Assessment and support of caregivers for preventing depression in caregivers

Matrix Insight, in collaboration with Imperial College London, Kings College London and Bazian Ltd, were commissioned by Health England to undertake a research study to develop and apply a method for prioritising investments in preventative interventions for England. Seventeen preventative health interventions were included in the study. Each intervention was evaluated in terms of the following criteria: reach; inequality score; cost-effectiveness; and affordability. This report presents the results of the analysis for one of the interventions: assessment and support of caregivers for preventing depression in caregivers. The full report of the study is available from the *H.E.L.P.* website.

Summary

Description of the intervention
A full year of day care support (2 days per week) for caregivers to reduce symptoms of depression compared to no day care support (Zarit, 1998) in a UK setting.

Criteria	Measure	Value	Certainty
1. Reach			
Percentage of population affected by the condition and that could potentially benefit from the intervention.	Depressed carers as a percentage of the population aged 15 and above in England (Keeley and Clarke, 2003; NICE, 2006; Secta, 2004).	3.25%	★★
2. Inequality score			
Ratio of the percentage of disadvantaged population to the percentage of the general population that could potentially benefit from the intervention.	Assumption	1	★
3. Cost-effectiveness			
Cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	£35,359	★★
Net cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	£35,264	★★
Timing of benefits	QALY gain and cost savings are estimated to occur in the short-run (between 1 and 5 years after the intervention).		
4. Affordability			
Total cost of implementing the intervention, as a percentage of the public health budget.	Multiple of eligible individuals and unit cost of the intervention	Over £1 billion	★★

Key to certainty grading scales

★   Low quality evidence
★★   Medium quality evidence
★★★   High quality evidence

Box 1. Cost per QALY gained

A quality adjusted life year (QALY) is a simple way of combining quality of life with length of life.
One QALY is equivalent to one year in full health. The cost per QALY gained is therefore the cost of achieving one extra year of full health. Its calculation is based on the following formula:

$$cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention}{QALYs\ gained}$$

The net cost per QALY gained is the cost per QALY considering the incremental cost of the intervention as well as the cost saved through health treatment avoided. Its calculation is based on the following formula:

$$net\ cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention - cost\ savings}{QALYs\ gained}$$

Cost effectiveness

Cost. A full year of day care support (2 days per week) for caregivers costs £6,670 per person (£2007/08) compared to no day care support.

Effect. Compared to no day care support, a full year of day care support decreases the percentage of caregivers with depression from 50 per cent to 36 per cent. This effect was obtained from a review undertaken to identify evidence on the effectiveness and cost-effectiveness of assessment and support of caregivers to prevent depression.

Benefits. The benefits of the intervention derive from decreased levels of depression in caregivers. Two types of benefits are considered: QALYs and health care cost savings. Based on the QALYs gained and the health care cost savings of reducing the probability of having depression, a decrease in the percentage of caregivers with depression from 50 per cent to 36 per cent is associated with the following benefits:

- An additional 0.19 QALYs per person
- Cost savings of £18 per person (£2007/08)

Please refer to decision model for details on how the QALY gain and cost savings were calculated.

Decision model

A decision model was built to estimate the cost-effectiveness of the intervention. The model estimates the QALY gain and cost savings associated with the intervention. Figure 1 illustrates the structure of the model, which is based on the following:

- Individuals receiving the intervention are caregivers of adults with dementia.
- The effect of the intervention is given by a change in the probability of a caregiver having depression.
- Future healthcare costs when depression persists are assumed to involve psychological therapies or guided self-help that is initiated at a primary care level.
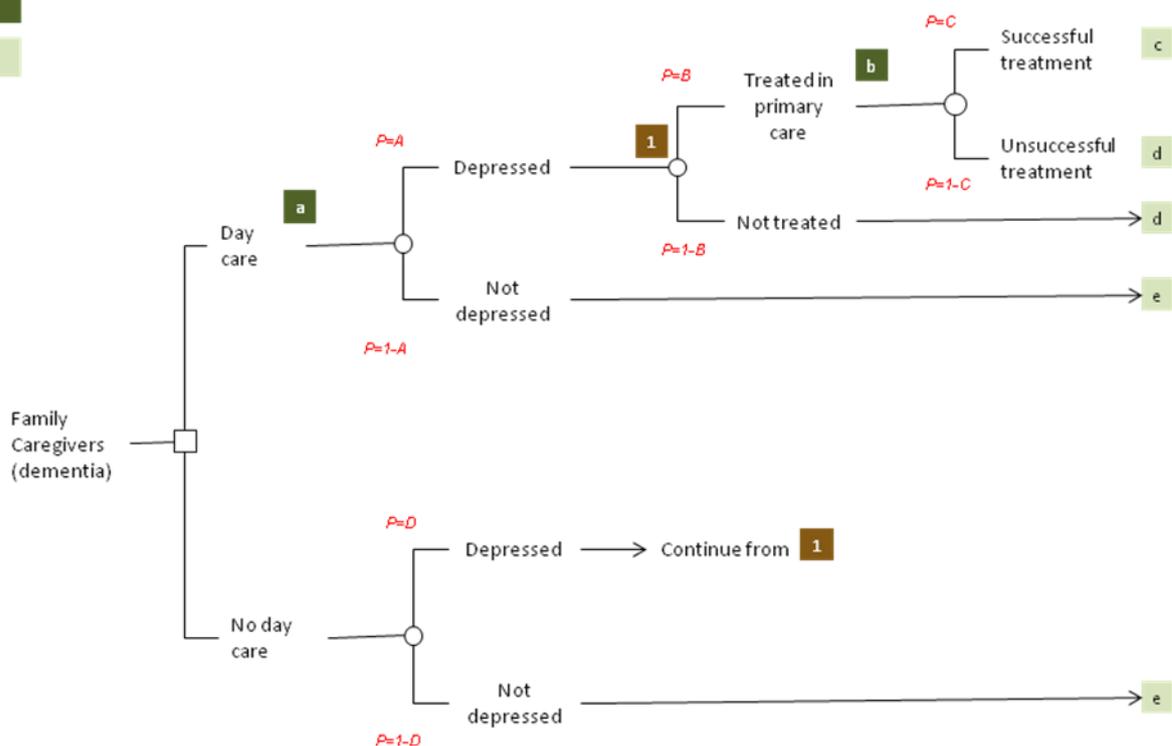
Figure 1. Day care model

References:

P=Probability of event

Cost

QALY

The model draws the following estimates from the literature:

- The unit cost of the intervention (Table 1).
- The effect of the intervention on caregivers' depression (Table 1).
- The probabilities that those who are depressed receive treatment (Table 2)
- The impact of depression on health care treatment costs (Table 3)
- The impact of depression on quality of life, measured in QALYs (Table 3)

Table 1. Intervention costs and effects (monetary values in £2007/08)

Ref	Description	Value	Calculation and source
a	Cost of intervention	£6,670	Based on use of day care services at least 2 days a week over a full year (Zarit, 1998). Daily costs for the provision of day care for people with mental health problems by an NHS Trust were taken from PSSRU unit costs (Curtis, 2008 - £65 per day).
A	P (depression if receiving day care)	0.36	Derived from the effectiveness data reported by Zarit (1998) - See evidence review. Participants that received day care had a mean of 12.8 and Standard Deviation (SD) of 9 on the Center for Epidemiologic Studies Depression Scale (CES-D). A cut-off point of 16 on the CES-D was used to indicate depression, as first suggested by Radloff (1977). Assuming that the scores on the scale were normally distributed, it was calculated that 36% of this sample would have had a score greater than 16.
D	P (depression if not receiving day care)	0.50	Derived from the effectiveness data reported by Zarit (1998) - See evidence review. Participants that did not receive day care had a mean of 16.1 and SD of 9 on the CES-D. Assuming that the scores on the scale were normally distributed, it was calculated that 50% of this sample would have had a score greater than 16.

Table 2. Transition probabilities

Ref	Description	Value	Calculation and source
B	P(depression is treated)	0.28	It is assumed that treatment is initiated following detection in primary care only[1]. NICE (2004) estimated that in standard primary care practice 75% of those with depression will attend, and depression will only be identified in 50% of those attending. NICE (2006) also suggest that only 75% of carers given the choice of therapy will take up the offer. The probability of depression being treated in primary care = 0.75*0.50*0.75 = 0.28
C	P(treatment is successful - remission with no relapse)	0.19	The proportion of caregivers with different severities of major depression were taken from the costing of dementia report (NICE, 2006): Mild - 36%; Moderate - 43%; and Severe - 21% In line with NICE (2006) it was taken that those caregivers with mild depression receive self-help (50%) or short-term psychotherapy (50%), and those with moderate/severe depression receive CBT. Data on the effectiveness of the interventions were extracted from estimates in the depression guidelines supplied by NICE (2004). Guided self-help was assumed to lead to recovery in 20% of cases of mild depression, short-term psychotherapy was assumed to also lead to 20% recovery. Event probabilities for CBT were taken from the meta-analyses of the available clinical evidence used for the depression guidelines as reported in Simon et al (2006). In line with the suggestion of Simon et al (2006) it is assumed that CBT has the same effectiveness as a course of pharmacotherapy (probability of remission = 0.43, probability of no relapse = 0.45). It was therefore assumed that CBT lead to recovery in 19% of cases (=0.43*0.45).

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[1] The need for treatment may be identified outside of primary care services however data was not available to accurately model this.

Table 3. Associated outcomes[2] (monetary values in £2007/08)

Ref	Outcome	Value	Calculation and source
All treatment costs were based on the costing guidelines for dementia provided by NICE (2006) and were updated with new hourly unit costs from the PSSRU (Curtis, 2008).			
b	Depression treatment cost [3]	£459	The proportion of caregivers with different severities of major depression were taken from the costing of dementia report (NICE, 2006):Mild - 36%; Moderate - 43%; and Severe - 21% In line with NICE (2006) it was assumed that 50% of those with mild depression received self-help (50%*36%=18%) and the other 50% received short-term psychotherapy (50%*36%=18%). Those patients with moderate depression and those patients with severe depression both received CBT (43%+21%=64%). Unit costs per treatment were calculated as £35 for self-help, £188 for short-term psychotherapy and £654 for CBT (see NICE 2006 for more detail of natural units)[4]. Treatment costs per person were taken as the sum of the unit costs per treatment multiplied by the proportion receiving each treatment.
c	QALYs: major depression in remission with treatment	2.36	Utility weights by severity of depression were taken from Revicki & Wood (1998): Mild = 0.68; Moderate = 0.63; and Severe = 0.30.The proportion of caregivers with different severities of major depression were taken from the costing of dementia report (NICE, 2006): Mild - 36%; Moderate - 43%; and Severe - 21%. The average duration of caregiving was assumed to be 4.3 years, based on data from National Alliance for Caregiving and AARP (US). It was estimated that day care services would be offered at the end of the first year of the caregiving period. This leaves 3.3 years of remaining caregiving in which a difference can be made (4.3 years – 1 year = 3.3 years). The estimated distribution of day care, treatment and remission across this time period is illustrated in Figure 2[5]

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[2] Cost savings due to increased productivity have not been included,

[3] Future costs following unsuccessful treatment, relapse or hospitalisation are not included.

[4] An estimated drop-out rate of 18% is included within these costs

[5] Any effect of day care provision is modelled as evident from the start of the intervention (e.g. if the intervention is effective then the caregiver will not be depressed for the full year it is delivered). It is also assumed that any effect will continue beyond the end of the intervention for the remaining 2.3 years of the time horizon.

Ref	Outcome	Value	Calculation and source
d	QALYs: major depression not in remission (unsuccessful treatment/no treatment)	1.91	Severity, utilities and treatment periods are identical to those used above. The estimated distribution of day care, treatment and remission across this time period is again illustrated in Figure 2
e	QALYs: full health without depression[6]	3.30	Standard Gamble methods were used by Revicki and Wood (1998) to determine the utility values used above. A utility of 1.0 was therefore assumed for full health. The estimated distribution of day care, treatment and remission across this time period is again illustrated in Figure 2

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[6] It is assumed that all caregivers that are not depressed after the intervention have returned to full health. It was not possible to estimate how many of those caregivers not depressed after the intervention were not depressed *before* the intervention, because sufficient data was not available from the effectiveness study (Zarit et al,1998). The proportion of caregivers in full health after the intervention may be overestimated.

Figure 2. Time periods estimated for calculation of QALYs
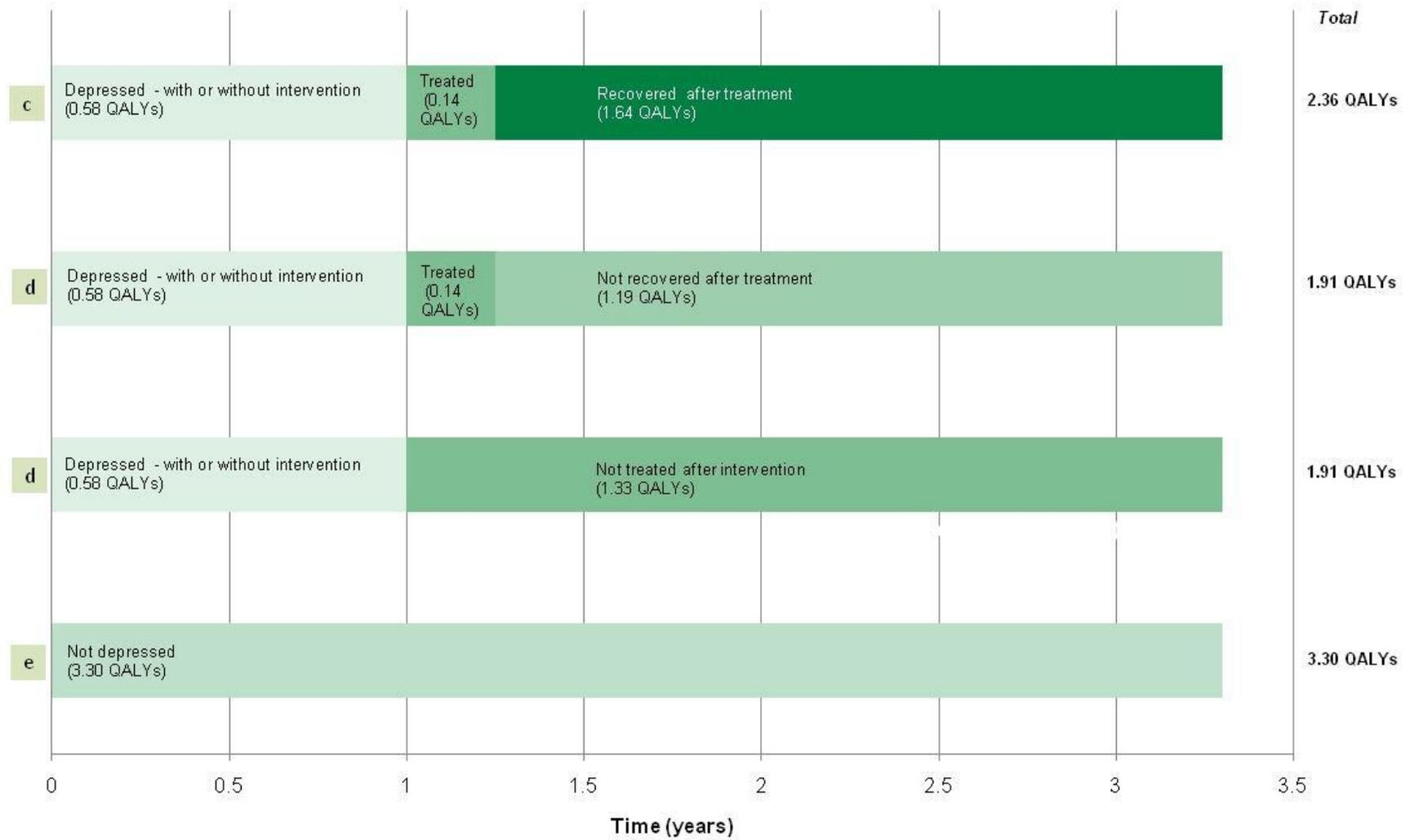
Effectiveness evidence

A literature review was undertaken by Bazian to identify evidence on the effectiveness and cost-effectiveness of the assessment and support of caregivers for preventing depression in caregivers. Further details are available on the evidence methods page of the *H.E.L.P.* website.

The review of the evidence on the effectiveness of the assessment and support of caregivers identified one review of studies. Table 4 provides the following details of the studies identified:

- Population
- Intervention
- Results

The review of the evidence on the cost-effectiveness of the assessment and support of caregivers identified one review of studies. Table 5 provides the following details of the studies identified.

- Population, intervention and model
- Perspective, discounting, inflation, cost year
- Utility/benefit
- Unit costs
- Efficiency

Table 6 and Table 7provide a quality assessment of the effectiveness and cost-effectiveness studies. Further details are available on the quality appraisal methods page.

The following criteria were applied to select effectiveness evidence for undertaking the economic analysis:

- Location. Studies from the UK were preferred over studies from other locations.
- Population. Studies applied to the general population were preferred over studies applied to restricted population groups (e.g. pregnant women; individuals from specific communities/nationalities).
- Counterfactual. Studies for which the counterfactual intervention was 'usual care' or 'do nothing' in a UK setting were preferred over studies for which the counterfactual was different from 'usual care' or 'do nothing'.
- Method. Studies using more rigorous design methods (e.g. randomised control trials or quasi experimental designs with regression models controlling for confounders) were preferred over studies using less rigorous design methods (e.g. before-after studies or simple correlation analysis).

Table 4. Effectiveness of assessment and support of caregivers for preventing depression in caregivers

Study reference	Population	Intervention	Results
One HTA assessed effectiveness and cost-effectiveness evidence for community-based respite care for frail people and their carers.39 This was the primary source for data for this intervention. The report includes 22 primary studies and most of the evidence is from North America, with a minority of effectiveness and economic studies based in the UK. Only five economic evaluations of respite care services were found (two randomised and three quasi-experimental studies), all of which compared day care with usual care and only one study was undertaken in the UK. These five studies are extracted in the cost-effectiveness table; not all provide depression outcomes for carers, but satisfaction, carer burden and carer quality of life may be helpful proxy outcomes, so all five studies are detailed. Three studies found in the effectiveness review measured depression outcomes in carers. Zarit, 1998 was later used in cost-effectiveness modelling by Gaugler. We have extracted data from the other two studies, Grant and Niebuhr for information - although they were not used in modelling. Grant assesses effects of in-home respite care.			
Zarit, 1998, USA ▪ quasi-randomised study	Quasi-experimental study of 566 carer-care recipient dyads; principal carers of relatives with a diagnosis of dementia; no use of day-care services within previous 3 months; carer using 8 hours paid help per week; care recipient independently mobile or mobile with assistive devices (control group only); would be willing to use day-care services if available and affordable	*Intervention* ▪ Day-care services, mostly providing care on 5 days per week, 7 hours per day *Control* ▪ No day care services and less than 8 hours per week paid help	Mean (SD) CES-D score (20 items: 0–60) higher scores indicate worse health: 12.8 (9) with treatment vs. 16.1 (9) with control; p<0.05
Grant, 2003, USA ▪ randomised controlled trial	▪ 55 carer/care-recipient dyads ▪ Spousal carers of people with diagnosis of probable or possible AD; dyad living at home; carer in receipt of <8 hours respite per week ▪ Carers receiving medications known to alter plasma	*Intervention* ▪ In-home respite care: 10 days of in-home help (up to 6 hours per day) over a 2-week period *Control* ▪ Usual care	Mean (SD) Hamilton Depression Scale (higher scores indicate worse health) in vulnerable group of carers: 6.4 (5.1) with respite vs. 6.9 (5.6) without Mean (SD) Hamilton Depression Scale (higher scores indicate worse health) in vulnerable group of carers: 3.4 (3.6)

Study reference	Population	Intervention	Results
	catecholamine levels were excluded		with respite vs. 5.4 (5.7) without
Niebuhr, 1989 ▪ quasi-randomised study ▪ full text of this USA PhD thesis not retrieved. Data extracted here is that provided by the HTA review	Quasi-experimental study of 57 carer/care-recipient dyads. Family carers of persons whose level of impairment requires care comparable to intermediate or skilled nursing care. Carers had to be the primary carer, co-reside with the care recipient, be a close relative and experience at least mild burden and depressive symptoms.	*Intervention* ▪ In-home respite 2 to 4 times per week for 3 months *Control* ▪ No respite services	Geriatric Depression Scale (30 items) score (SD); higher scores indicate worse health: 10.6 (7.4) with treatment vs. 10.4 (6.8) with control
Donaldson, 1989, UK ▪ non-randomised, controlled study (unclear, could be retrospective record review)	105 carer/care recipient dyads – 35 attending FSU with 70 matched (age, sex, psychiatric diagnosis, physical state, behavioural ability, whether or not they lived alone) non-FSU visitors. Care recipients were mainly elderly mentally infirm people, suffering from organic brain disease, and their carers. First 35 visitors to a Family Support Unit in the UK were matched to a group of 70 non-FSU visitors on age, sex, psychiatric diagnosis, physical state, behavioural ability and whether or not they lived alone.	*Intervention* ▪ Receiving treatment in the FSU – Family Support Unit - Tailor-made service including day care, evening care, special occasional residential care to suit carer interests, plus 'mix of community services' vs. usual care (included day care, day hospital, home help, meals on wheels, institutional respite). In practice, care recipients received some non-FSU day care, but much less than those in the intervention arm *Control* ▪ Usual care in non-FSU environment	FSU group spent more time in community than control group (664 with FSU vs. 492 with control); significance not provided
Baumgarten, 2002, Canada ▪ randomised controlled trial with	180 elderly participants drawn from 30 geriatric day centres in the metropolitan Montreal area. All clients	*Intervention* ▪ Immediate admission to the day centre. Day-care (range of group-	▪ No statistically significant differences between intervention and control groups detected:

Study reference	Population	Intervention	Results
parallel cost study (see below)	were eligible if they were over 60 and could speak English or French. Those too cognitively impaired to be interviewed and who did not have an informal caregiver and those referred to the day centre for individual specialised treatments were excluded.	based activities, including education, support groups, exercise groups and carer counselling); median number of day care visits during the 13 week study period was 10 *Control* ▪ Usual care involving a waiting-list control group (3 months) and typical health or social services use	Carers - Carer Burden Inventory (0-96): 21.0 (SD 18.4) with intervention v 19.8 (SD 19.3) with control ▪ No evidence of effect of day centre on client's anxiety, depression, or function status ▪ No evidence of effect on caregiver burden

Table 5. Cost-effectiveness of assessment and support of caregivers for preventing depression in caregivers

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
This HTA reviews the effectiveness and cost-effectiveness evidence for respite care for frail people and their carers. The systematic review of cost-effectiveness studies identified 5 studies, all assessing day care. There were no economic studies of in-home respite, institutional respite, video respite or host family respite. These are extracted here.					
Artaso Irigoyen, 2002 ▪ article in Spanish, full text not retrieved ▪ details extracted here are from the HTA review	▪ Care provided in a psychogeriatric day-care centre (group-based activities, reality orientation therapy, behavioural skills training, pharmaceutical therapy and family support) vs. usual care (waiting-list control) ▪ 69 carers of people with psychiatric disorders (DSM-IIIR or affective disorder) and consequent loss of autonomy, aged 65 years or over with a principal carer	▪ Social perspective ▪ Unclear whether adjusted for inflation ▪ Unclear discounting ▪ Cost year: EURO1995	NS	Mean monthly cost of day care per patient (intervention): EURO1755 Mean monthly cost of community care per patient (control): EURO1238	
Baumgarten M, 2002 Canada ▪ cost study alongside randomised controlled trial (see above)	▪ Day-care (range of group-based activities, including education, support groups, exercise groups and carer counselling); median number of day care visits during the 13 week study period was 10 vs. usual	▪ Health and social care perspective ▪ Unclear discounting ▪ Unclear whether adjusted for inflation ▪ Cost year: Can$1991	NS	Mean cost per care recipient at 3 months: Can$2935 (SD$5536) for intervention group Can$2138 (SD$4530) for the usual care group	

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
	care involving a waiting-list control group and typical health or social services use ▪ 212 elderly day care clients and their formal caregivers; participants had psychiatric disorders (DSM-IIIR or affective disorder) and consequent loss of autonomy, aged 65 or over and with a principal carer				
Donaldson C, 1989 ▪ cost-effectiveness study based on non-randomised, controlled study	▪ Tailor-made service including day care, evening care, special occasional residential care to suit carer interests, plus 'mix of community services' vs. usual care (included day care, day hospital, home help, meals on wheels, institutional respite). In practice, care recipients received some non-FSU day care, but much less than those in the intervention arm ▪ 105 carer/care recipient dyads – 35 attending FSU	▪ Health and social care perspective ▪ Unclear discounting ▪ Unclear whether adjusted for inflation ▪ Cost year: GBP1986	If 30% of people in usual care died while living at home and the remainder were split among long-term care, local authority residential care and private nursing home care, this would result in a cost of £18.70.	Cost per person per day (control group): £6.62 Cost per person per day (intervention group): £2.34 Additional cost per additional day (E:C) spent in the community: £18.80	

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
	with 70 matched (age, sex, psychiatric diagnosis, physical state, behavioural ability, whether or not they lived alone) non-FSU visitors. Care recipients were mainly elderly mentally infirm people, suffering from organic brain disease, and their carers				
Gaugler JE, 2003, USA ▪ cost effectiveness study using effectiveness evidence from Zarit et al (see above)	Cost-effectiveness study evaluating US adult day care provided in the community and compared with usual care. US adults day care provided in the community involving out of home services, including therapeutic services, health monitoring, socialising, transport and medical care. Mostly providing care on 5 days per week, 7 hours per day. Usual care which excluded the use of day-care services; 'no day-care services and 8 or fewer hours per week paid help'.	▪ Unclear perspective (caregiver?) ▪ Unclear whether discounted (follow-up 12 months) ▪ No adjustment for inflation ▪ Cost year: USD1993	NS	▪ At 12 months: the total cost per day of day care was US$47.10 vs. US$41.15 for usual care (p<0.05) ▪ Incremental daily cost of day care over usual care was US$5.95 ▪ Daily cost of day care (carer charge) was US$17.26 ▪ Formal service costs per day: US$2.01 with day care v US$0.41 with usual care ▪ Secondary carer	At 12 months: Additional daily cost of day care to alleviate role overload by one unit: US$4.51 Additional daily cost of day care to alleviate depression by one unit: US$2.20

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
				costs: US$6.12 with day care v US$4.08 for usual care ▪ Primary care costs: US$32.42 with day care v US$35.61 for usual care (p<0.05) ▪ Employment costs: US$0.30 with day care v US$1.05 with usual care (p<0.05)	
Hedrick et al, 1993, USA ▪ cost study based on RCT (evaluation of VA-adult day health care was by RCT, evaluation of contract adult day health care was through a nonrandomised prospective study; not reported here) ▪ results here from primary effectiveness study and from HTA report on this and other publications from this research	▪ Resource-use data collected prospectively and concurrently with effectiveness data ▪ Randomised controlled trial evaluating ADHC (adult day health care) provided directly by the VA. Patients at 4 centres (826) were randomised to either ADHC or customary care, and outcomes were compared between the 2 groups vs. usual care (some non-VA day care for care recipients, but not significantly more than those in the intervention arms)	▪ Health sector ▪ Discounting not applied (follow-up was 12 months) ▪ Unclear whether adjusted for inflation ▪ Cost year: USD1989	NS	Mean total (VA and non-VA services) annual costs of care: DC-V US$18,582 Mean incremental cost of ADHC care compared to DC-V (adjusted for baseline differences): US$617 (95% CI US$ -2083 to 3715) Mean incremental cost of ADHC care compared to usual care group: US$2872 (95% CI US$-784 to 5684)	

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
	▪ 586 carers, 826 care recipients. Frail older people at high risk of nursing home placement and their carers. Patients used healthcare services before the study and 82% were dependent in at least one aspect of ADL (average of 2.4 dependencies)				

Table 6. Quality assessment for effectiveness studies

Study reference	QA for trials/RCTs					Score	Grading (++ 4-5; + 3; -0-2)
	Follow-up	Intention to treat?	Attrition	Groups similar or controlled?	Randomised?		
Zarit (1998) USA	Yes	No	No	Yes	No	2	-
Grant (2003) USA	No	Don't know	Don't know	Yes	Yes	2	-
Niebuhr, 1989, USA [PhD thesis; not retrieved]						Not rated	Not rated
Artaso Irigoyen, 2002, Spain [in Spanish; not retrieved]						Not rated	Not rated
Baumgarten M, 2002, Canada	No	No	Yes	Yes	Yes	3	+
Hedrick et al, 1993, USA	Yes	Yes	Don't know	Don't know	Yes	3	+
Donaldson, 1989, UK	Yes	Don't know	Don't know	Yes	No	2	-

Table 7. Quality assessment for economic studies

Study reference	QA for economic studies						Score	Grading (++ 4-6; + 3; -0-2)
	All costs of intervention included?	Market values used for costs?	Perspective reported?	Sensitivity analysis?	Reports base year adopted?	Effectiveness data from RCT or MA?		
Artaso Irigoyen, 2002, Spain [article in spanish]						No	Not rated	Not rated
Baumgarten M, 2002 Canada	Don't know	Yes	Yes	Yes	Yes	Yes	5	++
Donaldson, 1989, UK	No	Don't know	Yes	No	Yes	No	2	-
Gaugler, 2003, USA	Yes	Yes	No	Yes	Yes	No	4	++
Hedrick et al, 1993, USA	Yes	Don't know	Yes	Yes	No	Yes	4	++

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