White Rose Research Online
eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk
Universities of Leeds, Sheffield and York

Deposited via The University of Sheffield.

White Rose Research Online URL for this paper:
https://eprints.whiterose.ac.uk/id/eprint/106568/

Version: Published Version

Monograph:
Ara, R., Duarte, A., Harnan, S. et al. (2015) Supporting the routine collection of patient reported outcome measures in the National Clinical Audits for assessing cost-effectiveness. Work Package 1. What patient reported outcome measures should be used in the 2013/14 National Clinical Audit Programme. Appendix J - Dementia. Report. Policy Research Unit in Economic Evaluation of Health and Care Interventions (EEPRU) (RR0037). Policy Research Unit in Economic Evaluation of Health and Care Interventions

Reuse
Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

UNIVERSITY OF LEEDS
University of Sheffield
UNIVERSITY of York

EEPRU

Economic Evaluation of Health and Social Care Interventions Policy Research Unit

RESEARCH REPORT

Supporting the routine collection of patient reported outcome measures in the National Clinical Audits for assessing cost-effectiveness

Work Package 1
What patient reported outcome measures should be used in the 13 health conditions specified in the 2013/14 National Clinical Audit programme?

APPENDIX J, DEMENTIA

Authors: Roberta Ara, Ana Duarte, Sue Harnan, Jo Leaviss, Steve Palmer, Mark Sculpher, John Brazier

Correspondence to: Katherine Stevens, HEDS, ScHARR, University of Sheffield, Regent Court, 30 Regent Street, Sheffield, S1 4DA. Email: r.m.ara@sheffield.ac.uk

RR0037

March 2015

The University Of Sheffield.

UNIVERSITY of York

The Policy Research Unit in Economic Evaluation of Health and Care interventions is funded by the Department of Health Policy Research Programme. It is a collaboration between researchers from the University of Sheffield and the University of York.

The Department of Health's Policy Research Unit in Economic Evaluation of Health and Care Interventions is a 7 year programme of work that started in January 2011. The unit is led by Professor John Brazier (Director, University of Sheffield) and Professor Mark Sculpher (Deputy Director, University of York) with the aim of assisting policy makers in the Department of Health to improve the allocation of resources in health and social care.

This is an independent report commissioned and funded by the Policy Research Programme in the Department of Health. The views expressed are not necessarily those of the Department.

INDEX

TABLES

Acronym	Definition
AMSTAR	Assessing the quality of systematic reviews
ADCS-ADL	Alzheimer Disease Cooperative Study-Activities of daily living scale
ADRQL	Alzheimer's Disease-Related QOL
BSC	Best supportive care
CDR	Clinical Dementia Rating
DQoL	Dementia Quality of Life instrument
EMA	European Medicines Agency
EQ-5D	EuroQol 5 dimensions
FR	Future research
HRQoL	Health related quality of life
HS	Health states
HTA(s)	Health technology assessment(s)
HUI	Health Utility Index
KGV	Known group validity
MMSE	Mini-mental State Examination
MTA	Multiple technology assessment
NAD	National Audit of Dementia
NCA	National Clinical Audit
NHS	National Health Service
PR	Potential recommendations
PROM(s)	patient reported outcome measure(s)
QALY(s)	Quality adjusted life year(s)
QOL-AD	Quality of Life – Alzheimer's disease
QWB	Quality of Well Being
R&D	Research and development
RCT(s)	Randomised controlled trial(s)
TA(s)	Technology Appraisal(s)
TAG	Technology Assessment group
UK	United Kingdom
WP	Work package

1. BACKGROUND

EEPRU was approached by Jason Cox (Research and development (R&D) Division) to prepare a programme of research to support the appropriateness of, and use of, patient reported outcome measures (PROMs) collected for the National Clinical Audit (NCA). The EEPRU programme was informed by a R&D template prepared by Simon Bennett, Steve Fairman and Keith Willett at National Health Service (NHS) England.

The purpose of introducing PROMs into the NCA programme is to be able to 1) compare performance between providers and commissioners in the NHS, 2) compare the cost-effectiveness of alternative providers in delivering the specific services (i.e. linking outcomes and resource use), and 3) assess the cost-effectiveness of alternative interventions and other changes in the NHS. The intention is to introduce PROMs across a range of conditions over the next 3 years commencing with 13 conditions in the 2014/15 NCA programme.

The agreed research programme consists of 3 concurrent work packages (WP) as described in the document submitted to the Department of Health (DH) (8th November 2013). The current document provides details on the objectives, methodology and results for Work Package 1 (WP1): to determine what PROMS should be used in the 13 health conditions specified in the 2014/15 NCA programme.

2. OVERVIEW

WP1 is split into three separate components consisting of:

- WP1.1 To examine whether the EuroQol 5 dimensions (EQ-5D) is appropriate in the 13 health conditions specified in the 2013/14 NCA programme.
- WP1.2 To identify what measure could be used when the EQ-5D is not appropriate in the 13 health conditions, taking into account that the proposed measure would be used to generate preference-based utility measures (either directly through existing preference-based weights, or indirectly through existing mapping functions suitable for the proposed measure).
- WP1.3 To identify the evidence required to address questions of cost-effectiveness using the NCA data.

Each component consists of a series of reviews of the literature.

This Appendix provides the detailed results for the condition dementia and should be read in conjunction with both the main report and the methods/search strategy appendices.

3. METHOD

The full detailed methodology used is provided in Appendix A, including the search strategy, selection criteria for studies included, and data extraction etc. In summary, a review of the literature was undertaken to assess the appropriateness of the EQ-5D in terms of classic psychometric criteria (WP1.1); where the EQ-5D was not considered appropriate, additional searches were undertaken to identify alternative measures (WP1.2); and finally, existing health technology appraisals were reviewed and data requirements were compared with variables currently collected in the dementia audit (WP1.3).

3.1 Psychometric properties (WP1.1)

Assessments reported in the included studies were categorised according to the following definitions:

Acceptability

Data relating to how acceptable the measure was to the person completing it, expressed as the proportion of completed surveys, or the proportion of missing data.

Reliability

There are two main definitions for reliability, a) the degree to which a measure reproduces the same results in an unchanged population and b) the degree to which a measure reproduces the same results when completed by different assessors (e.g. patient and proxy report). In both cases, reliability can be assessed by re-testing, and calculating the correlations or difference between tests. In case a) the comparison may be between the same populations separated by time, where no change in health state was observed (as compared to using an alternative condition specific or generic measure). In case b) the measure may be completed by multiple people (proxies) on the patient's behalf and their responses compared with those of the patient. Where the outcome measure is specifically designed for self-report by patients, this test of reliability may be expected to produce less agreement.

Construct validity

This is an assessment of how well an instrument measures what it intends to measure. Two main definitions are used in this review.

a) Known group validity, where estimates for groups that are known to differ in a concept of interest are compared either qualitatively or statistically. The known groups may be defined using other measures, according to clinical categorisation.

b) Convergent validity assesses the extent to which a measure correlates with other measures of the same or similar concepts. Correlation coefficients were considered low if <0.3, moderate if between 0.3 and 0.5, and strong when >0.5.

Responsiveness

a) Change over time. This is an assessment of whether measurements using the instrument can detect a change over time, where a change is expected. This may be before and after an intervention, or through progression of a disease. Evidence was considered to be good where a t-test was significant, though weaker evidence to support responsiveness was considered where there was a change in the expected direction, but was not statistically significant or not tested. Effect size and standardised response mean were also acceptable assessments of responsiveness.

b) Ceiling and floor effects were also considered to be indicators of responsiveness. Assessments of ceiling effects include the proportion of patients who score full health within a group of patients with known health detriments. A ceiling or floor effect can affect the sensitivity of the measure in detecting changes over time in patients at the extremes of the measure (for example those with severe disease activity and those with just minor symptoms of the condition).

3.2 **Alternative measures** (WP1.2)

Searches were conducted to identify existing reports and guidelines relating to other measures that could be used in dementia, as the results of WP1.1 suggested that the EQ-5D was not appropriate for this condition.

3.3 **Evidence required for economic evaluations** (WP1.3)

The existing Health Technology assesments (HTAs) were reviewed alongside the variables currently collected in the NCA to determine if clinical or PROM data routinely collected in the NCAs would suffice to address questions of cost-effectiveness, and to identify any gaps in the evidence that would be required to compare providers, or the cost-effectiveness of interventions or policies.

4 RESULTS FOR DEMENTIA

4.1 Evidence of appropriateness of EQ-5D in dementia (WP1.1)

4.1.1 *Selection of systematic review*

No selection was required as only one review was identified. The review was identified from the Longworth et al review.(1)

4.1.2 *Structured abstract for Hounsome et al 2010(2)*

Purpose of review

The review aimed to summarise the existing evidence on the appropriateness of the EQ-5D in dementia. Within this wider aim, the feasibility, reliability and validity of the EQ-5D were examined although validity was mostly considered in light of convergence of self-reported and proxy (carers and clinicians) ratings.(2)

Methods of review: Search and study selection: EuroQol, MEDLINE, CAREDATA, CAB direct, CINAHL, Cochrane library, Emerald, PsychInfo, and BIOSIS previews. Electronic searches were conducted from 1990 to 2009, and used the terms 'EQ-5D', 'dementia', 'Alzheimer's' (Alzheimers/Alzheimer) 'quality of life'. A secondary search was conducted in Google Scholar, using the advanced option to search for articles including 'all the words' and 'everywhere in the article' for 'EQ-5D and dementia' and 'EQ-5D and Alzheimer's' (Alzheimers/Alzheimer). However, the full search strategies were not reported and exact terms used in the research database searches were not provided. The review included studies that presented original research, used EQ-5D as the primary or secondary outcome, and were published in English.(2)

Data extraction and synthesis: No details were provided on how data extraction was conducted. A narrative synthesis was performed, and all included studies were summarised in a tabular form in the paper. The psychometric properties of interest were i) feasibility, as assessed by completion rates and completion time ii) reliability, described as temporal stability (test-retest correlation) and internal consistency (correlation between items that measure the same domain), iii) responsiveness, defined as characterising the ability of the instrument to capture health changes over time, iv) construct validity, whether the instrument really measures HRQoL, v) criterion validity, whether scores on the instrument agree with gold standard measures, and vi) content validity, which was described as determining whether all the important aspects of the construct are covered.

Results of the review

Hounsome et al 2010(2) included 21 articles describing 18 studies which reported evidence on the application/appropriateness of the EQ-5D, self or proxy-reported (carers or clinicians, as proxies) in dementia research. The tabulated summary of included studies reported sample characteristics, severity of cognitive impairment within the sample, subject of assessment (patients and/or carers), mode of assessment (self-report or proxy report), findings and conclusions. The review results were presented for feasibility, validity, and for the use of EQ-5D with carers.

Self-report was examined in 4 studies, and included the assessment of acceptability (through completion rates) and time spent completing the questionnaires. High completion rates were reported for patients with mild dementia (according to Mini-mental State Examination (MMSE) or the Clinical Dementia Rating (CDR)), but lower rates were reported in patients with moderate and severe dementia (13% to 63% depending on the study).(3-6) In two studies, feasibility was also assessed by examining completion times of EQ-5D by patients, with average values ranging from 4.1 to 15.3 minutes to complete the questionnaire.(5;7) Two studies examined the feasibility of EQ-5D proxy-scores, and found that more than 90% of carers completed the questionnaire and that the mean time for completion was 2.3 minutes.(7;8)

Results were presented for overall validity, rather than for each validity-related psychometric property. Some evidence of potential ceiling effects was found in three studies where more than a third of patients were at the highest level of response ('no problems') for several or all of EQ-5D health domains.(3;4;7) This ceiling effect was not observed for other generic measures, namely Quality of Well Being (QWB) and Health Utility Index (HUI).(7) Two studies examined correlation between patient rated EQ-5D score and disease specific health related quality of life (HRQoL) measures, which included the Quality of Life – Alzheimer's disease (QoL-AD) and the Dementia Quality of Life instrument (DQoL). One study found strong correlations between EQ-5D index scores and the two measures (QoL-AD: r=0.72; DQoL: r=0.63; n=24),(9) while the other study found lower but still strong correlation between EQ-5D scores and QoL-AD (QoL-AD: r=0.72; DQoL: r=0.51; $p<0.001$; n=not clear).(10) It is worth mentioning that there was one other study (not mentioned in the narrative synthesis), where no association was found between EQ-5D scores (unclear if ratings were performed by patients, carers or both) and MMSE (p=0.16).(3) Another study was said to have found no correlation between patient rated EQ-5D domains and dementia severity, except for a positive association between the anxiety/depression and MMSE.(5) Construct validity was assessed for different type of proxies, namely clinicians and carers, by examining correlations between EQ-5D health dimensions and scores of other instruments. One study found clinicians' ratings had higher

construct validity for more observable domains (mobility and self-care), while carers had higher construct validity for less observable dimensions (usual activities and anxiety/depression). The correlation of EQ-5D usual activities dimension with the Bristol Activities of Daily Living scale was strong for clinicians ($r=0.87$; $p<0.01$; $n=64$), and the correlation of the anxiety/depression dimension with the Neuropsychiatric Inventory was also strong for carers ($r=0.57$; $p<0.01$; $n=64$).(10) Another study examined the level of agreement between carers' and clinicians' ratings of EQ-5D, and reported poor agreement between these two proxies for the pain/anxiety health dimension. The kappa statistics were reported to be lower than 0.5 between patients, carers and physicians, as well as between carers and physicians for all dimensions except mobility.(4)

The assessment of content validity was based on two studies, which identified attributes considered by patients to be part of HRQoL and compared these to the attributes of EQ-5D and other generic measures (QWB and HUI), to verify whether these were included. The following attributes were mentioned by dementia patients, and were not present in EQ-5D: sleep disturbances, burden of memory loss, disorientation in space, lack of interest and motivation, lack of exercise, concerns over medication, contact with family members, opportunity to travel, and religion.(7;11)

The authors claim that several studies demonstrated the feasibility, reliability and validity of proxy ratings of the EQ-5D, and report mean proxy rated EQ-5D utilities for patients at different severity levels (mild dementia:0.69; severe dementia:0.33),(6) and for dementia patients compared to the general population (0.27 vs. 0.70).(12) These studies also reported strong correlations between EQ-5D proxy ratings and patient cognitive function.(6)

Review authors' conclusions

The authors of the review concluded that the EQ-5D performance in dementia studies is comparable to other generic utility instruments. They also concluded that EQ-5D is more reliable than other utility instruments in patients with mild dementia. The authors advise caution when selecting proxy respondents, given poor agreement of ratings between different proxies, and between patients and proxy respondents. Finally, they state that there are some concerns about the validity of EQ-5D in studies in moderate to severe dementia, but the EQ-5D still remains useful especially in conjunction with robust dementia specific quality of life-measures.

Assessment of review in relation to objectives of work package 1.1

Relevance of review question: Although the overall purpose of the review was partly convergent with the aims of WP1.1 for dementia, a greater focus was placed in assessing validity of EQ-5D in terms of convergence between self-reported and proxy ratings of the instrument. This is however an important issue in dementia, as higher levels of cognitive impairment may hinder the patient's ability to self-report.

Assessment of review quality: Hounsome et al. (2011)(2) scored poorly against the relevant Assessing the quality of systematic reviews (AMSTAR) criteria. It was unclear whether an a priori design was used, as no reference was made to it within the review. Although study characteristics were reported, no mention was made regarding whether a quality assessment of studies was conducted, and therefore, this was not taken into account when formulating conclusions. The process of data extraction and data checking was not described, and the number of reviewers involved in this process was not reported.

Acceptability of the search: The review authors conducted searches in a wide range of databases. The described method of concept combination and terms used was appropriate to the review in topic.

Acceptability of study selection: The selection criteria were succinctly described and appeared to be in accordance with the aims of WP1.1.

In summary, although there are some positive results, in general, Hounsome provides sufficient evidence to raise concerns relating to the appropriateness of EQ-5D in patients with dementia. A ceiling effect was observed in three studies,(3;4;7) two studies reported the EQ-5D may not be acceptable for patients with severe dementia,(4;5) and two studies reported no relationship between self-reported EQ-5D scores and clinical measures.(3;6) Conversely two of three studies reported there was a relationship between proxy scores and clinical variables.(3;13) However, several issues with proxy scores were also described. Six studies reported no relationship between self-reported and proxy scores (even in patients with mild dementia).(3;5-7;14;15) Patients scored higher HRQoL than proxies in those that provided this information and the carers' responses were influenced by the level of dependency of the patient.(6;7;15) In addition, three studies reported no association between clinician and carer-proxy scores, with evidence suggesting that each may have a more accurate concept of particular attributes of HRQoL.(4;5;10)

Table 1: Summary of evidence on EQ-5D for dementia

Measure (N)	Acceptability	Reliability	Construct (KGV; Convergent)	Responsiveness (Change over time; Ceiling effects)	
Self-reported					
EQ-5D (17)	Good for mild dementia. Poorer for moderate to severe dementia.	-	Mixed; Poor	-	Evidence of ceiling effects
Proxy-rated					
EQ-5D (19)	Good	-	Some positive evidence, but methods have flaws; Fair.	-	Evidence of ceiling effects
Concerns about appropriateness.					

4.2 Alternative measures in dementia (WP1.2)

4.2.1 *Other measures for dementia*

Twelve documents were identified by the initial searches as described in Appendix B. Two documents described standards of care for patients with dementia, with the latter focusing on setting the standards of care against which the dementia NCA results would be compared(16;17). Four other documents were reports, two describing the results of two audits, one conducted in memory clinics in England,(18) another on the first round of the dementia NCA.(19) Two of the reports were produced by the Alzheimer's society; one was a costing report, while the other colated evidence on the experiences and outcomes of providing dementia care in the community.(20;21) The search also identified a carer/patient questionnaire applied in the first round of the dementia NCA;(17) a document describing how to integrate geriatricians in an integrated pathway of dementia care;(22) and another document which provided guidance on the provision of services by general practioners with special interests in dementia.(23) None of these documents presented evidence on the use of PROMs in dementia, and were thus excluded from the review, leaving two potentially relevant documents. One document was an European Medicines Agency (EMA) guideline on the clinical investigation of medicinal products in the treatment of Parkinson's disease, including the treatment of cognitive disfunction (dementia) in this pathology. This document states that efficacy in Parkinson's disease dementia should be demonstrated on cognition and activities of daily living (ADL), but makes no recommendations on instruments to measure it, and refers to the EMA's guidance on Alzheimer's disease.(24) The other relevant document corresponded to guidance on

medicinal products for the treatment of Alzheimer's disease and other dementias, which describes a number of instruments that can be used to demonstrate treatment efficacy without recommending any single instrument. Thus, the guideline states that applicants must justify the instruments selected with respect to their psychometric properties and the population studied (defined by type of dementia).(25)

The EMA guideline on dementia recommended the use of the following types of instruments to assess efficacy: objective cognitive tests; measures of self care and activities of daily living; global assessment of change; measures of HRQoL; and behavioural signs and symptoms. It was highlighted that in general, self-report measures tended be less sensitive to treatment effects than observer related instruments, particularly in moderate to severe disease stages, and recommended the involvement of relatives or nurses in the assessment.(25) The guideline stated that measures of HRQoL cannot be specifically recommended for regulatory purposes in dementia due to insufficient validation of its assessment in this condition. Two disease specific instruments, the Alzheimer's Disease-Related QOL (ADRQL) and the QOL-Alzheimer's Disease (QOL-AD) were said to have sufficient psychometric properties with ongoing studies in responsiveness to clinical change. Nevertheless, the guideline recommended that similar instruments be developed for other forms of dementia.(25) Overall, the guideline provided very sparse information on the psychometric properties of the different outcome measures. Most measures that were said to be validated were specific for Alzheimer's disease, with extension to other types of dementia requiring further validation studies. The guideline also identified issues with the appropriateness of instruments at different disease severity levels, and recommended that disease severity was taken into account when selecting instruments.(25)

In addition to the documents described in the previous paragraph, evidence presented in two manuscripts known to the authors is worthy of consideration.(26;27) Whilst these sources are of relevance, it should be noted that they were not found through a systematic search process, and consequently all relevant evidence may not have been identified.

The first source of evidence is a validation study of a bolt-on for cognitive impairment developed for the EQ-5D (EQ-5D+C).(26) Patients are asked to select between "I have no impairment of cognitive functioning"; "I have some impairment of cognitive functioning" and "I have severe impairment of cognitive functioning", with cues provided to characterise the cognition attribute (described as including memory, concentration, coherence, Intelligence Quotient).(28) The impact of responses on

the valuation of health states has been tested in an exploratory study.(26) The cognitive impairment bolt-on has been shown to significantly impact on at least some health states, with complex interplay between severity of the cognitive impairment response, and severity of responses in the other dimensions, and increases the variance of the valuations. The authors concluded that overall the proxy-rated EQ-5D+C performed similarly to the EQ-5D, and although they did not recommend its use in isolation, they stated that comparison of the utility scores obtained with the two instruments could give insight on whether cognition has a significant impact on utility.(26)

The second source of evidence is a HTA report that aimed to develop health-state classifications for two dementia specific HRQoL instruments, the DEMQOL and the DEMQOL-proxy, so as to generate health states amenable to valuation and thus a preference-based tariff. The study also aimed to examine whether the utility values elicited from the general population differed from the utility values elicited from patients and carers for dementia health states generated for the classification system, and finally to examine the psychometric properties of dementia-specific preference-based measures.(27) The two resulting measures were named DEMQOL-U and the DEMQOL-proxy-U, and their validity (convergent and known-group), patient/proxy agreement and responsiveness to change were compared to EQ-5D and non-preference based measures using trial data. The data used to assess the psychometric properties of the instruments was from a study on the use of antidepressants for depression in dementia (n=236). There was evidence for the acceptability of the DEMQOL system, but missing data rates are higher than for EQ-5D. However, the DEMQOL utility measures appeared to be less affected by ceiling effects than the EQ-5D. The preference-based measures (DEMQOL, self-reported and proxy, and EQ-5D) were mostly in agreement, except for the lowest levels of utility. Mixed results were found for agreement between patient and carer reports over time, and low intraclass correlations were found throughout. Evidence regarding convergent of the DEMQOL-U system was also mixed, with these instruments having higher (but moderate) correlations with the Cornell Scale for Depression in Dementia than EQ-5D or the original DEMQOL. However, correlations between DEMQOL-U and the EQ-5D and the indicators of cognition, daily activities and behavioural disturbances were low. There was also no clear pattern to the DEMQOL utility measures or the EQ-5D across cognitive impairment and depression severity groups (known-group validity). The DEMQOL-U performed better than DEMQOL-Proxy-U, but the proxy (carer) rated EQ-5D performed better than the self-reported EQ-5D. In terms of responsiveness, the DEMQOL utility measures and the EQ-5D did not perform as well as the original DEMQOL and DEMQOL-Proxy. In conclusion, the study provided early positive evidence of acceptability, validity and responsiveness of the DEMQOL-U and DEMQOL-proxy. The authors caution that further research should be

conducted using other datasets incorporating a range of clinical indicators and dementia severity levels.(27)

4.3 Evidence for economic evaluations in dementia (WP1.3)

4.3.1 *Cost-effectiveness modelling approach used in recent HTAs in dementia*

Three technology appraisals (TAs) relating to dementia were identified from the searches, one of these has been suspended, and another has been superseded by a subsequent TA.(29) Only one TA was thus considered relevant, TA217 (Table 2). This TA was a multiple technology appraisal (MTA) which assessed the clinical and cost-effectiveness of anti-dementia medication (acetylcholinesterase inhibitors, i.e. donezepil, galantamine and rivastigmine, and memantine) compared to each other and best supportive care (BSC) for the treatment of Alzheimer's disease. Acetylcholinesterase inhibitors are indicated for mild to moderate Alzheimer's disease, while memantine is indicated for moderate to severe forms of the condition.(30)

The MTA used a Markov model with three discrete health states defined by institutionalisation and survival status (pre-institutionalisation, institutionalisation and death).(30) The natural disease history was modelled by two multivariate regression time to event models (time to institutionalisation and time to death), which predict events based on age, cognition (measured by MMSE) and functional ability (measured by ADL). Cohorts entered the model 4.9 years after disease diagnosis, based on patient population characteristics reported in the UK observational study that informed natural history of the disease in the model, with treated cohorts starting treatment at model entry. For the initial treatment period, mean time to institutionalisation and mean time to death are predicted using mean baseline characteristics of the cohort. After the initial treatment period, any treatment effects are assumed to have occurred, and so from that point onwards, mean time to institutionalisation is predicted based on the mean baseline characteristics plus the mean treatment effect for the treated cohorts. For example, if a mean baseline MMSE of 17 and a mean treatment effect of 0.5 on the MMSE scale are assumed, the mean time to institutionalisation for an untreated cohort would be predicted using a mean MMSE of 17. Mean time to institutionalization for a treated cohort is based on a mean MMSE of 17 for the initial treatment period, but would be based on a mean MMSE of 17.5 from the end of initial treatment onwards. Treatment effect was applied as the (weighted) mean difference in MMSE and Alzheimer Disease Cooperative Study ADL scale (ADCS-ADL) from randomised clinical trials (RCTs) to the baseline estimates of MMSE and ADCS-ADL used in the BSC cohort. Thus treated cohorts had a delay in institutionalisation compared to BSC. The model implicitly assumed that institutionalisation was equivalent to severe Alzheimer's

disease (MMSE < 10), and did not allow transition from the institutionalisation to the pre-institutionalisation state. The base-case analysis assumed that treatment effect had no impact in survival, while sensitivity analysis included a treatment effect on survival modelled through the impact of treatment on MMSE and ADL.(30)

The model quality adjusted survival by assigning mean utility values to the discrete health states. While for the institutionalisation state a single utility estimate (corresponding to mean EQ-5D score for patients of MMSE lower than 10) was applied to patients, utility in the pre- institutionalisation state depended on MMSE range and time to the end of institutionalisation. Utilities in the base-case analysis were derived from mean EQ-5D estimates sourced from external estimates reported in the published literature, and were carer proxy ratings. (30)

Table 2: Summary of existing model used in dementia TAs

Model approach	Method used to model utilities
MTA (TA217): Alzheimer's disease - donepezil, galantamine, rivastigmine and memantine (replaces TA111); 2011 (30)	
TAG Markov model; three discrete health states: pre-institutionalisation, institutionalisation and death Effectiveness: Disease progression (time to institutionalisation and time to death) was based on a multivariate regression time to event models Model covariates included age, MMSE and ADL. The proportion of patients in pre-institutionalisation state and institutionalisation state at model entry depended on disease severity and was estimated from a separate observational study. Treatment effect estimated by weighted mean differences in MMSE and ADL applied to the baseline estimate of MMSE and ADL used in the BSC cohort. Sources: UK observational studies; clinical RCTs (treatment effects).	Utility: Patient utility (rated by carer-proxy in the base-case, and self-rated for sensitivity analysis): For the EQ-5D utility scores by MMSE ranges mapped onto time to the end of pre-institutionalisation, so as to allow for heterogeneous HRQoL in pre- institutionalisation state. Single utility estimate for institutionalisation state, corresponding to mean EQ-5D utility score for patients with a MMSE score lower than 10. Carer's utility (included in sensitivity analysis): HUI2 utility scores by MMSE ranges (severity measured in the CDR scale and mapped onto the MMSE scale) mapped onto time to the end of pre-institutionalisation. Source: Published literature for utility estimates; MMSE scores at varying times to the end of pre-institutionalisation data from UK observational study.

AE: Adverse Events; MTA: Multiple Technology Appraisal; STA: Single Technology Appraisal; MI: Myocardial Infarction; TAG: Technology Appraisal Group; TA: Technology Appraisal; RCT: randomised controlled trial; RR: Relative risk; MMSE: Mini-mental state examination; ADL: Uniform activities of daily living; CDR: Clinical dementia rating scale.

In summary, the following evidence would be required to compare providers or the cost-effectiveness of interventions for dementia:

- Dementia diagnosis
- MMSE score
- ADL score
- Full-time institutionalisation
- Drug therapy administered (type of intervention)
- Utility values (patient and/or carer)
- Death rates

The majority of this evidence would need to be dated and linked through timings of collection.

4.3.2 *Fields collected in National Audit of Dementia*

The National Audit of Dementia (NAD) in its second and latest round (2012-2013) consisted of two modules, the hospital organisational checklist, and the casenote audit. The hospital organisational checklist is focused on structures, policies, care processes and key staff that impact on service planning and provision for care of people with dementia within a general hospital. The casenote audit consists of a sample of a minimum of 40 patients with a diagnosis or current history of dementia per hospital, which is audited against a checklist of standards that relate to their admission, assessment, care planning/delivery, and discharge. Participation in the NAD was open to all general acute hospitals, or those providing general acute services on more than one ward, in England and Wales. Data in the hospital organisational checklist is collected through the 'Organisational Checklist' tool, and the casenote audit data was collected through the 'Audit of Case Notes' tool. The casenote audit was a retrospective audit of the records of patients with a diagnosis of dementia discharged from a given hospital between 1 September 2011 and 29 February 2012 (for the current round of the audit). The fields collected via both tools are listed in the Appendix.

Overall the audit provides data that allows comparing the standard of treatment and care in dementia between participating hospitals, and for the same hospital for different periods in time (by comparing results between rounds of the audit). These data are grouped by the following themes: governance; assessments; antipsychotic prescription: protocol and practice; liaison psychiatry services; hospital discharge and transfers; information and communication; and staff training. The ultimate objective of the audit is to improve the quality of care and support of people with dementia and frailer older people who are admitted to hospital for acute treatment.(18)

The first round of the audit (2010-11) also included 'enhanced audit tools', which were not collected for the second round of the audit. These components did not collect any PROM data (or other outcome measures), and included:

- ward organisational checklist concerning staffing, support and governance at a ward level;
- a ward environmental checklist - information about aspects of the ward physical environment known to impact on people with dementia;
- staff questionnaires to gather feedback from ward staff about awareness of dementia and about support offered to patients with dementia on their ward;
- carer/patient questionnaire that evaluates carers' experience of the support received from ward staff and patients' overall perception of the quality of care on the ward; observation of care interactions to evaluate the quality of the hour-to-hour provision of care to people with dementia.(19)

4.3.3 *Comparing fields in the National Audit of Dementia with variables used in existing HTAs*

The TA on Alzheimer's disease(30) used survival analysis to model mortality and disease progression. The audit collects data on in-hospital death, as well as patient's age which was a covariate in the regression models used to predict mortality, and time to institutionalisation in the economic model. However, the NAD does not collect data on the two other covariates in both regression models, i.e. measures of cognition and physical ability. There are two fields on the casenote audit ('Place of Living or Care before Admission', 'Place of Living or Care after Discharge') that provide some information on whether the patient was institutionalised before and/or after hospital admission. The only treatment data collected by the audit refers to the use of antipsychotic drugs, which are not anticipated to impact on disease progression, but may reduce behavioural and psychological symptoms ('Distress, agitation and behaviour that challenges') fields (Appendix).

Data collection within the NAD has the objective of allowing comparisons between hospitals in terms of standard of treatment and care provided to dementia patients. The focus of the audit is mostly on describing the treatment, care and support of these patients. Although this is valuable information, the audit in its current format does not collect any variable that can be used to derive utility estimates, directly or indirectly (e.g. through a mapping function). To our best knowledge the collection of any PROMs within the NAD is not currently being considered.

4.4 Recommendations for dementia

Based on the evidence reviewed, the EQ-5D is not thought to be appropriate for patients with dementia. It is not believed that there are data in the dementia NCA which could be used to inform the HRQoL associated with the condition, either directly through a preference-based measure, or indirectly through a surrogate. In addition, it is not believed that the other variables collected in the audit will suffice to conduct robust economic evaluations. Potential recommendations (PR) and areas for future research (FR) are discussed below. All suggested future research areas are indicative and would require a discussion and detailed proposal if required.

Based on previous modelling approaches, it is recommended that MMSE and ADL scores are collected in the NCA, to inform disease progression in models. However, these measures are not preference-based and cannot be used to generate quality adjusted life years (QALYs) in economic evaluations. The review in Section 4.2 identified two dementia specific preference-based measures, the DEMQOL-U and the DEMQOL-U-proxy, that should be collected in the audit alongside cognition and functional ability measures (for example, MMSE and ADL) (PR.1). The assessment of the psychometric properties of these measures has provided some early evidence that they might be suitable to inform cost-effectiveness analysis in dementia, but further research is necessary to ascertain their construct validity and responsiveness to clinical change. The dementia NCA data can be used to assess the psychometric properties of the DEMQOL-U and the DEMQOL-U-proxy, if these are collected alongside clinical measures, such as the MMSE and ADL (FR.1).

The dementia audit does not currently collect suffient detailed information to compare providers or perform economic evaluations. The inclusion of mandatory information on time and date of full-time institutionalisation, type of drug therapy administered, death and utility values would increase the flexibility of the secondary use of the data (PR.2).

Table 3: Recommendations and associated future research for dementia

PR.1	*Collect the* DEMQOL-U and the DEMQOL-U-proxy *in a service user questionnaire alongside clinical measures such as the MMSE and ADL.*
FR.1	*Assess the appropriateness of the DEMQOL-U and the DEMQOL-U-proxy in dementia patients using the data from the NCA*
PR.2	*Collect mandatory information on time and date of full-time institutionalisation, type of drug therapy administered, death and utility values.*

5. SUMMARY

5.1 Summary of evidence used to inform the conclusions for WP1.1 and WP1.2

An existing review provided evidence that there are some concerns relating to the use of the EQ-5D in dementia, including ceiling effects, and a lack of relationship between self-report and clinical measures. This review focussed some attention on the convergent validity between self-report and proxy-report, showing there was no relationship between self and proxy reports even in mild disease, and no association between carer-proxy and clinician scores, perhaps due to each having better insight in different attributes. Other measures were considered in two guidelines, and two reports known to the authors. It is recommended that two dementia-specific preference-based measures, the DEMQOL-U and the DEMQOL-U-proxy, should be collected in the audit alongside cognition and functional ability measures (see summary for WP1.3)

Table 4: Summary of evidence currently available for recommended measure(s)

Measure	N	Acceptability	Reliability	Construct		Responsiveness		Overall
				KGV	Convergent	Change over time	Ceiling Effect	
EQ-5D	21	Mixed	NR	Mixed	Poor	NR	Poor	Not appropriate
DEMQoL-U								
		These measures (patient and proxy rated) provided early positive evidence of acceptability, validity and responsiveness, but require further validation in datasets incorporating a range of clinical indicators and dementia severity levels.						

N= number of studies used to inform conclusions, KGV: known group validity; NR, the existing review did not review this psychometric property.

5.2 Summary of evidencerequired for use in economic evaluations (WP1.3)

In its latest round, the dementia audit does not include a service user or carer questionnaire and thus no PROMs are currently collected. The information collected in the audit would enable comparison of providers (i.e. hospitals) in terms of the standard of treatment and care provided to patients with dementia, and to compare the performance of the individual hospital over time. However, it is not clear if the data could be case-mixed using variables such as cognition and physical ability. In addition to evidence on HRQoL, to conduct formal economic evaluations, the audit would require additional detailed mandatory information such as dementia diagnosis, MMSE score, ADL score, type of pharmaceutical therapy administered and death rates.

7. APPENDIX

The tables in this Appendix provide additional information for the reviews (WP1.1 and 1.3) conducted for dementia.

Table A1: Characteristics of studies in the systematic review for dementia (WP 1.1)

Study ref Author, Year	Country	Disease/treatment stage	Treatment (if any)	Study type (e.g. cross sectional, RCT, cohort)	Study objective
Wolfs, 2008(31)	The Netherlands	Moderate dementia	NR	RCT	NR
Karlawish, 2008[a](3)	United States	Mild to moderately severe dementia	NR	NR	NR
Boström, 2007(14)	Sweden	Mild to severe Alzheimer's disease and dementia with Lewy bodies	NR	NR	NR
Wolfs, 2007(26)	The Netherlands	Moderate dementia	NR	NR	NR
Jönsson, 2006[a](6)	Sweden, Denmark, Finland, Norway	Mild to severe dementia	NR	NR	NR
Jönsson, 2006[b](32)	Sweden, Denmark, Finland, Norway	Mild to severe dementia	NR	NR	NR
Naglie, 2006(7)	Canada	Mild to moderate dementia	NR	NR	NR
Vogel,2006 (15)	Denmark	Mild dementia	NR	NR	NR
Bryan, 2005(10)	UK	Mild to moderate dementia	NR	NR	NR
Selwood, 2005(9)	UK	Mild to moderate dementia	NR	NR	NR
Andersen, 2004(33)	Denmark	Mild to severe dementia	NR	NR	NR
Ankri, 2003(5)	France	Mild to severe dementia	NR	NR	NR
Thorgrimsen, 2003(34)	UK	Mild to severe dementia	NR	NR	NR
Coucill, 2001(4)	UK	Mild to moderately severe dementia	NR	NR	NR

Silberfeld , 2002(11)	Canada	Mild to moderate dementia	NR	NR	NR
Karlawish, 2008 [b](8)	United States	Mild to moderate dementia	NR	NR	NR
Charlesworth, 2008(8)	UK	Dementia/not indicated	NR	RCT	NR
Lopez-Bastida, 2006(12)	Spain	Mild to severe dementia	NR	NR	NR
Dixon, 2006(35)	UK	Dementia/not indicated	NR	NR	NR
Andrén and Elmstahl, 2008(36)	Sweden	Mild to moderate dementia	NR	NR	NR
Serrano-Aguilar, 2006(37)	Spain	Dementia/not indicated	NR	NR	NR

NR, Not reported; RCT, randomised clinical trial.

Table A2: Participant characteristics in studies in the systematic review for dementia (WP 1.1)

Ref Man ID	Study ref Author, Year	Number of participants recruited	Age in years mean (sd); range	male %	Ethnicity (%)	Other characteristics (%)	Missing data (patients completing study) include reasons for non-completion if given
	Wolfs, 2008(31)	Intervention: 137 Control: 93	Intervention: 78.3 Control: 77.3	NR	NR	NR	NR
	Karlawish, 2008[a](3)	93	77	NR	NR	NR	NR
	Boström, 2007(14)	Alzheimer'd disease:34 Dementia with Lewi's bodies:34	Alzheimer'd disease:78.2 Dementia with Lewi's bodies:77.4	NR	NR	NR	NR
	Wolfs, 2007(26)	196	77.8	NR	NR	NR	NR
	Jönsson, 2006[a](6)	208	75.9	NR	NR	NR	NR
	Jönsson, 2006[b](38)	208	75.9	NR	NR	NR	NR
	Naglie, 2006(7)	60	78.6	NR	NR	NR	NR
	Vogel,2006 (15)	48	77	NR	NR	NR	NR
	Bryan, 2005(10)	64	76	NR	NR	NR	NR
	Selwood, 2005(9)	24	81.5	NR	NR	NR	NR
	Andersen, 2004 (33)	211	78.1	NR	NR	NR	NR
	Ankri, 2003(5)	142	82.9	NR	NR	NR	NR
	Thorgrimsen, 2003(13)	Sample 1: 60 Sample 2: 201	Sample 1: 81 Sample 2: 85	NR	NR	NR	NR
	Coucill, 2001(4)	64	76	NR	NR	NR	NR
	Silberfeld , 2002(11)	20	79	NR	NR	NR	NR
	Karlawish, 2008 [b](8)	100	77	NR	NR	NR	NR
	Charlesworth, 2008(39)	Intervention: 116 Control: 120	Intervention: 79 Control: 78	NR	NR	NR	NR
	Lopez-Bastida, 2006(12)	237	75.5	NR	NR	NR	NR

Dixon, 2006(35)	64	80	NR	NR	NR	NR
Andrén and Elmstahl, 2008(36)	130	61	NR	NR	NR	NR
Serrano-Aguilar, 2006(37)	237	75.5	NR	NR	NR	NR

SD, standard deviation; NR, not reported;

Table A3: Valuation and descriptive methods used in studies in the systematic review for dementia (WP 1.1)

Study ref Author, Year	GENERIC MEASURES Descriptive system	Tariff used	Mean (SD); 95% CI	OTHER MEASURES USED Condition-specific HRQL measures	Clinical measures	Qualitative questions	Missing data; completion rates of measures; etc.
Wolfs, 2008(31)	EQ-5D	NR	NR	None	MMSE	NR	NR
Karlawish, 2008[a] (3)	EQ-5D	NR	NR	QoL-AD	MMSE	NR	Self-reported EQ-5D: 99% completion rate
	HUI	NR	NR				
Boström, 2007(14)	EQ-5D	NR	NR	QoL-AD	MMSE	NR	NR
Wolfs, 2007(26)	EQ-5D	NR	NR	EQ-5D-C	MMSE	NR	NR
Jönsson, 2006[a](6)	EQ-5D	NR	NR	None	MMSE	NR	Self-reported completion rate in patients with moderate to severe dementia :13% Overall completion rate:50%
Jönsson, 2006[b] (38)	EQ-5D	NR	NR	None	MMSE	NR	NR
Naglie, 2006(7)	EQ-5D	NR	NR	None	MMSE	NR	NR
	HUI	NR	NR				
Naglie, 2006(7)	EQ-5D	NR	NR	None	MMSE	NR	NR
	HUI	NR	NR				
Vogel,2006 (15)	EQ-5D	NR	NR	QoL-AD	MMSE	NR	NR
Bryan, 2005(10)	EQ-5D	NR	NR	NPI BALDS	MMSE	NR	NR
Selwood, 2005(9)	EQ-5D	NR	NR	QoL-AD Dementia QoL	MMSE	NR	NR

Andersen, 2004 (33)	EQ-5D	Mapped from ADL	NR	ADL	MMSE	NR	NR
Ankri, 2003(5)	EQ-5D	NR	NR	None	MMSE	NR	Completion rate in moderate to severe dementia:< 63% 22% of patients gave no response
Thorgrimsen, 2003(13)	EQ-5D	NR	NR	QoL-AD Dementia QoL	MMSE	NR	NR
Coucill, 2001(4)	EQ-5D	NR	NR	None	CDR scale	NR	NR
	SF-12	NR	NR				
Silberfeld , 2002(11)	EQ-5D HUI QWB	NR NR NR	NR	None	MMSE	NR NR	NR
Karlawish, 2008[b](8)	EQ-5D	NR	NR	QoL-AD IADL BADL	MMSE	NR	NR
	SF-36	NR	NR				
Charlesworth, 2008(39)	EQ-5D	NR	NR	None	NR	NR	NR
Lopez-Bastida, 2006(12)	EQ-5D	NR	Patient (self-report): 0.29 Carers (proxy-report): 0.67	None	CDR scale	NR	NR
Dixon, 2006(35)	EQ-5D	NR	NR	None	NR	NR	NR
Andrén and Elmstahl, 2008(36)	EQ-5D	None	NR	None	MMSE	NR	NR
Serrano-Aguilar, 2006(37)	EQ-5D VAS	None	NR	None	NR	NR	NR

BADLS, Bristol Activities of Daily Living Scale; BADL, basic activities of daily living; CDR, Clinical Dementia Rating; EQ-5D+C, EQ-5D with a cognitive dimension; HUI, Health Utility Index; IADL, Instrumental Activities of Daily Living; MMSE, Mini-Mental State Examination; NPI, Neuropsychiatric Inventory; QoL-AD, Quality of Life–Alzheimer's Disease; QWB, Quality of Well being.

Table A4: Acceptability, reliability and validity assessment in studies in the systematic review for dementia (WP 1.1)

Author, Year	Method of measuring validity Type of validity, how (e.g. known group/convergent)?	Validity results Group A(n) vs. Group B(n)[ø] Mean EQ-5D; mean difference in EQ-5D	Authors' conclusions/notes
Karlawish, 2008[a] (3)	Known-group validity	No association between EQ-5D and disease-specific scores MMSE (P = 0.16).	
	Convergent validity	No association between EQ-5D and QoL-AD (P < 0.01).	
	Convergent validity	NR	Lack of association between self- and proxy EQ-5D ratings.
	Acceptability: % self-completion by severity class	Mild dementia: 99%	
	Reliability: test-retest	NR	Carers's response had higher reliability than self-reported
Boström, 2007(14)	Convergent validity	NR	No correlation between proxy and self-reported HR-QoL.
Jönsson, 2006[a](6)	Known-group validity	NR	No correlation between MMSE and patient-reported EQ-5D scores for mobility, pain/discomfort, and anxiety/depression. Discrepancy between patient and proxy ratings, even in the mild stage of dementia.
	Acceptability: % self-completion by severity class	Moderate to severe dementia :13% Overall completion rate:50%	
Naglie, 2006(7)	Reliability	Mean patient self-reported EQ-5D scores were significantly higher than mean proxy scores (P < 0.0001).	Proxy ratings did not accurately reflect patient self-ratings.
	Convergent validity	NR	EQ-5D score has strong correlation with QWB and HUI
	Reliability: test-retest	NR	VAS unreliable in patients with mild and moderate dementia.

	Feasability: Average completion time	Patients: 15.3 minutes Carers:2.3	
	Feasability: % self-completion	Carers: 90%	
Vogel,2006 (15)	Convergent validity	NR	Lack of correlation between self- and proxy ratings. Patients reported significantly higher EQ-5D scores for mobility, self-care, and usual activities compared to proxies (P < 0.001).
Bryan, 2005(10)	Construct validity: correlation between specific domains of EQ-5D and disease specific measures	Usual activities and BALDS (clinicians): r = 0.87, P < 0.01 Anxiety/ depression and NPI (carers): r = 0.57, P < 0.01	Data provided by clinicians had higher construct validity for more observable EQ-5D domains. Data provided by carers had higher construct validity for less observable domains.
Selwood, 2005(9)	Convergent validity: correlation of EQ-5D scores with those of QoL-AD and dementia QoL	QoL-AD: r = 0.72, P < 0.01 dementia QoL: r = 0.63, P < 0.01	EQ-5D correlated with QoL-AD and dementia QoL.
Ankri, 2003(5)	Reliability: agreement between different raters (kappa statistics)	Patients and carers: Kappa < 0.5 for all domains except mobility. Family and institutional carers: Kappa < 0.5 for all domains except mobility.	Poor agreement between dementia patients and carers, as well as between family and institutional carers, except for mobility domain. VAS had poor reliability for dementia patients
	Acceptability: % self-completion by severity class	Moderate to severe dementia:< 63% 22% of patients gave no response	The severity of dementia influences acceptability of EQ-5D in patients.
	Feasability: Average completion time	4.1 minutes	
	Known-group validity	NR	No correlation between patients rated EQ-5D domains and dementia severity, except for a positive association between the anxiety/depression and MMSE.
Thorgrimsen, 2003(13)	Convergent validity: correlation of EQ-5D and QoL-AD scores	R=0.54, p<0.001	EQ-5D scores reported by patients correlated with QoL-AD scores.
	Content validity	Participants indicated more HRQOL attributes than included in EQ-5D (e.g., boredom, loneliness, loss of role, food and drinks)	
Coucill, 2001(4)	Reliability: agreement between different raters (kappa statistics)	Patients, carers and physicians: Kappa < 0.5 for all domains except mobility.	Weak agreement between patients, carers and physicians and between carers and

		Carers and physicians: Kappa < 0.5 for all domains except mobility.	physicians, except for mobility domain.Uncertainty about the severity of dementia at which patients are able to provide valid ratings.
Silberfeld , 2002(11)	Content validity	EQ-5D has less HRQoL attributes than QWB. Patients and carers identified more dementia-related HR-QoL attributes associated with physical function (fatigue, sleep disturbances, loss of appetite, incontinence), emotional well-being (religion, personal losses), cognition (memory, reading, communication) and functional well-being (driving, exercising, travelling).	
Karlawish, 2008[b](8)	Known-group validity	No association between patient proxy EQ-5D scores and MMSE (P = 0.13).	
		No association between patient proxy EQ-5D scores and QoL-AD, IADL, and BADL (P < 0.0001).	

BADLS, Bristol Activities of Daily Living Scale; BADL, basic activities of daily living; CDR, Clinical Dementia Rating; HUI, Health Utility Index; IADL, Instrumental Activities of Daily Living; MMSE, Mini-Mental State Examination; NPI, Neuropsychiatric Inventory; QoL-AD, Quality of Life–Alzheimer's Disease; QWB, Quality of Well being.

Table A5: Responsiveness assessment in studies in the systematic review for dementia (WP 1.1)

Author, Year	Method of measuring responsiveness (e.g. effect sizes, statistical significance)	Responsiveness results	Authors' conclusions/notes
Karlawish, 2008[a] (3)	Tendency towards a single level response	More than one-third of patients rated themselves at the highest level of HRQoL for several or all five EQ-5D dimensions	Ceiling effect for patient self-ratings.
Naglie, 2006(7)	Tendency towards a single level response	More than one-third of patients rated themselves at the highest level of HRQoL for several or all five EQ-5D dimensions	Ceiling effect for patient self-ratings with EQ-5D, but not with QWB and HUI.
Coucill, 2001(4)	Tendency towards a single level response	More than one-third of patients rated themselves at the highest level of HRQoL for several or all five EQ-5D dimensions	Ceiling effect' for patient ratings.

Table A6: Fields collected in the hospital organisational checklist of the NAD

Hospital code
Contact details of data collector (Name, Job title; Email address; Telephone)
GOVERNANCE
A care pathway for patients with dementia is in place?
The care pathway is adaptable for use within or fitted to the following existing care pathways: acute, palliative, end of life?
A senior clinician is responsible for implementation and/or review of the care pathway?
Senior clinician who leads the work of the hospital or Trust on this
There is a named officer with designated responsibility for the protection of vulnerable adults?
The Executive Board regularly reviews information collected on:
– Re-admissions, in which patients with dementia can be identified in the total number of patients readmitted?
– Delayed discharge/transfers, in which patients with dementia can be identified in the total number of patients with delayed discharge/transfers?
The Executive Board regularly reviews the number of in-hospital falls and the breakdown of the immediate causes, in which patients with dementia can be identified?
The Executive Board regularly receives feedback from the following:
Clinical Leads for older people and people with dementia including Modern
– Matrons/Nurse consultant?
– Complaints – analysed by age?
– Patient Advice and Liaison Services – in relation to services for older people and people with dementia?
– Patients forums or Local Involvement Networks – in relation to services for older people and people with dementia?
There is a process in place to regularly review hospital discharge policy and procedures, as they relate to people with dementia?
Nursing staff have access to a recognised process to record and report risks to patient care if they believe ward staffing is inadequate?
There are champions for dementia at Directorate level, Ward level?
Comments on Governance
SECTION 2: DELIVERY OF CARE
Multidisciplinary assessment includes:
– Problem list?
– Comorbid conditions?

- Current medication including dosage and frequencies?
- Assessment of functioning using a standardised instrument – i.e. basic activities of daily living, instrumental activities of daily living, mobility?
- Assessment of mental state using a standardised instrument – i.e. mental status (cognitive) testing?
- Nutritional status?

As part of initial assessment, the patient's BMI (Body Mass Index) or weight is recorded, wherever possible?
Social and environmental assessment includes support provided to the person 'informally'?
Social and environmental assessment includes care provision assessment?
Social and environmental assessment includes financial support assessment?
Social and environmental assessment includes home safety assessment?
Wards' adherence to protected mealtimes is reviewed and monitored?
Comments on Delivery of Care

MENTAL HEALTH NEEDS

There are policies or guidelines in place to ensure that patients with dementia or cognitive impairment are assessed for the presence of delirium at presentation?
There are policies or guidelines in place to ensure that patients with dementia or cognitive impairment with behaviour changes suggesting the presence of delirium, are clinically assessed by a healthcare professional who is trained and competent in the diagnosis of delirium?
There are systems in place to ensure that where dementia is suspected but not yet diagnosed, this triggers a referral for assessment and differential diagnosis either in the hospital or in the community (memory services)?
There is a policy or guideline stating that an assessment of mental state is carried out on all patients over the age of 65 admitted to hospital?
There is a protocol in place governing the use of interventions for patients displaying violent or challenging behaviour, aggression and extreme agitation, which is suitable for use in patients who present behavioural and psychological symptoms of dementia?
The protocol specifies that restraint and sedation is used only as a final option?
The protocol specifies consideration of physical causes which may cause challenging behaviour in people with dementia?
The protocol considers environmental factors such as noise, lack of activity, disorientation?
The protocol specifies the possibility of using techniques of reassurance de-escalation, distraction?
The protocol specifies the risks that must be assessed and taken into account before any use of restraint or sedation in people with dementia and the frail elderly?
The protocol specifies any prescription and administration of antipsychotic drugs is in line with NICE guidance?

There is a section or prompt in the general hospital discharge summary for mental health diagnosis and management?

Comments on Mental Health needs

DISCHARGE AND TRANSFER POLICIES

The discharge policy states that discharge should be an actively managed process which begins within 24 hours of admission?

The discharge policy specifies that:

- Discharge should take place during the day?
- Relatives and carers should be informed and updated about the prospective discharge date?

Information about discharge and support (written in plain English or Welsh, and available in other appropriate languages) is made available to patients and their relatives?

The discharge policy specifies that this information is made available to patients and their relatives on admission?

The written information about discharge provided to patients and relatives contains information about organisations representing people with dementia and carers?

The transfer policy specifies that:

- The transfer policy can be part of the discharge policy?
- People with dementia should be moved only for reasons pertaining to their care and treatment?
- The move should take place during the day?

Relatives and carers should be kept informed of any moves within the hospital

Comments on Discharge and transfer policies

INFORMATION

There is a formal system (pro-forma or template) in place for gathering information pertinent to caring for a person with dementia?

Information collected by the pro-forma includes personal details, preferences and routines?

Information collected by the pro-forma includes reminders or support with personal care?

Information collected by the pro-forma includes recurring factors that may cause of exacerbate distress?

Information collected by the pro-forma includes support or actions that can calm the person if they are agitated?

Information collected by the pro-forma includes details of life details which aid communication?

The form prompts staff to approach carers or relatives to collate necessary information?

Comments on Information

RECOGNITION OF DEMENTIA

There is a system in place across the hospital that ensures that all staff in the ward or care area are aware of the person's dementia or condition and how it affects them? Please say what this system is?

There is a system in place across the hospital that ensures that staff from other areas are aware of the

person's dementia or condition whenever the person accesses other treatment areas? Please say what this system is?

The patient's notes are organised in such a way that it is easy to:

- Identify any communication or memory problems?
- See the care plan?

There is a system in place to ensure that carers are advised about obtaining carer's assessment and support?

There are clear guidelines regarding involvement of carers and information sharing. This includes:

Making sure the carer knows what information will be shared with them?

Asking the carer about the extent they prefer to be involved with the care and support of the person with dementia whilst in the hospital?

Asking the carer about their wishes and ability to provide care and support of the person with dementia post discharge?

Comments on Recognition of Dementia

TRAINING, LEARNING AND DEVELOPMENT

There is a training and knowledge framework or strategy that identifies necessary skill development in working with and caring for people with dementia?

Staff induction programmes include dementia awareness?

The following questions are about training that is provided to acute healthcare staff who are involved in the care of people with dementia (or suspected dementia):

- Dementia awareness training?
- Protection of vulnerable adults?
- How to support people with hearing/visual impairments?
- Mental Capacity Act?
- Communication skills specific for people with dementia?
- Approaches to behaviour that challenges including management of aggression and extreme agitation?
- Assessing risk whenever the use of restraint or sedation is considered?
- Involvement of people with dementia and carers and use of their experiences is included in the training for ward staff?
- Liaison teams from local mental health and learning disability services offer regular training for healthcare professionals in the hospital who provide care for people with dementia?

Comments on Training, learning and development

SPECIFIC RESOURCES SUPPORTING PEOPLE WITH DEMENTIA

The hospital has access to intermediate care services, which will admit people with dementia?

Access to intermediate care services allows people with dementia to be admitted to intermediate care

directly and avoid unnecessary hospital admission?

There is a named dignity lead to provide guidance, advice and consultation to staff?

There is a named person who takes overall responsibility for complex needs discharge and this includes people with dementia? This person has training in ongoing needs of people with dementia? This person has experience of working with people with dementia and their carers?

There is a social worker or other designated person responsible for working with people with dementia and their carers, and providing advice and support, or directing to appropriate organisations or agencies?

There is access to specialist assessment and advice on helping patients with dementia in their swallowing and eating?

Specialist assessment and advice can be obtained from:

- Speech and Language Therapist?
- Dietician?
- Other?

There is access to an interpreting service which meets the needs of people with dementia in the hospital?

There is access to advocacy services with experience and training in working with people with dementia?

Comments on Specific resources supporting people with dementia

LIAISON PSYCHIATRY

The hospital provides access to a liaison psychiatry service which can provide assessment and treatment to adults throughout the hospital?

The liaison service provides emergency/urgent assessment?

There is a named Consultant Psychiatrist?

The Consultant Psychiatrist has dedicated time in his/her job plan for the provision of this service?

The Consultant Psychiatrist specialises in the care and treatment of older people?

Liaison psychiatry is provided by a specialist mental health team?

The liaison service in your hospital regularly provides?

Times when liaison psychiatry is available

Where the liaison psychiatry team is based

Do all healthcare professionals who are part of the liaison psychiatry service have dedicated time?

If there is no specialist mental health team, who does provide liaison psychiatry/mental health input?

Extracted from the PDF file available on:

http://www.rcpsych.ac.uk/pdf/CCQI%20NAD%20organisational%20checklist%20round%202.pdf

Table A7: Fields collected in the Casenote audit of the NAD

Hospital code
Has the patient been in hospital for 5 days or longer?
Case note number
Has this case note been selected as a data reliability check?
Contact details of data collector (Name, Job title; Email address; Telephone)
INFORMATION ABOUT THE PATIENT
Age, Gender, Ethnicity, First language, Ward Speciality (where patient spent the longest period during the admission), Death at the hospital, Self-discharge, End of Life Care or End of Life Pathway, Admission date, Discharge or Death date, Place of Living or Care before Admission, Place of Living or Care after Discharge, Comments about Patient
ASSESSMENT
Has the patient's mental health history been recorded – dementia or other conditions or symptoms?
COMPREHENSIVE ASSESSMENT OF THE OLDER PERSON
MULTIDISCIPLINARY ASSESSMENT:
The multidisciplinary assessment includes problem list?
The multidisciplinary assessment includes comorbid conditions?
The assessment includes a record of current medication, including dosage and frequency?
The multidisciplinary assessment includes comorbid conditions?
An assessment of nutritional status was performed by a healthcare professional?
The assessment of nutritional status includes recording of BMI (Body Mass Index)/weight?
Has a formal pressure sore risk assessment been carried out and score recorded?
As part of the multidisciplinary assessment has the patient been asked about any continence needs?
As part of the multidisciplinary assessment has the patient been asked about the presence of any pain?
Has an assessment of functioning, using a standardised assessment, been carried out?
MENTAL ASSESSMENT:
Has a standardised mental status test been carried out? (e.g. MMSE)
Has an assessment been carried out for recent changes or fluctuation in behaviour that may indicate the presence of delirium?
Has the patient been clinically assessed for delirium by a healthcare professional?
SOCIAL AND ENVIRONMENTAL ASSESSMENT:
Has a need for care assessment by a social worker been identified?
Has a care assessment by a social worker been requested?

Has a care assessment by a social worker been carried out?
Did the assessment include an assessment of support provided to the person 'informally'?
Did the assessment include a formal care provision assessment?
Did the assessment include a financial support?
Did the assessment include a home safety?

INFORMATION ABOUT THE PERSON WITH DEMENTIA:
Does the care assessment contain a section dedicated to collecting information from the carer, next of kin or a person who knows the patient well?
Has information been collected about the patient regarding reminders or support with personal care?
Has information been collected about the patient regarding recurring factors that may cause of exacerbate distress?
Has information been collected about the patient regarding support or actions that can calm the person if they are agitated?
Has information been collected about the patient regarding details of life details which aid communication?
Has information about support on discharge been given to the patient and/or the carer?

DISTRESS, AGITATION AND BEHAVIOUR THAT CHALLENGES:
Has this patient had antipsychotic drugs at any point during admission (whether or not prescribed in the hospital)?
On admission, was the patient taking antipsychotics due to an existing regular prescription?
Was a PRN prescription for antipsychotics in place for this admission?
Was an antipsychotic administered via PRN?
Was a new or additional prescription made for an antipsychotic?
What was the main or primary reason recorded for prescription of antipsychotics?
What are the other reasons recorded for prescription of antipsychotics?

DISCHARGE

ASSESSMENT BEFORE DISCHARGE
At the point of discharge the patient's level of cognitive impairment, using a standardised assessment, was summarised and recorded?
At the point of discharge the cause of cognitive impairment was summarised and recorded?
Have there been any symptoms of delirium?
Have the symptoms of delirium been summarised for discharge?
Have there been any persistent behavioural and psychiatric symptoms of dementia (wandering, aggression, shouting) during this admission?

Have the symptoms of behavioural and psychiatric symptoms of dementia been summarised for discharge?
Is there any record in the discharge summary/notes that there is a prescription of antipsychotics that is being continued post discharge?

DISCHARGE COORDINATION AND MULTIDISCIPLINARY TEAM INPUT:
Did a named person coordinate the discharge plan?
Is there evidence in the notes that the discharge coordinator/person planning discharge has discussed appropriate place of discharge and support needs with the person with dementia?
Is there evidence in the notes that the discharge coordinator/person planning discharge has discussed appropriate place of discharge and support needs with the person's carer/relative?
Is there evidence in the notes that the discharge coordinator/person planning discharge has discussed appropriate place of discharge and support needs with the consultant responsible for the patient's care?
Is there evidence in the notes that the discharge coordinator/person planning discharge has discussed appropriate place of discharge and support needs with other members of the multidisciplinary team?
Has a single plan for discharge with clear updated information been produced?
Are any support needs that have been identified documented in the discharge plan or summary?
Has the patient and/or carer received a copy of the plan or summary?

DISCHARGE PLANNING:
Was discharge planning initiated within 24 hours of admission?
Reason why discharge planning could not be initiated within 24 hours

SUPPORT FOR CARERS AND FAMILY:
Carers or family have received notice of discharge and this is documented?
An assessment of the carer's current needs has taken place in advance of discharge?
Comments about Discharge

LIAISON PSYCHIATRY

Has any referral been made to psychiatric consultation/liaison?
Has any need for referral to liaison psychiatry been noted on admission or during further assessment?
Has a follow up referral to community based mental health services been made on discharge?
Is it stated whether the referral was emergency, urgent or routine?
Time between referral and assessment
What was the main reason given for referral?
Comments about Liaison Psychiatry

RECORD KEEPING

	Is information about the person's dementia quickly found in a specified place in the file?
	Is information about related care and support needs quickly found in a specified place in the file?
	In your opinion, how would you rate the organisation of this case note?
	Comments about Record Keeping

[a] conducted on admission or after patient is well enough

Extracted from the PDF file available on:

http://www.rcpsych.ac.uk/pdf/CCQI%20NAD%20casenote%20audit%20round%202.pdf

Reference List

(1) Longworth L, Yang Y, Young T, Mulhern B, Hernandez AM, Mukuria C, et al. Use of generic and condition-specific measures of health-related quality of life in NICE decision-making: A systematic review, statistical modelling and survey. Health Technol Assess 201418(9):1-224. Available from: URL: http://www.journalslibrary.nihr.ac.uk/__data/assets/pdf_file/0008/108368/FullReport-hta18090.pdf

(2) Hounsome N, Orrell M, Edwards RT. EQ-5D as a quality of life measure in people with dementia and their carers: evidence and key issues. Value Health 2011 Mar;14(2):390-9.

(3) Karlawish JH, Zbrozek A, Kinosian B, Gregory A, Ferguson A, Glick HA. Preference-based quality of life in patients with Alzheimer's disease. Alzheimers Dement 2008 May;4(3):193-202.

(4) Coucill W, Bryan S, Bentham P, Buckley A, Laight A. EQ-5D in patients with dementia: an investigation of inter-rater agreement. Med Care 2001 Aug;39(8):760-71.

(5) Ankri J, Beaufils B, Novella JL, Morrone I, Guillemin F, Jolly D, et al. Use of the EQ-5D among patients suffering from dementia. J Clin Epidemiol 2003 Nov;56(11):1055-63.

(6) Jonsson L, Andreasen N, Kilander L, Soininen H, Waldemar G, Nygaard H, et al. Patient- and proxy-reported utility in Alzheimer disease using the EuroQoL. Alzheimer Dis Assoc Disord 2006 Jan;20(1):49-55.

(7) Naglie G, Tomlinson G, Tansey C, Irvine J, Ritvo P, Black SE, et al. Utility-based Quality of Life measures in Alzheimer's disease. Qual Life Res 2006 May;15(4):631-43.

(8) Karlawish JH, Zbrozek A, Kinosian B, Gregory A, Ferguson A, Low DV, et al. Caregivers' assessments of preference-based quality of life in Alzheimer's disease. Alzheimers Dement 2008 May;4(3):203-11.

(9) Selwood A, Thorgrimsen L, Orrell M. Quality of life in dementia--a one-year follow-up study. Int J Geriatr Psychiatry 2005 Mar;20(3):232-7.

(10) Bryan S, Hardyman W, Bentham P, Buckley A, Laight A. Proxy completion of EQ-5D in patients with dementia. Qual Life Res 2005 Feb;14(1):107-18.

(11) Silberfeld M, Rueda S, Krahn M, Naglie G. Content validity for dementia of three generic preference based health related quality of life instruments. Qual Life Res 2002 Feb;11(1):71-9.

(12) Lopez-Bastida J, Serrano-Aguilar P, Perestelo-Perez L, Oliva-Moreno J. Social-economic costs and quality of life of Alzheimer disease in the Canary Islands, Spain. Neurology 2006 Dec 26;67(12):2186-91.

(13) Thorgrimsen L, Selwood A, Spector A, Royan L, de Madariaga LM, Woods RT, et al. Whose quality of life is it anyway? The validity and reliability of the Quality of Life-Alzheimer's Disease (QoL-AD) scale. Alzheimer Dis Assoc Disord 2003 Oct;17(4):201-8.

(14) Bostrom F, Jonsson L, Minthon L, Londos E. Patients with dementia with lewy bodies have more impaired quality of life than patients with Alzheimer disease. Alzheimer Dis Assoc Disord 2007 Apr;21(2):150-4.

(15) Vogel A, Mortensen EL, Hasselbalch SG, Andersen BB, Waldemar G. Patient versus informant reported quality of life in the earliest phases of Alzheimer's disease. Int J Geriatr Psychiatry 2006 Dec;21(12):1132-8.

(16) Royal College of Nursing. The Triangle of Care. Carer's included: A guide to best practice for dementia care. 2013.

(17) Royal College of Psychiatrists. National Audit of Dementia: Care in General Hospitals. 2010.

(18) Royal College of Psychiatrists. National Audit of Dementia care in general hospitals 2012-13: Second round audit report and update. London: Health Quality Improvement Partnership; 2013.

(19) Royal College of Psychiatrists. Report of the National Audit of Dementia Care in General Hopstials. London: Healthcare Quality Improvement Partnership; 2011.

(20) The Alzheimer's Society. Counting the Cost. Caring for people with dementia on hospital wards. 2009.

(21) The Alzheimer's Society. Support, Stay, Save. Care and support of people with dementia in their own homes. 2011.

(22) British Geriatric Society. Delirious about dementia. 2005.

(23) Royal College of General Practitioners. Guidance and competences for the provision of services using general practitioners with special interests in dementia. 2013.

(24) European Medicines Agency.
Guideline on clinical investigation of medicinal products in the treatment of Parkinson's disease . 2012.

(25) European Medicines Agency. Guideline on medicinal products for the treatment of alzheimers disease and other dementias. 2008.

(26) Wolfs CA, Dirksen CD, Kessels A, Willems DC, Verhey FR, Severens JL. Performance of the EQ-5D and the EQ-5D+C in elderly patients with cognitive impairments. Health Qual Life Outcomes 2007;5:33.

(27) Mulhern B, Rowen D, Brazier J, Smith S, Romeo R, Tait R, et al. Development of DEMQOL-U and DEMQOL-PROXY-U: generation of preference-based indices from DEMQOL and DEMQOL-PROXY for use in economic evaluation. Health Technol Assess 2013 Feb;17(5):v-140.

(28) Krabbe PF, Stouthard ME, Essink-Bot ML, Bonsel GJ. The effect of adding a cognitive dimension to the EuroQol multiattribute health-status classification system. J Clin Epidemiol 1999 Apr;52(4):293-301.

(29) Loveman E, Green C, Kirby A, Takeda J, Picot J, Payne E, et al. The clinical and cost-effectiveness of Donepezil, Rivastigmine, Galantamine and Memantine for Alzheimer's Disease TA111. 2004.

(30) Peninsula Technology Assessment Group. The effectiveness and cost-effectiveness of donepezil, galantamine, rivastigmine and memantine for the treatment of Alzheimer's disease (review of TA111): a systematic review and economic model TA217. 2010.

(31) Wolfs CA, Kessels A, Dirksen CD, Severens JL, Verhey FR. Integrated multidisciplinary diagnostic approach for dementia care: randomised controlled trial. Br J Psychiatry 2008 Apr;192(4):300-5.

(32) Jonsson L, Bolinder B, Lundkvist J. Cost of hypoglycemia in patients with Type 2 diabetes in Sweden. Value Health 2006 May;9(3):193-8.

(33) Andersen CK, Wittrup-Jensen KU, Lolk A, Andersen K, Kragh-Sorensen P. Ability to perform activities of daily living is the main factor affecting quality of life in patients with dementia. Health Qual Life Outcomes 2004;2:52.

(34) Thorgrimsen L, Spector A, Wiles A, Orrell M. Aroma therapy for dementia. Cochrane Database Syst Rev 2003;(3):CD003150.

(35) Dixon S, Walker M, Salek S. Incorporating carer effects into economic evaluation. Pharmacoeconomics 2006;24(1):43-53.

(36) Andren S, Elmstahl S. Effective psychosocial intervention for family caregivers lengthens time elapsed before nursing home placement of individuals with dementia: a five-year follow-up study. Int Psychogeriatr 2008 Dec;20(6):1177-92.

(37) Serrano-Aguilar PG, Lopez-Bastida J, Yanes-Lopez V. Impact on health-related quality of life and perceived burden of informal caregivers of individuals with Alzheimer's disease. Neuroepidemiology 2006;27(3):136-42.

(38) Jonsson L, Eriksdotter JM, Kilander L, Soininen H, Hallikainen M, Waldemar G, et al. Determinants of costs of care for patients with Alzheimer's disease. Int J Geriatr Psychiatry 2006 May;21(5):449-59.

(39) Charlesworth G, Shepstone L, Wilson E, Reynolds S, Mugford M, Price D, et al. Befriending carers of people with dementia: randomised controlled trial. BMJ 2008 Jun 7;336(7656):1295-7.