THICKENED FLUIDS FOR PEOPLE WITH DEMENTIA IN RESIDENTIAL AGED CARE FACILITIES: A COMPREHENSIVE SYSTEMATIC REVIEW

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EXECUTIVE SUMMARY

Background: Dementia is an umbrella term for a large group of conditions that cause a progressive decline in a person’s functioning. Dementia is a progressive condition which causes cognitive and functional decline and, as part of this, the ability to swallow diminishes, a condition known as dysphagia. Aspiration of fluids is a common result of dysphagia and is a significant problem, both in terms of its effect on the patient and its cost to the community. In order to increase the viscosity of drinking fluids and thereby minimise the likelihood of aspiration, people with dementia living in residential aged care facilities (RACFs) are often prescribed thickened fluids.

Objectives: The overall objective of this comprehensive systematic review was to establish best practice in relation to thickened fluids for people living in RACFs to: establish factors associated with the prescription and administration of thickened fluid for people with dementia living in RACFs; assess the effectiveness of administering thickened fluids for people with dementia in RACFs in terms of adequate hydration, mortality, morbidity and patient comfort; identify attitudes of people with dementia in RACFs and their family/carers regarding the administration of thickened fluids; and identify attitudes of staff regarding the administration of thickened fluids for people with dementia in RACFs.

Search Strategy: English language articles published from 1995 to 2008 were sought in a comprehensive search of an extensive range of databases, online sources and unpublished literature.

Selection criteria: The review considered all types of studies which included the oral administration of fluids with the addition of commercial thickening agent to the liquid which may include: energy/nutritional supplements, juice, water, tea, coffee, cordial, milk drinks, etc., for the purpose of increasing the viscosity of the liquid to minimise the chance of aspiration for persons with dementia in residential aged care.

Data collection and analysis: Two independent reviewers assessed the eligibility of each study for inclusion into the review, critically appraised the study quality and extracted data using standardised tools. Any disagreements were adjudicated by a third reviewer.

MAIN FINDINGS

- Nine papers recommend the use of thickened fluids as a strategy to maintain adequate fluid intake for demented persons with dysphagia in RACFs. (Level III.c – IV evidence)
- Four papers directly recommend thickened fluids as an effective method of maintaining hydration for persons with dementia. (Level IV evidence)
- One study found that the use of thickened fluids was generally acceptable to older persons in the event of dementia and dysphagia and was more acceptable to the participants than the prospect of enteral feeding. (Level IV evidence)
- One study found that the practice of adding infant cereals to fluids as a thickening agent cannot be recommended due to concerns over dehydration and folate deficiency. (Level IV evidence)

CONCLUSION

There appears to be little specific data on the effectiveness of thickened fluids for people with dementia in residential aged care. Most included studies had mixed populations of demented and non-demented residents, making dementia-specific results impossible to quantify. From the retrieved data, evidence-based best practices cannot be concluded. It may, however, be cautiously inferred that thickened fluids may be effective for residents with dementia if set guidelines are instituted.
BACKGROUND
Dementia is an umbrella term for a large group of conditions that cause a progressive decline in a person’s functioning and cognition. There are different forms of dementia and each has its own causes, including Alzheimer’s disease, vascular dementia, fronto-temporal dementia and dementia with Lewy bodies.

Dysphagia, as well as other conditions (e.g. dependence for feeding; dependence for oral care; decayed teeth; number of medications taken) put people with dementia at risk of aspiration pneumonia. Aspiration of fluids is a common result of dysphagia and is a significant problem, both in terms of its effect on the patient and its cost to the community. US figures cited by Felt list common co-morbidities from dysphagia and their cost (2002):

- Pneumonia: mean hospital stay 5.8 days; mortality 5.56%; national cost $2 345 241 969USD
- Aspiration pneumonitis: mean stay 8.75 days; mortality 18.3%; national cost $5 737 998 273USD
- Dehydration: mean stay 4.11 days; mortality 2.87%; national cost $6 672 747 130USD

In order to increase the viscosity of drinking fluids (and thereby minimise the likelihood of aspiration and the other adverse events described above), people with dementia living in RACFs are often prescribed thickened fluids. These fluids are either commercially pre-thickened, or else produced by staff at RACFs, by adding a thickening agent to a beverage.

There is some evidence that thickened fluids are often not well accepted by patients. One reason is that the thickeners can suppress the flavour of the beverage to which they are added (e.g. juice, milk, water, coffee). Another aspect that may make a thickened fluid unpalatable is texture. University student participants in a study by Howarth et al. identified negative qualities and described thickened fluids as too lumpy, too gritty, not sweet enough, too smooth or slimy. A study conducted with eight patients with dysphagia found that the majority (six patients) reported that they did not like using a thickener.

A recently completed Australian study addressed the considerable variation in how the viscosity levels of thickened fluids are qualitatively described. The joint project between Speech Pathology Australia and the Dieticians’ Association of Australia established standardised definitions, terminology and names for texture modified foods and fluids within Australia. One finding of the project was that 39 different labels for thickened fluids were being used throughout Australia. Previous research conducted by the project’s consultant, Dr Julie Cichero, identified 12 different names that were being used for three different levels of fluid viscosity, amongst ten major hospitals in Brisbane.

Variations in the actual administration, in terms of “type of beverage used (e.g. milk, water, coffee), brand of thickener used, temperature of the fluid and time between preparation and delivery of thickened fluid”, should also be considered. For example, Glassburn and Deem found poor intersubject reliability between experienced speech language pathologists (SLP), in the SLP’s attempts to produce fluids of nectar and honey consistency. Intrasubject reliability was higher but still weak.
The effectiveness of thickened fluids in preventing aspiration has not been well established and much of the existing evidence in relation to this is mixed. However, it is known that dysphagia increases the risk of developing a lower respiratory tract infection (i.e. chest infection, pneumonia or aspiration pneumonia)\(^24\). Loeb et al.\(^25\) conducted a systematic review which investigated the effectiveness of interventions for preventing aspiration pneumonia in older adults, with one intervention being the administration of thickened fluids. The review found scant clinical trial data to support the administration of thickened fluids to reduce incidence of aspiration pneumonia.

A recently completed randomised controlled trial\(^26\) compared the effectiveness of two interventions in the prevention of liquid aspiration and aspiration pneumonia; two viscosities of thickened fluids (nectar consistency or honey consistency) and chin down positioning. The study, in which participants had either dementia, Parkinson’s disease or both conditions, contained two sequential trials. The initial trial (Part I) compared the short term effectiveness of the interventions in minimising aspiration, by observing participants during a Videofluoroscopic Swallow Study (VSS). The second trial (Part II) compared the effectiveness of the interventions over a longer time frame (three months), in preventing the development of aspiration pneumonia.

For participants in Part I, liquid thickened to honey consistency was most often successful in avoiding aspiration, followed by nectar-consistency liquid and then receiving thin fluids whilst in a chin-down position. For Part II, no significant difference was noted in the frequency of aspiration pneumonia between chin-down or thickened fluid groups (11.6% vs 9.8%). However, it was found that using honey-thickened liquids resulted in a more than twofold pneumonia risk, than using nectar-thickened liquid. This was even after risk factors such as dementia diagnosis or aspiration on all three interventions were adjusted for.

Concern has also been expressed that being restricted to thickened fluids may increase the likelihood of patients becoming dehydrated. Staff at Frazier Rehabilitation Centre in the United States developed and implemented a free-water protocol, after noting that patients who drank thin liquids, despite being supposed to only receive thickened fluids, did not develop aspiration pneumonia\(^27\). However, the protocol has been criticised because no large randomised controlled trial has investigated its effectiveness\(^27\). Garon et al.\(^28\) conducted a small, one year randomised controlled trial with two groups of stroke patients to evaluate the effectiveness of thickened fluids in preventing aspiration. Ten patients served as the control group and received thickened fluids only. The intervention group (n=10) received thickened fluids of the same consistency, but were also allowed access to water. There were no incidences within either group of aspiration pneumonia or dehydration during the study or during the 30 day follow-up. All except one of the controls reported displeasure with thickened fluids, citing reasons including: the thickened fluids did not quench their thirst, and they lacked flavour. All in the intervention group reported high satisfaction with access to water or ice chips, although the researchers were surprised that thickened fluid intake was still higher than water consumption for every patient in this group.

Another small study conducted by Scott and Benjamin\(^29\), suggested that a free water protocol may be useful for some patients. This study was conducted with 26 residents in an aged care setting (n = 14 with dementia). The research was prompted by observations of residents finding thickened fluids unappealing, staff expressing concern that residents were not receiving sufficient fluid and observations of residents covertly obtaining thin fluids, such as from a tap or a vase.
The benefits or adverse consequences of thickened fluids in terms of adequate hydration, mortality, morbidity and patient comfort are not clear. According to Robbins et al.30 “thickened liquids are prescribed broadly without instrumental evidence that the patient is actually aspirating on thin liquids. This standard of practice is occurring despite the possibility that remaining at a dietary level that provides satisfying liquid intake…may maximise quality of life for these older people” (p.427). As long as thickened fluids continue to be given to people with dementia living in RACFs, there is a need to establish an evidence base to support their prescription and administration.

OBJECTIVES
The overall objective of this systematic review was to establish best practice in relation to thickened fluids for people living in residential aged care facilities (RACFs) with the following specific aims:
1. To establish factors associated with the prescription and administration of thickened fluid for people with dementia living in RACFs.
2. To assess the effectiveness of administering thickened fluids for people with dementia in RACFs in terms of adequate hydration, mortality, morbidity and patient comfort.
3. To identify attitudes of people with dementia in RACFs and their family/carers regarding the administration of thickened fluids.
4. To identify attitudes of staff regarding the administration of thickened fluids for people with dementia in RACFs.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of participants
The review considered studies which included people with dementia living in RACFs who were receiving thickened fluids.

Types of interventions
The review considered studies that examined the oral administration of fluids with the addition of commercial thickening agent to the liquid. This may include: energy/nutritional supplements, juice, water, tea, coffee, cordial, milk drinks, etc., for the purpose of increasing the viscosity of the liquid to minimise the chance of aspiration.

Types of outcome measures
The review considered studies which included outcomes relating to the effectiveness of thickened fluids:
- Mortality
- Morbidity, number of people with complications (aspiration pneumonia, choking incidents, constipation, diarrhoea, vomiting, fluid refusal, anorexia, weight loss/gain, dehydration)
- Functional status (cognitive functioning, muscle functioning, mobility, ability to perform activities of daily living)
- Nutritional status (change in anthropometry)
- Economic considerations (e.g. wastage)

Outcomes relating to the prescription and administration of thickened fluids to people with dementia in RACFs:
Factors associated with the prescription and administration of thickened fluids to residents with dementia
Residents' and carers' attitudes regarding the administration of thickened fluids
Staff attitudes regarding the administration of thickened fluids

Types of studies
To investigate questions relating to the effectiveness of thickened fluids, the following study types were considered: randomised controlled trials, quasi-experimental studies, cohort studies, case control studies and observational studies without control group.

To investigate questions relating to the prescription and administration of thickened fluids, the following study types were considered: descriptive studies, qualitative studies (including ethnographies, phenomenologies, grounded theory studies) and discussion papers. In the absence of these, opinion papers or reports that met the inclusion criteria were included.

Language
Only studies in English were considered for inclusion. The authors acknowledge the possible bias this brings to the review.

SEARCH STRATEGY
The search strategy aimed to identify both published and unpublished studies, reported in English. A three-step strategy was followed, in which the initial phase consisted of searches of the CINAHL and MEDLINE databases to establish suitable search terms. Secondly, an extensive search was performed using the appropriate Subject Headings and/or keywords/phrase/strategy for each of the databases listed below. Finally, the reference lists of identified reports and articles were hand searched for additional studies. Searches are summarised in the table in Appendix 1.

Keywords
The searches were adapted from the MEDLINE search strategy using the following keywords or terms: dementia, Alzheimer disease, Alzheimer's disease, vascular dementia, deglutition disorders, dysphagia, energy intake or oral nutrition, diet therapy or dietary proteins, thick* agent or thick* liquid or thick* beverage, modified* agent or modified* liquid or modified* beverage, modified* fluid or modified* drink or thick* fluid or thick* drink, nutrit* support or nutrit* therapy or protein energy malnutrition, nurs* home or resident* facility or home* for age* or long-term care or age specific care. Complete search details are documented in Appendix 2.

Databases
Searches were conducted from 1995 - 2008. The databases searched were:
CINAHL, MEDLINE, EMBASE, PubMed, Ageline, APAIS Health, Australian Resource Centre of Healthcare Innovations (ARCHI), Health and Medical Complete, Health Reference Center Academic, Current Controlled Trials, Clinical Trials.gov, UK Clinical Research Network: Portfolio Database, Dissertations & Theses, The Trials Register of Promoting Health Interventions (TRoPHI), Health Source: Nursing/Academic Edition, SCOPUS, TRIP database, BioMed Central, Sociological Abstracts, National Health and Medical Research Council, Cochrane Library (All Cochrane Products), Health and Society, National Rehabilitation Information Center, Meditext, Academic Search Australian/New Zealand Reference, ECO and World Catalogue, Health Sciences Library and Informatics Center, National Guideline Clearinghouse, Health Technology Assessment Database.
Grey literature
The grey literature search consisted of searching reference lists of included articles, contacting authors who may be knowledgeable about the phenomena of interest to attempt to identify further published, un-published or ongoing studies and conducting a computer search within the following databases and websites:
- SIGLE (System for Information on Grey Literature in Europe)
- Science.gov (USA)
- Google Scholar
- CRISP (Computer Retrieval of Information on Scientific Projects)
- Health Research Projects in Progress (National Library of Medicine)
- New York Academy of Medicine Gray Literature Report
- SIGNPOST - Journal of Dementia and Mental Health for Older People
- ACQuiring Knowledge in Speech, Language and Hearing (Journal of the Speech Pathology Australia Association)
- American Speech and Hearing Association (ASHA) (http://www.asha.org/default.htm)
- National Institute of Clinical Studies
- Australian Centre for Evidence Based Clinical Practice (http://www.acebcp.org.au)
- Alzheimer’s Disease Education and Referral Centre Clinical Trials Database  
  *host:* Food and Drug Administration and the National Institute on Aging (http://www.alzheimers.org/trials/index.html)
- National Institutes of Health (NIH) Clinical Trials Database  
  *host:* NIH (http://clinicaltrials.gov/ct)
- National Institute of Clinical Studies  

Hand searching
Hand searching was conducted of the following specialised relevant journal that is not indexed on any electronic database or available online: *Perspectives in food and nutrition* (until 1998), which then changed its name to *Perspectives: nutrition news and views* (from 2003 until April 2008).

Unindexed Online Journals
Dementia through SAGE Journals Online; *Journal of Nutrition; Food Science and Technology International; Topics in Clinical Nutrition; Nutrition Clinics; Nutrition in Clinical Practice; Food Quality and Preference; Current Opinion in Clinical Nutrition and Metabolic Care; Nutrition in Clinical Care; Nutrition & Dietetics.*

METHODS OF THE REVIEW

Data Retrieval
All studies identified by the database searches were critically appraised by two independent reviewers for relevance to the review based on the title and abstract. For studies that appeared to meet the inclusion criteria, the full paper was retrieved and assessed for compliance to the review criteria. We were unable to retrieve one conference paper that appeared to be relevant, despite attempting to contact the authors.

Inclusion Criteria
Studies were deemed assessable for the review if they met the inclusion criteria as detailed above. To that end, a form detailing the inclusion criteria, and based on the
recommendations of the Cochrane Collaboration, was developed to standardise study inclusion and exclusion (see Appendix 3). This was used to assess the eligibility of all retrieved papers for appraisal and possible inclusion.

Criteria on which quality of studies were assessed
Quantitative studies were assessed by two independent reviewers for methodological quality prior to inclusion in the review using appraisal checklist instruments developed by the Joanna Briggs Institute (JBI) and based on the work of the Cochrane Collaboration and Centre for Reviews and Dissemination (Appendices 4 & 5). Data from qualitative studies were assessed using the Qualitative Assessment and Review Instrument (JBI-QARI) data extraction tool developed by JBI (Appendix 6). Opinion papers, discussion papers and letters were appraised using the Narrative, Opinion and Text Assessment and Review Instrument (JBI-NOTARI) data extraction tool developed by JBI (Appendix 7). Any disagreements arising between the reviewers were resolved by referring to a third reviewer.

Data extraction
Data from included quantitative studies were extracted using a data extraction tool developed by JBI (Appendices 8 and 9). Data from qualitative studies were extracted using JBI-QARI (Appendix 10) and conclusions/recommendations from non-research papers (such as opinion papers, discussion papers and letters) were extracted using JBI-NOTARI (Appendix 11).

Data synthesis
Due to significant heterogeneity, statistical pooling was not possible. Findings are summarised in narrative form instead for all study types.

RESULTS
Using the outlined search strategies in Appendix 2, 112 papers were identified for retrieval. After the removal of ten duplicates and following the process outlined above, 14 papers were included in the review (Appendix 12). Papers that did not meet the inclusion criteria, did not constitute primary research (e.g. literature or systematic reviews comprising sources outside the scope or timeframe of this review), or were of insufficient quality were excluded (Appendix 13).

The included papers comprised:

- One qualitative study
- Eight quantitative studies
  - One RCT
  - One retrospective audit
  - One mixed method experimental study
  - Three observational studies
  - Two descriptive studies
- Five textual papers
  - Two clinical guidelines
  - Three discussion papers

Due to significant heterogeneity of all included studies, results are presented in a narrative format.
Qualitative:

Only one qualitative study met the inclusion criteria for this review. This 2003 dissertation on factors influencing food and fluid consumption in persons with dementia in residential care utilised a social-ecological perspective within a mediational conceptual framework. The cross-sectional survey of one mealtime used a Structured Meal Observation tool which was designed to collect data on overall resident mealtime experience. Observations took place on-site over 2-10 work days between September 2001 and September 2002 with a six month follow-up until August 2003.

Participants consisted of 21 residents with dementia in 45 long-term care facilities in four US states. Four different types of facility were recruited: three residential care/assisted living (RC/AL) providing 24 hour supervision and one nursing home providing 24 hour nursing care. The total sample comprised 75% RC/AL and 25% nursing home. In addition to the residents, one direct care worker per resident and family members were also interviewed.

This study had two aims:

1) To evaluate the appropriateness of an observational tool for assessing residents’ mealtime experience.
2) To identify the determinants of adequate food and fluid intake for long-term care residents with dementia.

There were differences in prevalence of low food and low fluid intake between nursing home and RC/AL facilities. Nursing home residents were more likely to be assessed and treated for eating and drinking difficulties but also had a high prevalence of low food and low fluid intake compared to RC/AL residents. Environmental influences such as the less institutionalized setting of an RC/AL facility may offer one explanation for the difference.

Reed utilised multivariable logistic regression using the Generalized Estimating Equation (GEE) and found that overall there was a high prevalence of low food (54.1%) and low fluid (51.3%) intake among cognitively-impaired residents. The most important component of adequate food and fluid intake was likely to be staff monitoring. Other contributory factors included a non-institutional environment and facility type. This study found that having pureed food and/or thickened fluids did not emerge as significant. Therefore it was not included in subsequent analyses.

Quantitative:

Eight quantitative studies met the inclusion and quality criteria for this review. Steele et al assessed mealtime difficulties experienced by residents of a geriatric care facility. The researchers used observational cross-sectional analysis to quantify results from a mealtime screening tool with weighted scores according to resident disability. The tool was used daily during a single mealtime (either lunch or dinner) over a six week period.

Participants were 349 residents (mean age 87 years) requiring five different levels of care ranging from standard physical care to severe cognitive impairment care (numbers from each group: n=95, n=46, n=41, n=83 and n=85) recruited from a single geriatric care facility with almost 1000 residents accommodated variously in a seniors’ independent living area, a chronic care hospital and a home for the aged. Data assessed included: diet texture, fluid viscosity, assistance required, attitude towards eating, oral intake, seating, positioning problems, challenging behaviours,
dentition, specific eating problems, and time to complete meal. There was a wide variety of causes of mealtime difficulties and differing priorities per resident care category. There was a high prevalence of mealtime difficulties (87%) and of those, 68% were related to dysphagia, 46% to reduced oral intake, 35% due to positioning problems, and 40% due to challenging behaviours. Modified diets were prescribed for 48% of the sample and only 6% of the total sample were prescribed thickened fluids, most of whom (66%) required severe cognitive impairment care (SCI).

A notable finding was that those receiving SCI care had higher levels of oral intake than those on mild-moderate cognitive impairment units. Residents in this area appeared to have slow or absent swallows with associated coughing and choking during meals, however the area was staffed in anticipation of higher resident acuity and so residents received more assistance. The authors concluded that recognition of declining ability to eat independently needs to be given a high priority and recommend that residents are assessed appropriately on admission.

The findings highlight the low levels of use of thickened fluids across one large facility and the need for improved nutritional assessment of residents with deteriorating levels of cognition.

Smith, Sun and Pippin’s observational/exploratory mixed method study combined assessment, instrument evaluation, data collection, evaluation of process control and dissemination of results to assess the effectiveness, over a short period of time, of the fluid viscosity management process at two intermediate and skilled care nursing homes. Samples of thickened fluids (milk, water, juice, coffee) prepared by nursing home staff and about to be served to residents were tested for fluid viscosity by a line spread test (test not described by authors). The samples were collected at breakfast, lunch and dinner times, pre- and post-implementation of a training program for staff on preparing suitable fluids for dysphagia diets. The first data collection took place over six weeks but the report does not specify the second data collection period.

Data analysis showed that residents may be at risk of being offered unthickened or inappropriately thickened fluids. Following the education program the percentage of milk and water samples (n=25) that were unthickened fell from 18% to 12%. Following the study, one nursing home chose to use commercially pre-thickened liquids as a risk management strategy. Researchers identified a training need for health care providers in the evaluation of fluid viscosity and recommended the implementation of the line-spread test as a clinical tool for determining whether or not fluids were thickened adequately.

The observational study conducted by Philip and Greenwood examined the use of commercial infant cereals to thicken fluids for persons with swallowing problems. This study compared a regular fluid diet to a diet with fluids thickened with a commercial infant cereal (Pablum). Participants in the control group (regular fluids) were four men (mean age 88.5 yr, mean BMI 20.9) and 19 women (mean age 89.7yr, mean BMI 19.4). Participants in the experimental group (thickened fluids) were 2 men (mean age 89 yr, BMI 27.2 & 20.6) and 19 women (mean age = 84.0 years, mean BMI 22.3) who were already assessed as requiring, and receiving, thickened fluids. The intervention for this study involved replacing the usual commercial thickening agent with the infant cereal to assess the change in nutrient and water intake.

Despite the addition of infant cereal (Pablum) showing some benefits in terms of increased nutrient and energy intake, the researchers were unable to lower the risk of inadequate water and folate intake. The low folate intake was attributed by the
researchers to the infant cereal's low levels of this nutrient. Overall, cereal contributed 15% of energy intake for the treatment group. Weights for all groups remained stable. Of concern is the finding that water intake was reduced in participants receiving the thickened fluids. These participants were identified as only consuming 301ml (+/-103) daily, which is far below the average daily adult requirement of 1500ml. They concluded that Pablum should not be used as a sole-source thickening agent for fluids.

O'Loughlin and Shanley developed a dysphagia assessment and management training package, which included staff education about thickened fluids. This program recognised the prevalence of untrained staff in many aged-care facilities and included resources for registered nurses to provide education to these untrained staff. The program described in this study showed statistically significant improvements in applied knowledge pre and post-test, including at three month follow-up, clarity of Assistant-In-Nursing (A.I.N.) knowledge about swallowing management, and overall management pre-test and at 3 months. It is, however, unclear from the published results whether the researchers surveyed the A.I.N.s regarding this knowledge or whether this result was based solely on the RNs' perception of improved knowledge amongst A.I.N.s. The questions asked are related to opinion only, not confirmation of knowledge. What is clear from the results of this study is that education for nursing and other staff providing feeding assistance to residents with dysphagia is an important part of the safe administration of thickened fluids.

The need for staff education about dysphagia, safe feeding and thickened fluids was also highlighted by Kayser-Jones and Pengilly in their 1999 observational study. This multi-stage study used: 1) event analysis, 2) a participant observer portion, 3) in-depth interviews, 4) a nursing dysphagia assessment, 5) mealtime observations, to comprehensively examine factors that influence nutritional intake in nursing homes.

Of interest to this systematic review is the finding that 86% of all residents were severely or moderately cognitively impaired and of those 55% had some degree of dysphagia. Of these, only 22% had been evaluated by a speech or occupational therapist. Observations found that residents were fed inappropriate food and fluid consistencies. Only 6 residents had a physician's order for thickened fluids although 44 residents were identified as having some degree of dysphagia. The researchers concluded that dysphagia is under-recognized and staff members responsible for feeding residents with swallowing disorders have limited knowledge about how to feed them safely.

Low et al surveyed 52 non-demented, non-depressed nursing home residents (mean age 82.7 years) from six Australian residential nursing homes (five privately owned and one administered by a church organisation) from June-August 2000. The purpose was to examine their attitudes regarding hypothetical future treatment for recurrent aspiration pneumonia. Participants were asked to identify their preferences regarding nursing home versus acute hospital care in terms of: the use of antibiotics; artificial feeding or modified diet for swallowing difficulties, all in the context that they were suffering end-stage dementia.

After screening for cognitive impairment and depression using the Short Portable Mental Status Questionnaire (SPMSQ) and the Geriatric Depression Scale (GDS-15) respectively, participants were presented with a semi-structured questionnaire, visual materials (photographs) and a hypothetical scenario (below).
"Imagine yourself in a state where you have severe dementia. You have poor long-term and short-term memory and are unable to recognise even your close relatives (e.g. spouse, children). You are also unable to communicate, are incoherent, confused and require help in all activities of daily living, including feeding. On top of that, you have problems with feeding and swallowing and as a result, have had several episodes of pneumonia (lung infection) requiring admission to hospital." (p. 346)

Participants were then asked if in that situation they would agree to further hospitalisations, intravenous antibiotics, ventilatory support, artificial feeding (via a nasogastric tube or gastrostomy), a modified diet, or, receive an oral diet of choice with the accompanying risk of aspiration pneumonia. The majority of participants (61.5%) stated they would prefer acute hospital admission and receiving antibiotic treatment (73.1%) for recurrent aspiration pneumonia treatment rather than remain in the nursing home. A majority agreed with the use of a modified diet (blended, pureed, thickened) for swallowing difficulties (75%) but did not agree with tube feeding (69.2%) or gastrostomy feeding (71.2%).

The authors concluded that some elderly nursing home residents would elect relatively aggressive treatment for recurrent aspiration pneumonia, with a preference for acute hospital admission and antibiotic treatment rather than continued nursing home care and that they are more conservative in relation to mode of nutrition, reporting greater acceptance of a modified diet (including thickened fluids) than artificial means of nutrition.

Castellanos et al's descriptive study provides a systematic collection of prevalence data on thickened fluid administration in residential care settings. Using a standardised recording sheet, this study collected data from 252 skilled nursing facilities (SNFs) across 41 US states in May 2002. Data was collected on 25,470 residents regarding: number receiving thickened fluids, thickness type, number of residents requiring feeding assistance, percentage of residents on thickened fluids who had been assessed by barium swallow, census and capacity, county/state facility location, payment source per resident, average monthly admissions, speech pathologist (SLP) hours per week, registered dieticians' (RD) hours per week, RD & SLP collaboration (hours per month). The study provides the first comparison of thickened fluid use per participating facility, with United States national and regional averages. There is considerable variation in the administration of thickened fluids across SNFs (0%-28%) and across regions (5.4% - 10.9%) suggesting a multi-factorial effect on rate of thickened fluid use as well as lack of a national evidence-based standard in the United States.

An average of 8.3% residents received thickened fluids while 30-90% were estimated to have dysphagia and considered to be at high risk for dehydration and aspiration pneumonia although there is limited data on prevalence of dysphagia. The researchers conclude that, as part of quality assurance and improvement programs, dieticians and speech and language pathologists may want to determine the thickened liquid use in their facility for comparisons with regional and national data. They also recommend that if percentages fall outside the national averages there may be a need to investigate if the facility is offering optimal care in relation to dysphagia management. The number of residents receiving thickened fluids should be taken into account when evaluating the staffing needs and the financial resources required to provide thickened liquids to these patients. This evaluation would justify the need for dieticians to identify the most effective and efficient systems by which these liquids are procured, prepared and delivered.
Germain et al\textsuperscript{4} conducted a randomised controlled trial in a Canadian residential aged care facility to examine the effectiveness of a novel dysphagia diet (which included thickened fluids) compared to the standard facility diet. Participants were residents between 65-90 years old, who had been at the centre more than three months and experienced an involuntary weight loss greater than 7.5\% of their usual weight or had a BMI of <24 and who screened positive for swallowing problems.

The control group (n=9) received traditional modified textured diets with three levels: 1) minced-70; 2) minced-3; 3) pureed diet and one (uncontrolled) consistency of thickened fluids – honey consistency. Diets were tailored to the subject’s specific needs. The experimental group (n=8) received Sainte-Anne’s Hospitals’ reformed food diet (three levels of pureed and minced food, and three consistencies of fluid: Nectar, Honey & Pudding) and dietary supplements as required. Anthropometric data was measured at baseline, six and twelve weeks.

This study found that a reformed diet of minced/pureed foods and thickened fluids can demonstrate a significant change in dietary intake resulting in weight gain for an undernourished, elderly group with dysphagia and some cognitive decline when compared to a traditional modified-textured diet. It also demonstrated that a change in thickened fluid (type and range offered) may be beneficial for residents with dementia who require thickened fluids. Unfortunately for the purposes of this review the study does not provide data about hydration, or separate effectiveness data for thickened fluids.

**Textual Data:**

Five textual papers met the inclusion and quality criteria for this review. Thomas et al\textsuperscript{10} reported on the development of a clinical guideline to prevent and manage malnutrition in long-term care (LTC) in the presence of dysphagia. ‘The Clinical Guide to Prevent and Manage Malnutrition in LTC’ offers a best-practice approach to the management of nutritional problems in LTC facilities. The Council for Nutritional Clinical Strategies in LTC consisted of an expert panel of United States academics and members of the medical community who collaborated with the American Dietetics Association. The results were peer-reviewed by a committee from The Gerontological Society of America.

The guidelines were generated by three factors aimed at regulating the nutritional status of LTC residents. The algorithm provided by the guideline states that it should be applied to patients/residents who experience: 1) involuntary weight loss of >5\% in 30 days or 10\% in 180 days; 2) leaving >25\% of food in the previous seven days or 2/3 of meals based on a 2000kcal diet; 3) a BMI of equal to or less than 21.

Thomas et al\textsuperscript{10} report that involuntary weight loss, reduced appetite, and cachexia are common among LTC residents, which gives rise to the need for a structured approach and careful clinical evaluation.

These guidelines recommend that strategies such as swallowing evaluation, food consistency change, thickened fluids, special feeding programs and enteral/parental feeding can be applied to the management of dysphagia/aspiration. The guidelines state that food consistency changes should be based on assessed needs and that regardless of fluid viscosity needs, persons under the guideline should consume at least 1500ml of fluid per day.

The discussion paper by Felt\textsuperscript{15} discusses, in part, the National Dysphagia Diet Taskforce (NDDT) recommendations on the viscosity of fluids. One of the aims of the NDDT guidelines is to standardise the way that fluid viscosity is managed. This
guideline also reports there is medical evidence "at the highest level" to support dietary modification (including thickened liquids) for persons with dysphagia. Besides viscosity, other identified factors this author suggests should be considered in the interests of safe and efficient swallowing include the density, shear rate and cohesion of thickened fluids.

Importantly, this paper identifies the problems associated with incorrect fluid viscosity. It states that both over and under-thickening of fluids may lead to adverse effects for dysphagic persons. Over-thickened fluids can be unappealing and not be consumed, which may lead to dehydration, while under-thickening (which may be more appealing to the consumer) may lead to fluid aspiration. The consensus of this paper is that providing liquids thickened appropriately should be "obligatory in any healthcare setting" (p.13). It also states that studies have shown that pre-thickened fluids given at regular intervals improve consumption and lead to better nutrition and hydration.

The Royal Australian College of General Practitioners' expert panel guideline, "Medical care of older persons in residential aged care facilities", states that older people with dementia in residential care are one of the groups of people at risk of aspiration. One dietary management strategy this guideline recommends is the use of thickened fluids instead of thin fluids and also educating relatives not to provide inappropriate food or drink to persons requiring a modified fluid intake.

The narrative text by Morris and Volicer discusses persons with Alzheimer's disease and other dementias in terms of their quality of life, particularly comfort and dignity, with particular reference to fluid and food intake. This paper provides an overview of Alzheimer's disease and then describes nutritional factors in a logical manner including the benefits of thickened fluids in enhancing caloric intake and maintaining hydration. The text provides a description of three levels of consistency for thickening fluids and argues that medical nutritional therapy for persons with dementia plays an important part in end-of-life care to preserve dignity and comfort.

An important point made by these authors is that it may be difficult to maintain adequate fluid intake in persons with dementia due to lack of thirst sensation and behavioural issues, such as wandering and pacing, or resistive behaviours during feeding. They recommend the use of thickened fluids at 'honey' consistency for persons with dementia and using yoghurt as a thickening agent where appropriate. Thickened fluids are an appropriate method of increasing and/or maintaining adequate fluid intake in persons with dementia in conjunction with an interdisciplinary approach. Dysphagia and risk of aspiration are an inevitable progression of Alzheimer's disease and other dementias, according to this text.

This paper concludes that thickened fluids are an appropriate nutritional strategy for residents with Alzheimer's disease and that a formal swallowing evaluation, such as a barium swallow is of little value in terms of improving outcomes.

Aziz and Campbell-Taylor's discussion paper on older people in residential care in North America recommends the use of thickened fluids. This paper contends that commercial thickeners are expensive and difficult to use and tend to become too thick if left standing for too long. It also claims that many facilities use infant cereal (as described in Philip and Greenwood above), cornstarch, potato flakes and tapioca to thicken fluids as a cost saving and to add some nutrition. However, this means that the fluids must be counted as food and not fluids because water binds too closely with the thickeners. In contrast, commercial thickeners release water readily and thus fluids can be counted as part of daily hydration requirements.
Dehydration in the elderly is a concern because with increasing age the sense of thirst diminishes and less fluid is consumed. They caution that adding cereals, cornstarch, tapioca, potato flakes or similar to fluids makes the fluids less available for absorption and may lead to dehydration which may then increase confusion and delirium in elderly patients, as well as causing other health problems.

DISCUSSION

The papers that were included in this review varied widely in terms of quality. Few RCTs address this subject, and of those, none fully addressed the review question. The other included quantitative works, similarly, addressed only parts of the review question and only some of the objectives. Additionally, because only one qualitative study met the inclusion criteria, no thematic synthesis was possible. Of the included textual papers, two were high quality expert panel guidelines; however, they include minimal amounts of data directly pertinent to the review question. Due to the fragmented nature of the included evidence, the objectives of the review will form the framework for the discussion.

Objective One: To establish factors associated with the prescription and administration of thickened fluid for people with dementia living in RACFs.

Seven included papers addressed this objective, at least in part: three quantitative, one qualitative and three textual (two expert opinion/one discussion). The administration of thickened fluids to persons with dementia in RACFs appears to occur largely on an ad-hoc basis. Despite these people being at high risk of dysphagia, and despite expert opinion recommending the use of thickened fluids, the percentage of residents actually receiving thickened fluids (8.3%) may be far less than the percentage suffering dysphagia (30-90%), based on US figures.

The administration of thickened fluids is further complicated by the variety of methods used to produce them. It has been suggested that staff have difficulty producing thickened fluids of a consistent viscosity when commercial thickening powders are added to fluids ‘on-site’ and that the subjective evaluation of fluid thickness may be quite unreliable. It is recommended that thickened fluids be inspected visually to gauge viscosity; however, the practicality of this seems dubious. While pre-thickened fluids may cost more, they do offer a reliably consistent viscosity, which may, through the reduction of adverse events for residents caused by aspiration or dehydration, actually reduce overall costs.

On the whole, the data seems to suggest a high prevalence of feeding difficulty amongst cognitively impaired persons which may play some part in the rationale for not prescribing or administering thickened fluids to this population. However, as Morris and Volicer state, medical nutritional therapy for persons with dementia is an important aspect of end-of-life care in order to preserve dignity and comfort.

It is clearly shown that administering fluids of an inappropriate viscosity can lead to aspiration, pneumonia and death, so it is vital that strategies are devised and enacted to ensure that fluids are prescribed and administered correctly. Ensuring high-dependency residents maintain an adequate and appropriate food and fluid intake may be difficult and labour-intensive, however the alternative seems to be to risk malnutrition and aspiration.
Objective Two: To assess the effectiveness of administering thickened fluids for people with dementia in RACFs in terms of adequate hydration, mortality, morbidity and patient comfort.

Two included quantitative studies\textsuperscript{4, 12} and one textual paper\textsuperscript{2} addressed this objective. Both quantitative studies collected data on morbidity (weight gain), however we were unable to retrieve any studies that collected data on mortality solely related to thickened fluids. In both studies, participants maintained or gained weight while consuming diets that included thickened fluids.

Two of the studies\textsuperscript{2, 12} examined water intake but neither provides separate data on hydration. The available data seems to suggest that persons receiving thickened fluids are at risk of becoming dehydrated if careful attention is not given to water intake and symptoms of dehydration. It is important to note that fluid intake may be difficult to monitor in persons with dementia, due to behavioural issues. The thirst sensation of persons with dementia may be blunted or absent, particularly in the latter stages of the disease\textsuperscript{2}. Alternatively, residents may seek water from sinks or vases rather than drinking the thickened fluids\textsuperscript{29}.

It does appear clear that the practice of adding infant cereals, or other food substances, to fluids in order to both thicken them and add nutritive value cannot be recommended on the available evidence as it may lead to dehydration and folate deficiency\textsuperscript{12}.

No studies meeting the inclusion criteria were found that directly addressed the administration of thickened fluids in terms of patient comfort.

Objective Three: To identify attitudes of people with dementia in RACFs and their family and/or carers regarding the administration of thickened fluids

Only one included descriptive study\textsuperscript{5} addressed this objective and this study did not directly survey persons with dementia, but non-demented residents of an aged-care facility to assess their attitudes and wishes for future care. As persons with dementia may not be able to express their wishes regarding the administration of thickened fluids due to their disease, this study represents some worthwhile, if theoretical, evidence on the acceptability of thickened fluids as a treatment. A majority (75\%) of participants in this study responded that they would find a modified diet that included thickened fluids acceptable, whereas 71.2\% would not accept enteral feeding, and 69.2\% would not accept tube feeding.

No studies that examined the attitudes of family or carers regarding thickened fluids or the acceptability of the taste or texture of thickened fluids were able to be included.

Objective Four: To identify attitudes of staff regarding the administration of thickened fluids for people with dementia in RACFs.

One included textual paper\textsuperscript{7} and one quantitative study\textsuperscript{5} addressed this objective. The need for education appears to be a common theme among these papers, as both state the importance of education for staff as a factor in the safe administration of thickened fluids to residents. The use of untrained care staff in aged care appears to impact on both the recognition of dysphagia and the safe administration of food and fluids to residents. However, this problem is not only a nursing-centred one but as Kayser-Jones and Pengilly\textsuperscript{34-38} identify, physicians often do not prescribe thickened fluids, despite the presence of dysphagia. It would seem that expanding
education for nurses and physicians regarding the prescription and safe administration of thickened fluids may be warranted.

SUMMARY

1. Factors associated with the prescription and administration of thickened fluids for people with dementia living in RACFs:
   • administration of thickened fluids appears to occur largely on an ad-hoc basis
   • staff within the facilities have difficulty producing thickened fluids of a consistent viscosity
   • residents should be assessed by a suitably qualified speech and language professional before the initiation of thickened fluids

2. Effectiveness of administering thickened fluids for people with dementia in RACFs in terms of adequate hydration, mortality, morbidity and patient comfort:
   • persons receiving thickened fluids are at risk of dehydration unless water intake is appropriately monitored
   • due to behavioural issues this is difficult in people with dementia
   • the practice of adding infant cereals to fluids as a thickening agent cannot be recommended as it may lead to dehydration and folate deficiencies
   • no includable studies were found which examined patient comfort and/or mortality rates solely in relation to intake of thickened fluids

3. Attitudes of people with dementia in RACFs and their family/carers regarding the administration of thickened fluids:
   • one included paper found that 75% of the participants responded in favour of having modified fluids in preference to enteral feeding
   • no includable studies were found which examined the acceptability of taste, or texture solely in relation to intake of thickened fluids

4. Attitudes of staff regarding the administration of thickened fluids for people with dementia in RACFs:
   • there is a need for appropriate education and the use of trained staff and consultation with experts

RECOMMENDATIONS

• Residents should be assessed by a suitably qualified speech and language professional before the initiation of thickened fluids.
• Residents who are prescribed thickened fluids should have their fluid intake monitored by nursing staff.
• Swallowing assessment should form part of any admission assessment when persons with dementia are admitted to an aged care facility.
• Careful attention should be paid to the viscosity of thickened fluids being administered to residents with dementia – pre-thickened commercially thickened fluids may offer more consistent viscosity than those made up on site.
• Staff in residential aged care facilities should receive appropriate education on the preparation and administration of thickened fluids to persons with dementia.

IMPLICATIONS FOR PRACTICE
Nursing and other care staff may require education regarding the safe administration of thickened fluids, particularly to residents with dementia as they may display challenging behaviours during feeding. Attention needs to be paid to methods used
to thicken fluids and procedures put in place to ensure residents are served fluids of a consistent and appropriate thickness.

**IMPLICATIONS FOR RESEARCH**

There is a clear need for high-quality studies, both qualitative and quantitative, into the use, effectiveness and outcomes of thickened fluids for persons with dementia in RACFs. Due to the special needs of this group, recommendations from studies of thickened fluid administration to non-demented patients may not be directly applicable, putting persons with dementia at risk from inappropriate or ineffective interventions. There is also a need for research into staff, family and carer attitudes regarding the use of thickened fluids for persons with dementia.

**CONCLUSION**

A total of 112 documents were originally retrieved. Ten of these documents were duplicates. Following the assessment for quality process fourteen articles were included in the review. This review found little specific data on the effectiveness of thickened fluids for people with dementia in the residential aged care setting. Most included studies had mixed populations of demented and non-demented residents, making dementia-specific results impossible to quantify. Residents with dementia are more likely to display challenging behaviours during feeding. Therefore, it is recommended that nursing and other care staff be given education specific to the safe administration of thickened fluids to patients with dementia including specific uniform methods to thicken fluids that are to be administered. Procedures should be instituted to ensure residents are served fluids of a consistent and appropriate thickness. This may involve consultation with nutritionists and/or speech pathologists. From the retrieved data, evidence-based best practices cannot be concluded. From the data retrieved it may be cautiously inferred that thickened fluids are effective for residents with dementia if set guidelines are instituted.

**LIMITATIONS**

Several otherwise includable papers were excluded from this review due to the limitations of the residential aged care setting criteria. Studies in non-residential settings, such as aged care units of hospitals may have provided valuable data to answer the review questions more fully.

**POTENTIAL CONFLICTS OF INTEREST**

None known.

**Acknowledgements**

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REFERENCES


[29] Scott A, Benjamin L. A review of the introduction of a free fluid protocol in a long term aged care setting. Document provided by author: Caulfield General Medical Centre


## Appendix 1

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Appendix 2

Search Strategies

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S10 nurs* home or resident* facility or home* for age* or long-term care or age specific care 23766
S11 S3 or S2 or S1 16055
S12 S9 or S8 or S7 or S6 or S5 or S4 5545
S13 S12 and S11 and S10 11

2 Retrieved

**Medline via EBSCO HOST – QUT library catalogue 18/12/2007**

Limits set: Date of publication from 199501-200801; English language

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S3 (MH “Deglutition Disorders+) 300087
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S11 S3 or S2 or S1 475383
S12 S9 or S8 or S7 or S6 or S5 or S4 93998
S13 S12 and S11 and S10 47

5 Retrieved

**Embase via Queensland health library catalogue 26/03/2008**

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PubMed 19/12/2007
Limits Publication Date from 1995/01/01 to 2008
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10 Retrieved

Ageline via CSA – QUT library catalogue (18/12/2007)

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#12 (deglutition disorders) or (Alzheimer disease) or (dementia) 8374
#13 (dysphagia) or (deglutition disorders) or (Alzheimer disease) or (dementia) 8402
#14  (nutrit* support or nutrit* therapy or protein energy malnutrition) or (modified fluid or modified drink or thick* fluid or thick* drink) or (modified agent or modified liquid or modified beverage) or (thick* agent or thick* liquid or thick* beverage) or (diet therapy or dietary proteins) or (energy intake or oral nutrition)  
#15  (nutrit* support or nutrit* therapy or protein energy malnutrition) or (modified fluid or modified drink or thick* fluid or thick* drink) or (modified agent or modified liquid or modified beverage) or (thick* agent or thick* liquid or thick* beverage) or (diet therapy or dietary proteins) or (energy intake or oral nutrition) and ((dysphagia) or (deglutition disorders) or (Alzheimer disease) or (dementia)) and nurs* home or resident* facility or home* for age or long-term care or age specific care

3 found  0 Relevant

**APAIS Health via informit – QUT library catalogue 31/03/2008**

**Search history**

#1  dementia or alzheimers disease or deglutition disorder  (168)
#2  dysphagia  (5)
#3  energy intake or oral nutrition or diet therapy or dietary proteins  (2)
#4  thick* agent or thick* liquid or thick* beverage or thick* fluid or thick* drink  (0)
#5  modified* agent or modified * liquid or modified * beverage or modified * fluid or modified* drink  (0)
#6  nutrit* support or nutrit* therapy or protein energy malnutrition  (3)
#7  nurs* home or residen* facility or home* for age* or long-term care or age specific care  (1183)
#8  ((dysphagias) AND ((dementia or alzheimers disease or deglutition disorder)))  (0)
#9  ((dysphagia) AND ((dementia or alzheimers disease or deglutition disorder)))  (0)
#10  (((nurs* home or residen* facility or home* for age* or long-term care or age specific care)) AND ((nutrit* support or nutrit* therapy or protein energy malnutrition)) AND ((dementia or alzheimers disease or deglutition disorder)))  (0)
#11  (((energy intake or oral nutrition or diet therapy or dietary proteins)) AND ((dementia or alzheimers disease or deglutition disorder)))  (0)

0 Retrieved

**Australian Resource Centre of Healthcare Innovations (ARCHI) 20/3/2008**

**http://www.archi.net.au/**

Searched – ARCHI – Aged Care
Searched – ARCHI – Chronic Care
Searched – ARCHI – Mental Health
Searched – ARCHI – Community Services
All titles reviewed – 0 Relevant

**Health and Medical Complete through ProQuest - QUT library catalogue 20/03/2008**

1. MESH (dementia) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

2. MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

3. (energy intake or oral nutrition) OR (diet therapy or dietary proteins) AND MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

4. (“thick* agent” or “thick* liquid” or “thick* beverage” or “thick* fluid” or “thick* drink”) and MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

5. (“modified* agent” or “modified* liquid” or “modified* beverage” or “modified* fluid” or “modified* drink”) and MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

6. (“nutrit* support” or “nutrit* therapy” or “protein energy malnutrition”) AND MESH (deglutition disorder) AND PDN(>1/1/1995) AND PDN(<12/31/2008) Look for terms in: Citation and abstract, All publication types

7. (“nurs* home” or “resident* facility” or “home* for age*” or “long-term care” or “age specific care”) AND MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

8. (MESH(dementia) AND PDN(>1/1/1991) AND PDN (<12/31/2008)) AND (“thick* agent” or “thick* liquid” or “thick* beverage” or “thick* fluid” or “thick* drink”) and MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008)) Look for terms in: Citation and abstract, All publication types

9. (“nurs* home” or “resident* facility” or “home* for age*” or “long-term care” or “age specific care”) AND (MESH (dementia ) AND PDN(>1/1/1991) AND PDN (<12/31/2008)) AND MESH (deglutition disorder) AND PDN(>1/1/1991) AND PDN (<12/31/2008) Look for terms in: Citation and abstract, All publication types

2 Results (0 Relevant)

**Health Reference Center Academic via GALE – QUT library catalogue 20/12/2007**

R1 AdvancedSearch (ke (dementia) Or (alzheimers disease))
R2 AdvancedSearch (ke energy intake or oral nutrition or diet therapy or dietary proteins)
R3 AdvancedSearch (modified* agent or modified* liquid or modified* beverage or modified* fluid or modified* drink)
R4 AdvancedSearch (ke (nutrit* support or nutrit* therapy or diet therapy or dietary proteins)
R5 AdvancedSearch (ke nur* home or resident* facility)
R6 AdvancedSearch (ke nur* home or home for age*)
R7 AdvancedSearch (ke long-term care or age specific care)
R7 AdvancedSearch (R2 or R3 or R4)
R8 AdvancedSearch (R5 or R6 or R7)
R9 AdvancedSearch (R1) And (R7) And (R8)

5 Retrieved

Current Contents Connect via Cross Search- QUT library catalogue (20/12/2007)
Search History
#1 (dementia or Alzheimer's disease or deglutition disorders) >100,000
#2 (energy intake or oral nutrition or diet therapy or dietary proteins) 99,949
#3 (thick* agent or thick* liquid or thick* beverage) 37,976
#4 (modified* agent or modified* liquid or modified* beverage) 61,128
#5 (modified* fluid or modified* drink or thick* fluid or thick* drink) 27,539
#6 (nutrit* support or nutrit* therapy or protein energy malnutrition) 99,832
#7 (nurs* home or resident* facility or home* for age*) >100,000
#8 (long term care or age specific care) 99,467
#9 (#2 or #3 or #4 or #5 or #6) >100,000
#10 (#7 or #8) >100,000
#11 (#1 and #9 and #10) 111

3 Retrieved

Current Controlled Trials 20/03/2008
http://www.controlled-trials.com/mrct/
dementia or Alzheimer disease: 174

0 relevant

Clinical Trials.gov 20/03/2008
http://clinicaltrials.gov/
search terms

1. dementia and alzheimers disease and long-term care: 15 (0 relevant)
2. dementia and alzheimers disease and homes for the aged: 13 (0 relevant)
3. dementia and alzheimer's disease and residential care facility: 1 (0 relevant)
4. dementia and alzheimer's disease and nursing home: 29 (0 relevant)
5. dementia and alzheimer's disease ("oral nutrition" or "diet therapy"): 0
6. dementia and alzheimer's disease (deglutition disorders): 1 (0 relevant)
0 Retrieved

UK Clinical Research Network: Portfolio Database 20/03/2008
http://www.ukcrn.org.uk/index.html
Search Terms:
• Mental Health > Dementia > Eating disorders: 0
0 Retrieved

Dissertations & Theses via ProQuest – QUT library catalogue 18/02/2008
Search terms
(fluid or drink) AND ( (Nurs* home or resident* facility or home* for age* or long-term care or age specific care) AND PDN(>1/1/1995) AND PDN(<12/31/2008)
1 Retrieved

The Trials Register of Promoting Health Interventions (TRoPHI) 20/03/2008
Search Terms:
• Freetext: “dementia or alzheimer's disease”
0 hits

Health Source: Nursing/Academic Edition – via EBSCO HOST – UQ library catalogue. 04/04/2008
Search Strategies
Limiters/Expanders: Published Date from 199501 – 200812

S1 dementia or alzheimer's disease 6256
S2 deglutition disorders or dysphagia822
S3 S2 or S1 12 (2 relevant)
S4 thick*agent or thick*liquid or thick*beverage or thick*fluid or thick*drink 7 (0 relevant)
S5 modified*agent or modified*liquid or modified*beverage or modified *fluid or modified*drink 0
2 Retrieved

SCOPUS UQ library catalogue. 26/03/2008
Search strategy
1 dementia AND alzheimers disease 1469
2 deglutition disorders 11072
3 energy intake OR oral nutrition 77043
4 diet therapy OR dietary proteins 131558
5 thick* agent OR thick* liquid OR thick* beverage OR thick* fluid OR thick* drink 657
6 modified* agent OR modified* liquid OR modified* beverage OR modified* fluid OR modified* drink 2019
7 nutrit* support OR nutrit* therapy OR protein energy malnutrition 14300
8 nurs* home OR resident* facility OR home* for age* OR long-term care OR age specific care 9710
9 (dementia AND alzheimers disease) OR (deglutition disorders) 12541
10 (energy intake OR oral nutrition) OR (diet therapy OR dietary proteins) OR (thick* agent OR thick* liquid OR thick* beverage OR thick* fluid OR thick* drink) OR (modified* agent OR modified* liquid OR modified* beverage OR modified* fluid OR modified* drink) OR (nutrit* support OR nutrit* therapy OR protein energy malnutrition) 184535
11 ((energy intake OR oral nutrition) OR (diet therapy OR dietary proteins) OR (thick* agent OR thick* liquid OR thick* beverage OR thick* fluid OR thick* drink) OR (modified* agent OR modified* liquid OR modified* beverage OR modified* fluid OR modified* drink) OR (nutrit* support OR nutrit* therapy OR protein energy malnutrition)) AND ((dementia AND alzheimers disease) OR (deglutition disorders)) AND (nurs* home OR resident* facility OR home* for age* OR long-term care OR age specific care) 6

3 Retrieved

**Trip database via Queensland health library catalogue 26/03/2008**

Search strategy

#1 dementia 3006
#2 alzheimers disease 2466
#3 deglutition disorders 709
#4 “nurs* home” or “resident* facility” of “home* for age*” 6
#5 “long-term care” or “age specific care” 1465
#6 “long-term care” or “age specific care” or “nurs* home” or “resident* facility” or “home* for age*” 1465
#7 dementia or alzheimers disease 3006
#8 dementia or alzheimers disease and “long-term care” or “age specific care” or “nurs* home” or “resident* facility” or “home* for age*” 173
#9 dementia or alzheimers disease and “long-term care” or “age specific care” or “nurs* home” or “resident* facility” or “home* for age*” and deglutition disorders 16

1 Retrieved
Search strategy
#1 dementia OR Alzheimer disease  1574
#2 deglutition disorders  5
#3 “energy intake” OR “oral nutrition” OR “diet therapy” OR “dietary proteins”  339
#4 thick* agent OR thick* liquid OR thick* beverage OR thick* fluid OR thick* drink  1792
#5 modified* agent OR modified* liquid OR modified* beverage OR modified* fluid OR modified* drink  2633
#6 nutrit* support OR nutrit* therapy OR protein energy malnutrition  1671
#7 nurs* home OR resident* facility OR home* for age*  7743
#8 long-term care OR age specific care  9029
#9 (“energy intake” OR “oral nutrition” OR “diet therapy” OR “dietary proteins”) OR (thick* agent OR thick* liquid OR thick* beverage OR thick* fluid OR thick* drink) OR (modified* agent OR modified* liquid OR modified* beverage OR modified* fluid OR modified* drink) OR (nutrit* support OR nutrit* therapy OR protein energy malnutrition )  5438
#10 (nurs* home OR resident* facility OR home* for age*) OR (long-term care OR age specific care)  13911
#11 (dementia OR Alzheimer disease) OR (deglutition disorders)  2551
#12 (dementia OR Alzheimer disease) OR (deglutition disorders) AND ((nurs* home OR resident* facility OR home* for age*) OR (long-term care OR age specific care)) AND (“energy intake” OR “oral nutrition” OR “diet therapy” OR “dietary proteins”) OR (thick* agent OR thick* liquid OR thick* beverage OR thick* fluid OR thick* drink) OR (modified* agent OR modified* liquid OR modified* beverage OR modified* fluid OR modified* drink) OR (nutrit* support OR nutrit* therapy OR protein energy malnutrition ))  264

Results 264
Retrieved 0

Sociological Abstracts through CSA ILLUMINA – QUT library catalogue 20/03/2008
Search Terms:
#1 dementia and alzheimers disease  1201 results found in Multiple databases +
1135 results found in COS Scholar Universe: Social Science
94 results found in Web Resources Related to the Social Sciences/Humanities
#2 (dementia or (alzheimers disease)) and ((deglutition disorder) or (energy intake) or (oral nutrition))
0 results found in multiple databases + 
99 results found in COS Scholar Universe: Social Science (1 relevant and already retrieved)
Date Range: Earliest to 2008
0 results found in Web Resources Related to the Social Sciences/Humanities

National Health and Medical Research Council 13/3/2008

Search terms: “dementia guidelines”

Search summary = 101 fully matching

0 Retrieved

All Cochrane Products via Wiley InterScience – QUT library catalogue 19/12/2007

Search History
#1 MeSH descriptor Dementia explode all trees  2510
#2 (Alzheimer disease):ti,ab,kw  2978
#3 Mesh descriptor Deglutition Disorders explode all trees  1432
#4 (energy intake or oral nutrition):ti, ab, kw  3868
#5 diet therapy or dietary proteins  10199
#6 thick* agent or thick* liquid or thick* or modified* agent or modified* liquid or modified* beverage  7550
#7 modified* fluid or modified* drink or thick* fluid or thick* drink  963
#8 nutrit* support or nutrit* therapy or protein energy malnutrition  12675
#9 nurs* home or resident* facility or home* for age* or long-term care or age specific care  20572
#10 (#1 or #2 or #3)  5307
#11 (#4 OR (#5 AND #6) OR #7 OR #8)  15251
#12 (#9 AND #10 AND #11)  35

1 Retrieved

Health and Society through Informit – QUT library catalogue 18/02/2008
(PY=1995-2008)
1. (alzheimers disease)
2. (dementia)
3. (deglutition disorder)
4. (energy intake or oral nutrition)
5. (diet therapy or dietary proteins)
6. (thick* agent or thick*liquid or thick* beverage or thick* fluid or thick* drink)
7. (modified* agent or modified* liquid or modified* beverage or modified* fluid or modified* drink)
8. (nutrit* support or nutrit* therapy or protein energy malnutrition)
9. ((nurs*home or resident* facility or home* for age* or long-term care or age specific care))
10. ((deglutition disorder) OR (dementia) OR (alzheimers disease))
11. ((nutrit* support or nutrit* therapy or protein energy malnutrition)
    OR (energy intake or oral nutrition))
12. (((nutrit* support or nutrit* therapy or protein energy malnutrition)
    OR (energy intake or oral nutrition)) AND ((deglutition disorder) OR (dementia) OR (alzheimers disease)) AND ((nurs* home or resident* facility)))

10 results 0 relevant

National Rehabilitation Information Center 13/3/2008
http://www.naric.com/public/

Search terms: dementia and deglutition disorders 0
Dementia and thickened fluids 0
Dementia and oral nutrition 1 (0 Relevant)
Dementia and fluid 7 (0 Relevant)
Dementia and modified drink or fluid 0

Meditext via Informit- QUT library catalogue 18/02/2008

Search Terms
# 1  PY=1995-2008
#2  (dementia) 594
#3  (alzheimers disease) 155
#4  (deglutition disorders) 154
#5  (energy intake or oral nutrition) 232
#6  (diet therapy or dietary proteins) 540
#7  (thick* agent or thick* liquid or thick* beverage or thick* fluid or thick* drink) 3
#8  (modified* agent or modified* liquid or modified* beverage or modified* fluid or modified* drink) 0
#9  (nutrit* support or nutrit* therapy or protein energy malnutrition) 83
#10 (nurs* home or resident* facility or home* for age* or long-term care or age specific care) 6138
#11 ((deglutition disorders) OR (alzheimers disease) OR (dementia)) 823
#12 (((nutrit* support or nutrit* therapy or protein energy malnutrition)
    OR (modified* agent or modified* liquid or modified* beverage or modified*
    fluid or modified* drink) OR (thick* agent or thick* liquid or thick* beverage
    or thick* fluid or thick* drink) OR (diet therapy or dietary proteins) OR
    (energy intake or oral nutrition) 758

17
((nutrit* support or nutrit* therapy or protein energy malnutrition) OR (modified* agent or modified* liquid or modified* beverage or modified* fluid or modified* drink) OR (thick* agent or thick* liquid or thick* beverage or thick* fluid or thick* drink) OR (diet therapy or dietary proteins) OR (energy intake or oral nutrition) AND (deglutition disorders) OR (alzheimers disease) OR (dementia) AND (nurs* home or resident* facility or home* for age* or long-term care or age specific care) 168

2 Relevant

Dementia through SAGE JOURNALS Online 18/03/2008

Search Terms:
Energy intake or oral nutrition in All fields OR diet therapy or dietary proteins in ALL fields Nutrit* support or Nutrit* therapy in ALL fields, published Jan 1995 to Mar 2008 0 results
Thick* agent or thick* liquid in All fields OR thick* beverage or thick* fluid in All fields published Jan 1995 to Mar 2008 0 results
Modified agent or modified liquid in All fields OR modified beverage or modified fluid or modified drink in All fields, published Jan 1995 to Mar 2008 0 results
Deglutition disorder in All fields, published Jan 1995 to Mar 2008 0 results
Dysphagia in All fields, published Jan 1995 to Mar 2008 2 results 0 relevant


#1 Publication Name = (current opinion in clinical nutrition and metabolic care) Databases=SCI-EXPANDED, SSCI, A &HCl 591
#2 Publication Name = (food quality and preference) Databases=SCI-EXPANDED, SSCI, A &HCl 882
#3 Publication Name = (nutrition in clinical practice) Databases=SCI-EXPANDED, SSCI, A &HCl 95
#4 Publication Name = (food science and technology international) Databases=SCI-EXPANDED, SSCI, A &HCl 642
#5 Publication Name = (journal of nutrition) 8448
#6 Topic = (alzheimers disease or dementia) Databases=SCI-EXPANDED, SSCI, A &HCl timespan 1995- 2008 69086
#7 Topic = (nurs* home or resident* facility or home* for age* or long-term care or age specific care) Databases=SCI-EXPANDED, SSCI, A &HCl timespan 1995- 2008 92513
#8 Topic = (deglutition disorders or energy intake or oral nutrition of diet therapy or dietary proteins) Databases=SCI-EXPANDED, SSCI, A & HCI timespan 1995-2008 21897
#9 Topic = (thick*(agent or liquid or beverage or fluid or drink) OR Topic= (modified* (agent or liquid or beverage or fluid or drink)) Databases=SCI-EXPANDED, SSCI, A & HCI timespan 1995-2008 50152
#10 Topic = (nutrit* (support or therapy) or protein energy malnutrition) Databases=SCI-EXPANDED, SSCI, A & HCI timespan 1995-2008 14323

#11 #7 AND #6 AND #1 3
#12 #10 OR #9 OR 8 84872
#13 #11 AND #12 2
#14 #6 AND #2 0
#15 #6 AND #3 1
#16 #6 AND #4 0
#17 #6 AND #5 23
#18 #17 AND #7 3
#19 #10 OR #9 OR #8 84872
#20 #19 AND #18 0

0 Retrieved

Search terms
Dementia or Alzheimer’s disease Date Range 1860 – 2008,

Hits 9 Relevant 0

Nutritional Abstracts 18/03/2008
http://www.exrx.net/Notes/NutritionAbstracts.html

Whole list searched: 74 titles: 0 relevant

Nutrition in Clinical Care through Blackwell Synergy – QUT library catalogue 18/03/2008

Search Terms: dementia or Alzheimer disease
14 results 2 relevant
2 Retrieved

Nutrition & Dietetics through Blackwell Synergy – QUT library catalogue 18/03/2008

Search Terms: dementia or Alzheimer disease
10 results 0 relevant
Academic Search Elite through EBSCO Host – QUT library catalogue 20/03/2008
(Limiters to all below – Published Date from 199501-200812)

S1  dementia or Alzheimer disease
S2  deglutition disorders or energy intake or oral nutrition
S3  diet therapy or dietary proteins or nutrit*(support or therapy) or protein energy malnutrition
S4  thick*(agent or liquid or beverage or fluid or drink)
S5  modified*(agent or liquid or beverage or fluid or drink)
S6  “nurs* home” or “resident* facility” or “home* for age*” or “long-term care” or “age specific care”
S7  (“nurs* home” or “resident* facility” or “home* for age*” or “long-term care” or “age specific care”) and (S6 and S1)
S8  S7 and S2: 8

2 Retrieved

Australian/New Zealand Reference Centre via EBSCO HOST – QUT library catalogue 18/12/2007

Limiters – Date of Publication from: 199501-200801

S1  SU dementia 735
S2  TX Alzheimer disease 12279
S3  SU deglutition disorders 46
S4  SU dysphagia 0
S5  TX energy intake or oral nutrition 1101
S6  TX diet therapy or dietary proteins 605
S7  TX thick* agent or thick* liquid or thick* beverage 277
S8  modified* agent or modified* liquid or modified* beverage 3
S9  modified* fluid or modified* drink or thick* fluid or thick* drink 3
S10 nutrit* support or nutrit* therapy or protein energy malnutrition 113
S11 nutrit* support or nutrit* therapy or protein energy malnutrition 113
S12 S4 or S3 or S2 or S112643
S13 S10 or S9 or S8 or S7 or S6 or S5 2059
S14 S13 and S12 and S11 0

0 Retrieved

OCLC FirstSearch QUT library catalogue 4/03/2008

Search terms
(kw: dementia or ks: alzheimers and (kw: fluid or kw: drink or kw: beverage)) and (kw: thickened or kw: modified) and yr: 1995-2008
7 hits 0 Relevant

**ECO AND World Cat via OCLC FirstSearch – QUT library catalogue**
4/03/2008
Search terms
Kw:dementia or alzheimers and “oral fluid”

ECO 0 hits
WorldCat 0 hits

**Science.gov (USA)- 31/03/2008**
http://www.science.gov/scigov/search.html?searchMode=advanced

Search terms
Dementia and dysphagia From 1995/ to: 2008
Hits 120
Retrieved 3

**Health Sciences Library and Informatics Center – 31/03/2008**
http://hsc.unm.edu/library/graylit/
searched:
*New York Academy of Medicine Gray Literature Report:*
http://www.nyam.org/library/pages/grey-literature-report
kw: dementia 10 hits 0 relevant

**CRISP database**
http://crisp.cit.nih.gov/
kw: dementia 9 hits 0 relevant

**Health Technology Assessment Database:**
http://www.york.ac.uk/inst/crd/htadbase.htm
kw: dementia 18 hits 0 relevant

**Health Research Projects in Progress**
http://wwwcf.nlm.nih.gov/hrs_project/home_proj.cfm
kw: dementia 81 hits 0 relevant

**National guideline Clearing House**
http://www.guideline.gov/
kw: dementia 17 hits 4 relevant
4 Retrieved

**SIGLE (European) – 31/03/2008**
http://opensigle.inist.fr/
kw: dementia AND eating disorder 2 hits 1 relevant
kw: dementia AND dysphagia 1 hit 0 relevant
0 Retrieved

**The Kaiser Family Foundation (Health Policy Resource) – 03/04/08**
http://www.kaiseredu.org/index.asp
kw: dementia 13 hits 0 relevant
kw: dysphagia 0 hits
kw: deglutition disorder 0 hits
kw: thick OR thickened fluids 0 hits
0 Retrieved

**Google Scholar – 27/02/2008**
Advanced search 1995 – 2008
Kw: dementia OR Alzheimers and "thickened liquid" 28 hits
Kw: dementia OR Alzheimers and "thickened beverage" 6 hits
Kw: dementia OR Alzheimer and "thickened agent" 0 hits
Kw: dementia OR Alzheimer and "thickened drink" 0 hits
Kw: dementia OR Alzheimer and "thickened fluid" 157 hits

Total 191 hits. 10 retrieved

**Hand Search:**

*Perspectives in Food and Nutrition until 1998, then changed title to Perspectives: Nutrition News and Views until 2003 - 01/04/2008*

Issue 6, 7, 12, 13, 14, 16, 17 contents reviewed 0 relevant.
## Appendix 3

### Thickened Fluids

**VERIFICATION OF STUDY ELIGIBILITY**

**INCLUSION CRITERIA**

<table>
<thead>
<tr>
<th>AUTHOR AND YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOURNAL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TITLE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>NAME/CODE OF REVIEWER</th>
<th>RECORD NUMBER</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Setting:</th>
<th>Residential Aged Care Facility</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population:</td>
<td>Adult</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Residents with a diagnosis of dementia are not excluded from the study</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Intervention:</td>
<td>Study subjects are receiving thickened fluids</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Language:</td>
<td>English</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Year:</td>
<td>Published 1995 or later</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**IF YOU HAVE NOT ANSWERED YES TO ALL OF THE ABOVE QUESTIONS, YOU SHOULD EXCLUDE THE STUDY. IF YOU ANSWERED YES TO ALL, PLEASE CONTINUE.**

<table>
<thead>
<tr>
<th>Study Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the study a quantitative examination of the effectiveness of thickened fluids?</td>
</tr>
<tr>
<td>Is the study a qualitative/discussion/opinion/report investigating questions relating to the prescription and administration of T.F?</td>
</tr>
</tbody>
</table>

If the study examines the **effectiveness** of T.F, please proceed to critical appraisal with MASTARI.

If the study descriptively investigates questions relating to the prescription and administration of T.F, please proceed to critical appraisal with MASTARI (descriptive tool).

If the study qualitatively investigates questions relating to the prescription and administration of T.F, please proceed to critical appraisal with QARI.

If the study is an opinion paper, a discussion or letter on the prescription and/or administration of T.F, please proceed to critical appraisal with NOTARI.

If the article is comprised of both quantitative and qualitative elements, then appraisal with more than one instrument is indicated.
## Appendix 4

### Critical Appraisal of Evidence of Effectiveness

**Reviewer___________________  Date __________**

**Author_____________   Year________  Record No____**

1. Was the assignment to treatment groups random?
   - Yes □
   - No □
   - Not clear □
   - NA □

2. Were the participants blinded to treatment allocation?
   - Yes □
   - No □
   - Not clear □
   - NA □

3. Was allocation to treatment groups concealed from the allocator?
   - Yes □
   - No □
   - Not clear □
   - NA □

4. Were the outcomes of people who withdrew described and included in the analysis?
   - Yes □
   - No □
   - Not clear □
   - NA □

5. Were those assessing the outcomes blind to the treatment allocation?
   - Yes □
   - No □
   - Not clear □
   - NA □

6. Were control and treatment groups comparable at entry?
   - Yes □
   - No □
   - Not clear □
   - NA □

7. Were groups treated identically other than for the named interventions?
   - Yes □
   - No □
   - Not clear □
   - NA □

8. Were outcomes measured in the same way for all groups?
   - Yes □
   - No □
   - Not clear □
   - NA □

9. Were outcomes measured in a reliable way?
   - Yes □
   - No □
   - Not clear □
   - NA □

10. Was there adequate follow-up of participants (>80%)?
    - Yes □
    - No □
    - Not clear □
    - NA □

11. Was appropriate statistical analysis used?
    - Yes □
    - No □
    - Not clear □
    - NA □

---

**Overall appraisal:**
- Include □
- Exclude □
- Seek further info □

**Comments (including reasons for exclusion)________________________________________________________________________**
### Appendix 5

**JBI-MAStARI Critical Appraisal form (descriptive studies)**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
</tr>
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<tbody>
<tr>
<td>1  Was the study based on a random or pseudo-random sample?</td>
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<tr>
<td>2  Were the criteria for inclusion in the sample clearly defined?</td>
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</tr>
<tr>
<td>3  Were confounding factors identified and strategies to deal with them stated?</td>
<td></td>
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<tr>
<td>4  Were outcomes assessed using the objective criteria?</td>
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<tr>
<td>5  If comparisons are being made, was there sufficient description of the groups?</td>
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<tr>
<td>6  Was follow up carried out over a sufficient time period?</td>
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<tr>
<td>7  Were the outcomes of people who withdrew described and included in the analysis?</td>
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<tr>
<td>8  Were outcomes measured in a reliable way?</td>
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<tr>
<td>9  Was appropriate statistical analysis used?</td>
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**Include:** Yes / No  

**Reason:**
## Appendix 6

### JBI-QARI Critical Appraisal Form

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<th>Criteria</th>
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<td>1) There is congruity between the stated philosophical perspective and the research methodology</td>
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<tr>
<td>2) There is congruity between the research methodology and the research question or objectives</td>
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<td></td>
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<tr>
<td>3) There is congruity between the research methodology and the methods used to collect data</td>
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<tr>
<td>4) There is congruity between the research methodology and the representation and analysis of data</td>
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</tr>
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<td>5) There is congruity between the research methodology and the interpretation of results</td>
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<tr>
<td>6) There is a statement locating the researcher culturally or theoretically</td>
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<tr>
<td>7) The influence of the researcher on the research, and vice-versa, is addressed</td>
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<tr>
<td>8) Participants, and their voices, are adequately addressed</td>
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<tr>
<td>9) The research is ethical according to current criteria or, for recent studies, there is evidence of ethical approval by an appropriate body</td>
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<tr>
<td>10) Conclusions drawn in the research report do appear to flow from the analysis, or interpretation, of the data</td>
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**TOTAL**

Reviewers Comments:
Appendix 7

JBI-NOTARI Critical Appraisal FORM

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<td>2) Does the source of the opinion have standing in the field of expertise?</td>
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<td>3) Are the interests of the patients/clients the central focus of opinion?</td>
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<td>5) Is the argument developed analytical?</td>
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<td>6) Is there reference to the extant literature/evidence and any incongruence with it logically defended?</td>
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<td>7) Is the opinion supported by peers?</td>
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Include: Yes / No

Reason:
Appendix 8

JBI Data Extraction Form for Experimental/Observational Studies

Reviewer___________________  Date __________
Author_____________   Year________  Record No____

Study Method  

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Participants

Setting______________________________________________________________

Population___________________________________________________________

Sample size

Intervention1______________ Intervention 2____________________
Intervention 3___________

Interventions

Intervention1______________________________________________________

Intervention2______________________________________________________

Intervention3______________________________________________________

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Study results

Dichotomous data

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Continuous data

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Author conclusions

Reviewer conclusions /comments

Include □ Exclude □ Seek further info □
Appendix 9  
JBI-MAStARI Data Extraction Tool (descriptive studies)

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Appendix 10
JBI-QARI Data Extraction Form

Qualitative Data Extraction Tool

Author: ______________________ Record Number: _____
Journal: ______________________  Year: ______
Reviewer: ______________________

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Authors conclusion

Comments
Appendix 11

JBI-NOTARI Data Extraction Tool

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<td>Aziz S, Campbell-Taylor I. Neglect and abuse associated with undernutrition in long-term care in North America: causes and solutions. Journal of Elder Abuse &amp; Neglect. 1999;10(1/2):91-117.</td>
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<td>2</td>
<td>Castellanos VH, Butler E, Gluch L, Burke B. Use of thickened liquids in skilled nursing facilities. (Current Research). Journal of the American Dietetic Association. 2004 08/01/;104(8):1222(5).</td>
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<td>3</td>
<td>Germain I, Dufresne T, Gray-Donald K. A novel dysphagia diet improves the nutrient intake of institutionalized elders. (Current Research)(Author)</td>
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<td>4</td>
<td>Kayser-Jones J, Pengilly K. Dysphagia among nursing home residents. Geriatric Nursing. 1999 03;20(2):77-85.</td>
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</table>

Descriptive cross-sectional with interview Residential nursing homes in Eastern Sydney from June- August 2000. 52 nursing home residents (mean age 82.7 years)

A majority of participants would prefer acute hospital admission for recurrent aspiration pneumonia treatment rather than remaining in the nursing home (61.5%) and with the use of antibiotic treatment (73.1%). A majority agreed with the use of a modified diet (blended, pureed, thickened) for swallowing difficulties (75%) but did not agree with tube feeding (69.2%) or gastrostomy feeding (71.2%). The authors conclude that some elderly nursing home residents would elect relatively aggressive treatment for recurrent aspiration pneumonia, with a preference for acute hospital admission and antibiotic treatment rather than continued nursing home care and that they are more conservative in relation to mode of nutrition, reporting greater acceptance of a modified diet (including thickened fluids) than artificial means of nutrition.


Discussion/narrative text Persons with Alzheimer's and other dementias at US veterans hospital/LTC

Medical nutritional therapy for PWD plays an important part in end-of-life care to preserve dignity and comfort. Difficult to maintain adequate fluid intake in PWD due to lack of thirst sensation and behavioural issues. Recommends use of TF and gives opinions on types of thickeners. Recommends 'honey' consistency for PWD. Recommends use of yogurt. States commercial TF and thickeners are 'time-consuming' and 'expensive'.


Pre test, post test quality improvement program AINs (untrained staff)

N = 30 (pre and post) 6 lost to follow up at 3 months

Educational program shown to have statistically significant effect on Nurses' knowledge and standards of care.

8. Philip KEA, Greenwood CE. Nutrient contribution

Observational Residents who required pureed food

Despite the addition of infant cereal showing some benefits in terms of increased nutrient and energy intake, the researchers were unable to lower the risk of inadequate water and folate intake. Cereal contributed 15% of energy intake for the treatment...
<table>
<thead>
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<th>ID</th>
<th>Study Title</th>
<th>Study Design/Method</th>
<th>Study Population</th>
<th>Findings/Conclusions</th>
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<td>of infant cereals used as fluid thickening agents in diets fed to the elderly. Journal of the American Dietetic Association. 2000;100(5):549-54.</td>
<td>N/A</td>
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<td>9</td>
<td>Reed PS. Food and fluid consumption among long-term care residents with dementia [Ph.D.]. United States – North Carolina: The University of North Carolina at Chapel Hill; 2003.</td>
<td>Observational, ethnographic</td>
<td>407 residents living with dementia in 45 long-term care facilities</td>
<td>Overall there was a high prevalence of low food (54.1%) and low fluid (51.3%) intake among cognitively-impaired residents. The most important component of adequate food and fluid intake was likely to be staff monitoring. Other contributory factors include a non-institutional environment and facility type.</td>
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<tr>
<td>10</td>
<td>Smith TL, Sun MM, Pippin J. Characterising process control of fluid viscosities in nursing homes. Journal of the American Dietetic Association. 2004;104:969-71.</td>
<td>Mixed method – assessment, instrument evaluation, data collection, evaluation of process control, dissemination of results.</td>
<td>Patients receiving thickened fluids in nursing homes (n=?)</td>
<td>Data analysis showed that residents may be at risk of being offered unthickened or inappropriately thickened fluids. Following educational program the percentage of milk and water samples (n=25) that were unthickened reduced from 18% to 12%. Following the study one nursing home choose to use pre-thickened liquids and nursing homes that value teamwork and innovations may implement more quality improvements. Researchers identified a training need for health care providers to evaluate fluid viscosity and recommended the line-spread test as a clinical tool for determining whether or not fluids were thickened.</td>
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<tr>
<td>11</td>
<td>Steele CM, Greenwood C, Ens I, Robertson C, Seidman-Carlson R. Mealtime difficulties in a home for the aged: not just dysphagia. Dysphagia. 1997</td>
<td>Observational</td>
<td>349 residents (mean age 87 years) requiring five different levels of care ranging from standard physical care</td>
<td>There was a high prevalence of mealtime difficulties (87%). Of these, 68% was related to dysphagia, 46% to reduced oral intake, 35% due to positioning problems, 40% due to challenging behaviours. Modified diets were prescribed for 48% of the sample and only 6% of the total sample were prescribed thickened fluids (TF), most of whom (66%) required severe cognitive impairment care (SCI). A notable finding was that those receiving SCI care had higher levels of oral intake than those on mild-moderate cognitive impairment units. The authors concluded that</td>
</tr>
<tr>
<td>1997 Winter;12(1):43.</td>
<td>to severe cognitive impairment care (numbers from each group: n=95, n=46, n=41, n=83 and n=85) Canadian aged care facility</td>
<td>recognition of declining ability to independently feed needs to be given a high priority. There is a wide variety of causes of mealtime difficulties and differing priorities per resident care category. Residents require appropriate assessment on admission.</td>
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<tr>
<td>13 Thomas DR, Ashmen W, Morley JE, Evans WJ. Nutritional management in long-term care: development of a clinical guideline. Journals of Gerontology Series A: Biological Sciences &amp; Medical Sciences.</td>
<td>Expert panel guideline</td>
<td>Older people with dementia are one of the groups of people at risk of aspiration. One dietary management strategy includes the use of thickened fluids instead of thin fluids and to educate relatives not to give inappropriate food or drink.</td>
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<td></td>
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<td>Recommends use of TF as part of clinical guide to prevent and manage malnutrition in LTC in the presence of dysphagia</td>
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<td>14</td>
<td>Felt P. Nutritional Management of Dysphagia in the Healthcare Setting. Healthcare Caterer. 2006;Spring 2006.</td>
<td>Discussion</td>
<td>Medical affairs specialist for Novartis Nutrition Corporation</td>
<td>Assessment of appropriateness of pre thickened fluids and manual thickened fluids should consist of visual examination and also checking for mouth feel. Evidence to support the opinion that thickened liquids of a certain viscosity will be swallowed more easily. Other identified factors for swallowing safely and efficiently include: density, shear rate and cohesion. Over-thickened fluids can be unappealing and not be consumed leading to dehydration. &quot;Providing liquids thickened appropriately to the correct consistency should be obligatory in any healthcare setting&quot;. State that studies have shown that pre-thickened fluids given at regular intervals improve consumption and lead to better nutrition and hydration. Any statistical analysis relates to dysphagia as a whole not just specific to thickened fluids.</td>
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## Excluded Articles

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<tr>
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<th>Author</th>
<th>Year</th>
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<th>Journal/Source</th>
<th>Vol/Issue</th>
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<th>Reason for Exclusion</th>
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<td>1. Hand searches references</td>
<td>Amella, E</td>
<td>2004</td>
<td>Feeding and hydration issues for older adults with dementia</td>
<td>Nursing Clinics Of North America</td>
<td>39(1)</td>
<td>607-623</td>
<td>does not meet inclusion criteria – intervention</td>
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<td>2. Current Contents Connect</td>
<td>Berner, Y. N.</td>
<td>2006</td>
<td>Non-benefit of active nutritional support in advanced dementia</td>
<td>Israel Medical Association Journal</td>
<td>8(7)</td>
<td>505-506</td>
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<td>Biernacki, C.</td>
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<td>Improving the nutritional status of people with dementia</td>
<td>British Journal of Nursing (BJN)</td>
<td>10(17)</td>
<td>1104</td>
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<td>Boffelli, Stefano</td>
<td>2004</td>
<td>Nutritional intervention in special care units for dementia</td>
<td>Journal Of The American Geriatrics Society</td>
<td>52(7)</td>
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<td>Challenges in the design and conduct of a randomized study of two interventions for liquid aspiration</td>
<td>2006</td>
<td>Clinical Trials</td>
<td>3(5) 457-468</td>
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<td>Byrd, L.</td>
<td>Artificial hydration and nutrition in elders with advanced dementia: an ethical dilemma</td>
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<td>Chouinard, J.</td>
<td>1998</td>
<td>Weight loss, dysphagia, and outcome in advanced dementia</td>
<td>Dysphagia</td>
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<td>Christensen MD</td>
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<td>Crogan, Neva</td>
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<td>A nursing assistants perception of barriers to nutrition care for residents in long-term care facilities</td>
<td>Journal for Nurses in Staff Development (JNSD)</td>
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<td>Shultz, Jill</td>
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