost savings from a public sector perspective. Although less  
32 certain, costs were likely to be offset from a wider societal perspective. In  
33 addition, comprehensive geriatric assessment and care was found by the two  
34 meta-analyses identified in the review to have a range of individuals' health  
35 benefits. The intervention was thus likely to be cost-effective.

1 Table 2: Cost of community health and social care for older people, derived from  
 2 Glendinning et al 2008, in 2013/14 prices

	Per week	Per year
<b>HEALTH CARE</b>		
Average inpatient stay	57.6	2997.7
Day hospital	15.8	822.9
Nurse	40.7	2116.0
Therapist	2.3	117.6
GP	5.7	293.9
A&E	0.5	23.5
Chiropodist	1.1	58.8
Total (health care)	49.7	2586.2
<b>SOCIAL CARE</b>		
Home care	76.8	3992.9
Meals service	2.1	109.5
Personal assistant	51.7	2688.8
Supporting people	1.1	54.8
Integrated community equipment	29.0	1508.5
Social worker/care manager	13.8	717.5
Total (social care)		
<b>TOTAL (health and social care)</b>	<b>224.2</b>	<b>11658</b>

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 5  
 6 **5.2 Limitations and challenges**

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 8 The analysis had a number of limitations and was based on a number of  
 9 assumptions. It was a simple threshold analysis carried out based on limited  
 10 data available from the literature. Information of resource use linked to the  
 11 intervention and usual care applicable to the UK was not directly available  
 12 from the literature. Instead the analysis took synthesised data on the relative  
 13 effects of the intervention on service use based on two high quality meta-  
 14 analyses. Effects were those on hospital costs and care home admission.  
 15 Studies did not report on the costs of the interventions separately. However,  
 16 they were presented as part of total hospital costs which were found to be  
 17 lower in the intervention group. This was considered in the form of a small  
 18 reduction in hospital length of stay. Assumptions were also made regarding  
 19 the costs of unpaid care, which were not included as part of the studies  
 20 reviewed in the two meta-analyses. They were taken from a separate source  
 21 and referred to people with mild dementia. The source was considered high  
 22 quality and the population was considered to have similar needs in regards to  
 23 informal or unpaid care than the population in this study.

1 **5.3. How findings informed guideline recommendations**

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The Guideline Committee used the findings of this report to develop and strengthen a number of recommendations on the provision of care for older people specified in Section 3.8 of the guideline, in particular:

*“1.3.10 Start a comprehensive geriatric assessment of older people with complex needs at the point of admission and preferably in a specialist unit.”*

*“1.4.4 Provide care for older people with complex needs in a specialist, geriatrician-led unit or on a specialist geriatrician-led ward.”*

Furthermore, informed by this analysis a research recommendation was derived for this economic priority area. It identified the need to further cost-effectiveness evidence of the different models of comprehensive geriatric assessment and care. The research recommendation is outlined with detail on background and methodology in Section 2.4 of the long guideline.

## 1 REFERENCES

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