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[Intervention Review]

Special care units for dementia individuals with behavioural problems

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ABSTRACT

Background

The behavioural problems of people with dementia are often considered as one of the most challenging issues in caring. Special Care Units (SCUs) have flourished since the 1980s with the aim of taking care of dementia patients, usually those with Alzheimer's disease, and in particular for those with behavioural problems. Although lacking a standard definition, SCUs are usually situated within nursing homes and commonly include the features of trained staffing, special programming, a modified physical environment, and family involvement. The costs of SCUs are commonly higher than for 'standard' nursing home care. However, evaluations of the outcomes of SCUs have yielded conflicting results. A systematic review of this evidence is therefore warranted.

Objectives

To evaluate the effect of SCUs on behavioural problems, mood, use of restraints and psychotropic medication in patients with dementia.

Search methods

The trials were identified from a search of the Specialized Register of the Cochrane Dementia and Cognitive Improvement Group (CDCIG), *The Cochrane Library,* MEDLINE, EMBASE, PsycINFO and CINAHL on 6 September 2007 using the search terms: Special Care Units or SCUs. The CDCIG Specialized Register contains records from major healthcare databases including MEDLINE, EMBASE, CINAHL, PsycINFO, CENTRAL, and LILACS as well as many ongoing trial databases and grey literature sources.

Selection criteria

All randomized controlled trials (RCTs) in which the outcomes of SCUs were compared against traditional nursing units (nursing homes, skilled nursing facilities) were included.

Data collection and analysis

Two reviewing authors independently read the full reports of the potentially eligible studies and selected those that met the inclusion criteria. Discrepancies were resolved by discussions among the two reviewing authors. Final consensus was reached with input from a third member of the team when necessary.

Main results

No RCTs meeting the selection criteria were identified. Since it is unlikely, for ethical and practical reasons that an RCT of SCUs will be conducted, a systematic review of non-RCTs using the same protocol and criteria was conducted. There were eight non-RCTs that fulfilled the criteria for inclusion. Only four studies had data which could be extracted for pooling in meta-analysis. Differences between comparator groups in these nonRCTs ? for example in severity of dementia - were not adequately adjusted for and were common in the trial which accounted for almost all of the positive outcomes of SCUs (Nobili, 2006)

All of the results of the outcomes came only from single studies except for "physical restraint use" at 6 months, which included data from two studies. A small improvement in total Neuropsychiatric Inventory scores, favouring SCU was noted in one study at 6, 12 and 18 months. The use of physical restraints was less common in SCUs at 6 and 12 months (OR= 0.46 (95% CI 0.27 to 0.80), p=0.006; and OR=0.49 (0.27 to 0.88), p=0.02 respectively). Patients in SCUs were less depressed at 3 months than those in traditional nursing home (WMD -6.30 (-7.88 to -4.72) Cornell points, p<0.00001). There was only one observation that favoured the control group: a small but significant effect favouring traditional nursing home care was observed at 6 months in the mean number of psychotropic medications used (WMD 0.20, CI 0.00 to 0.40, z=1.96, P=0.05).

Authors' conclusions

There are no identified RCTs investigating the effects of SCUs on behavioural symptoms in dementia, and no strong evidence of benefit from the available non-RCTs. It is probably more important to implement best practice than to provide a specialized care environment. The routine collection of data on behaviour, restraint and psychotropic drug use across multiple nursing home settings offers the best modality for formal evaluation of the benefit or otherwise of SCUs.

PLAIN LANGUAGE SUMMARY

There is limited evidence to support the assumption that the care of people with dementia in special care units is superior to care in traditional nursing units.

There is limited evidence to support the assumption that the care of people with dementia in special care units (SCUs) is superior to care in traditional nursing units. No randomized controlled trials (RCTs) can be found comparing the effect of SCUs against traditional nursing units in managing agitated behaviours in people suffering from dementia. This review has examined the results of non-RCTs. The findings about the outcomes of this review arise just from one study except for the outcome of "physical restraint use" at 6 months, which includes data from two studies. Selection bias is a major problem in non-RCTs, and confounds the limited evidence that favoured SCU care with regard to a decrease in agitated behaviour and in the use of physical restraints. A convincing case for the benefits of SCU care cannot be made and further studies are necessary.

BACKGROUND

Healthcare condition in question

In the 1980s, nursing homes in the United States (US) started to develop special care units (SCUs) to accommodate the special needs of people with dementia. Throughout the 1990s, SCUs increased in numbers (Aud 2005). To date SCUs remain popular among long-term care providers. For instance, Foster described a SCU director's course offered by the Rush Alzheimer's Disease Center in the US. However, the efficacy of SCUs in bringing about positive outcomes as opposed to traditional units is still controversial (Foster 2004).

Behavioural problems are deemed to be the most challenging issue in the care of people with dementia. Formal caregivers believe placement in SCUs helps with such problems. SCUs commonly refer to specially designed residential care settings catering only for people with dementia or more specifically, Alzheimer's disease (AD). Staff assigned to work in SCUs are often specially trained in dementia care and therefore more tolerant of behavioural disturbances and expected to better manage behavioural problems. Despite continued interest in SCUs in the US, there is no uni-

form agreement on their characteristics, specific outcomes, or consumers' satisfaction with them (Parker-Oliver 2005).

The intervention

The SCU is not a single intervention but a set of related interventions including features such as a unique staffing pattern, special programming, or environmental designs. To date, there is no standard definition of an SCU. However in the 1990s researchers began to deliberate and study what made a SCU different from a traditional nursing home or a skilled nursing facility. The following components were features consistently described as the defining characteristics of SCUs (Leon 1994):

1.admission of residents with dementia and most often with AD,
2.special selection, training, and supervision of staff members,
3.specially designed activity programming,
4.family involvement, and
5.a specially designed physical environment that is segregated from other areas.

Rationale for the review

Professional staff cite behavioural problems as one of the principal difficulties in caring for elderly patients with dementia (Normann 1999). Symptoms associated with behavioural problems in people with dementia can vary and may include aggression, screaming, restlessness, wandering, sexual disinhibition, hoarding, cursing, resistance to care and so on, However, environmental modifications and caregiver skill can minimize these problems (Reimer 2004; Sloane 1998). SCUs for older adults with dementia were developed on the basis that a prosthetic physical environment and a supportive social environment would reduce excess disability and improve quality of life (QOL) (Reimer 2004). SCUs have often been perceived as the epitome of care for people with dementia (Day 2000) and are believed to facilitate the successful management of behavioural problems (Foley 2003).

Despite the interest in and proliferation of SCUs in long-term care settings, the outcomes of SCUs are not without controversies. Some studies show associations between SCU environments and improvements or slowed decline in residents' self-care skills, social function, mobility, and affective responses while others reveal no particular benefits when compared with traditional units. Sand 1992 surveyed 103 long-term care facilities, of which 12 had SCUs, and reported significant differences in therapeutic approaches between the special care and traditional units. Sand 1992 documented that 92% of the SCUs sampled reported a decreased use of pharmacological restraint and 83% reported a decreased use in physical restraint. They also reported that residents became calmer, less disruptive, less agitated, and exhibited less physical violence following SCU admission. A number of studies echoed the findings of Sand et al. (Sloane 1998; Frisoni 1998). However, a lot of studies that claimed effectiveness are without a control group design, only comparing pre- and post-treatment outcomes (e.g., Bono 1997; Bellelli 1998).

Reimer 2004 compared SCUs and traditional nursing units and found that the special care group demonstrated less decline in activities of daily living (ADL), more sustained interest in the environment, and less negative affect than residents in the traditional care settings. However, they observed no differences between groups in terms of concentration, memory, orientation, depression, or social withdrawal. They concluded that the QOL for adults with middle to late stage dementia is the same or better in a purpose-built and staffed facility than in traditional institutional settings.

Other studies found no proof of better outcomes when comparing SCUs with non-SCUs. Such studies have not always distinguished between SCUs with and without special environmental features. Chafetz 1991 compared 12 SCU residents and eight residents of a separate but non-specialized NH unit. They rated cognitive ability and behaviour three times at a 28-week intervals, and their results indicate that there was no significant difference in behaviour or cognitive decline between the two groups. Holmes 1990 also concluded that no significant effects, whether positive or negative, could be attributed to SCU care in their study. Other studies reported SCUs as having little or no positive effect on residents' wandering, cognition, physical functions, and behaviour (Phillips 1997; Chappell 2000).

Inconsistencies in defining an SCU likely account for significant difficulties in determining outcomes. Mayers 1990 surveyed 305 nursing homes in the US state of Washington. One hundred and fifty-four homes responded, including 39 that offered SCUs. The findings showed that strategies for managing behavioural problems were greatly varied in SCUs. Further, another study reported similarities between SCUs and traditional nursing home units. In a statewide survey to compare services provided for residents with dementia in SCUs and non-SCUs in the US, the number and quality of services provided between the two types of service facilities were similar (Gerdner 2001).

Establishing a dementia SCU entails an allocation of resources. If the benefits to having a unit solely for people with dementia were greater than the costs incurred, then creating separate units would be prudent (Bass 2005). Yet empirical evidence has been vague with regard to the outcomes of SCUs. Due to the ongoing interest in and establishment of SCUs despite the presence of conflicting evidence, it is therefore necessary to review the use of SCUs for the behavioural problems of people with dementia.

OBJECTIVES

To evaluate the efficacy of SCUs in managing behavioural problems in patients with dementia.

METHODS

Criteria for considering studies for this review

Types of studies

All randomized controlled trials (RCTs) in which the outcomes of SCUs were compared against traditional nursing units (nursing homes, skilled nursing facilities) were included. Because of the difficulty in recruiting participants in dementia care studies, no limit concerning the number of participants in the trials was set. A double-blind assessment was not a requisite for inclusion for review because allocation concealment is not possible. Studies where participants received more than one intervention sequentially were not included unless results obtained during the first treatment phase assessing the outcomes of SCU placement were clearly documented. However, no such studies were found. Included studies are those that comprise pre- and post-intervention testing with at least two time measurement points. Clinical trials that investigated the effect of a certain dimension (e.g., the physical attributes of the environment) of SCUs were excluded, as were case studies. Clinical trials that included dementia subjects who had no behavioural problems at baseline were included if onset of new agitated behaviour was an outcome measure of those trials.

Types of participants

Intervention group

The intervention group consisted of patients with a confirmed diagnosis of dementia or Alzheimer's disease or related disorders (ADRD). No other participant characteristics were fixed. SCUs commonly have their own admission criteria, and those with a confirmed diagnosis of dementia or AD are frequently admitted. The criteria used in Diagnostic and Statistical Manual III (DSM-III) or IV (DSM-IV) (APA 1995), International Classification of Diseases 10th Edition (ICD-10) (WHO 2006) or National Institute of Neurological and Communicative Disorders and Stroke - Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) (McKhann 1984) in diagnosing dementia and AD were used as the operational definitions.

Control group

The control group comprised people with dementia and/or ADRD who resided in long-term care settings that were not specifically designed. The term "traditional" nursing unit is commonly used in the literature to refer to regular nursing home settings that mainly provide long-term residential care. Because not many papers described explicitly what was meant by a "traditional" unit. A traditional unit was operationally defined as a non-SCU in this review.

Exclusions

People with dementia and/or ADRD who live in psychiatric facilities.

Types of interventions

The SCU is not a single intervention but a set of related interventions. The components of an SCU as an intervention as described in an earlier section are:
1.admission of residents with dementia and most often with AD,
2.special selection, training, and supervision of staff members,
3.specially designed activity programming,
4.family involvement, and
5.a specially designed physical environment that is segregated from other areas.

Types of outcome measures

The primary outcome measures was agitated (and/or stated as disruptive or problematic) behaviours as measured in the studies included for review. The change in severity of agitated behaviours as compared from baseline and/or incidence of new onset agitated behaviours was noted. Secondary outcome measures included the use of physical restraint and psychotropic medications because both have been documented as approaches to handling behavioural problems (Webber 1995). Mood, well-being and QOL measures were also included as secondary outcomes because they indirectly reflect participant status. Other reported outcomes that were not related to the question of interest such as comorbidity, hospitalization rates, or facility characteristics were not included.

Search methods for identification of studies

See Cochrane Dementia and Cognitive Improvement Group methods used in reviews.
The Specialized Register of the Cochrane Dementia and Cognitive Improvement Group (CDCIG) was searched on 6 September 2007 for all years up to December 2005. This register contains records from the major healthcare databases: *The Cochrane Library*, MEDLINE, EMBASE, PsycINFO, CINAHL and LILACS, and many ongoing trial databases and other grey literature sources. The following search terms were used: special care units or SCU. *The Cochrane Library*, MEDLINE, EMBASE, PsycINFO and CINAHL were searched separately on 6 September 2007 for records added to these databases after December 2005 to September 2007. The search terms used to identify relevant controlled trials on AD and dementia for the Group's Specialized Register can be found in the Group's module on *The Cochrane Library*.

These search terms were combined with search terms related to behavioural problems and the following search terms and adapted for each database, where appropriate: special care units or SCU.
Reference lists of all identified studies were reviewed. Articles, books, and book chapters identified as potentially relevant by title and/or by abstract were assessed for appropriateness for inclusion. The authors of unpublished reports in these reference lists were contacted for a copy of their report, and these reports were included in the analysis if they met the criteria for inclusion. Other sources such as conference proceedings, the World Wide Web, or personal knowledge of the team of studies on this review topic were included for discussion if appropriate.
On 6 September 2007, the Register consisted of records from the following databases:

Healthcare databases

- CENTRAL: (The Cochrane Library 2006, Issue 1);
- MEDLINE (1966 to 2006/07, week 5);
- EMBASE (1980 to 2006/07);
- PsycINFO (1887 to 2006/08, week 1);
- CINAHL (1982 to 2006/06);
- SIGLE (Grey Literature in Europe) (1980 to 2005/03);
- LILACS: Latin American and Caribbean Health Science Literature (http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&base=LILACS&lang=i&form=F) (last searched 29 August 2006).

Conference proceedings

- ISTP (http://portal.isiknowledge.com/portal.cgi) (Index to Scientific and Technical Proceedings) (to 29 August 2006);
- INSIDE (BL database of Conference Proceedings and Journals) (to June 2000).

Theses

- Index to Theses (formerly ASLIB) (http://www.theses.com/) (UK and Ireland theses) (1716 to 11 August 2006);
- Australian Digital Theses Program (http://adt.caul.edu.au/): (last update 24 March 2006);
- Canadian Theses and Dissertations (http://www.collectionscanada.ca/thesescanada/index-e.html): 1989 to 28 August 2006);
- DATAD - Database of African Theses and Dissertations (http://www.aau.org/datad/backgrd.htm);
- Dissertation Abstract Online (USA) (http://wwwlib.umi.com/dissertations/gateway) (1861 to 28 August 2006).

Ongoing trials

UK

- National Research Register (http://www.update-software.com/projects/nrr/) (last searched issue 3/2006);
- ReFeR (http://www.refer.nhs.uk/ViewWebPage.asp?Page=Home) (last searched 30 August 2006);
- Current Controlled trials: Meta Register of Controlled trials (mRCT) (http://www.controlled-trials.com/) (last searched 30 August 2006) :
- ISRCTN Register - trials registered with a unique identifier
- Action medical research
- Kings College London
- Laxdale Ltd
- Medical Research Council (UK)
- NHS Trusts Clinical Trials Register
- National Health Service Research and Development Health Technology Assessment Programme (HTA)
- National Health Service Research and Development Programme 'Time-Limited' National Programmes
- National Health Service Research and Development Regional Programmes
- The Wellcome Trust
- Stroke Trials Registry (http://www.strokecenter.org/trials/index.aspx) (last searched 31 August 2006).

Netherlands

- Nederlands Trial Register (http://www.trialregister.nl/trialreg/index.asp) (last searched 31 August 2006).

USA/International

- ClinicalTrials.gov (http://www.ClinicalTrials.gov) (last searched 31 August 2006) (contains all records from http://clinicalstudies.info.nih.gov/);
- IPFMA Clinical trials Register: www.ifpma.org/clinicaltrials.html. The Ongoing Trials database within this Register searches http://www.controlled-trials.com/isrctn, http://www.ClinicalTrials.gov and http://www.centerwatch.com/. The ISRCTN register and Clinicaltrials.gov are searched separately. Centerwatch is very difficult to search for our purposes and no update searches have been done since 2003.
- The IFPMA Trial Results databases searches a wide variety of sources among which are:
- http://www.astrazenecaclinicaltrials.com (seroquel, statins)
- http://www.centerwatch.com
- http://www.clinicalstudyresults.org
- http://clinicaltrials.gov
- http://www.controlled-trials.com
- http://ctr.gsk.co.uk

- http://www.lillytrials.com (zyprexa)
- http://www.roche-trials.com (anti-abeta antibody)
- http://www.organon.com
- http://www.novartisclinicaltrials.com (rivastigmine)
- http://www.bayerhealthcare.com
- http://trials.boehringer-ingelheim.com
- http://www.cmrinteract.com
- http://www.esteve.es
- http://www.clinicaltrials.jp

This part of the IPFMA database is searched and was last updated on 4 September 2006;

- Lundbeck Clinical Trial Registry (http://www.lundbecktrials.com) (last searched 15 August 2006);
- Forest Clinical trial Registry (http://www.forestclinicaltrials.com/) (last searched 15 August 2006).

The search strategies used to identify relevant records in MEDLINE, EMBASE, PsycINFO, CINAHL and LILACS can be found in the Group's module on *The Cochrane Library*. A follow-up search was conducted by CDCIG up to 14 September 2008.

Data collection and analysis

Selection of studies

The first author screened the reports retrieved from the search, and discarded those papers that were clearly irrelevant on the basis of the title and/or the abstract. Similar reports discussing different dimensions of a study were treated as one study having two different reports. Two team members independently read the full report of the potentially eligible studies and selected those that met the inclusion criteria. Where discrepancies arose, the disagreement was discussed and resolved between the two team members. When a consensus could not be reached, a third member of the team was consulted.

Data extraction and management

Data was extracted from published or unpublished reports using the CDCIG template. The table included columns describing the dependent and independent measures of the primary and secondary outcome variables. The design of the studies, sample size, baseline characteristics of the subjects (e.g., age, gender ratio, types of dementia, cognitive and behavioural severity) and the results, recommendations, and future research directions were entered as appropriate. Data was extracted by one team member, who took note of specific details required by each column heading of a summary table. When queries about the data arose or when clarifications were required, another member looked up the full paper and worked with the member who extracted and input data to clarify the questions of concern. The original authors of the studies were contacted for any required data and also when clarifications were needed.

Quality assessment of studies

The quality of the studies was assessed to minimize potential sources of systematic bias including selection, performance, attrition and detection biases. The criteria for assessment were those as outlined in section 6.2 of the Cochrane Handbook for Systematic Reviews of Interventions Version 4.2.5 (Higgins 2005). Other dimensions of quality assessment being considered included the recentness of the study, the breadth and depth of the critique of other studies, sample size, and the degree of specification of the experimental variables, the levels of data utilized, the appropriateness and specificity of the hypothesis testing, and the extent of extrapolation of the recommendations derived from the results.
Given the inconsistencies in how SCUs are defined and operated, the use of the SCU as an independent variable were also carefully assessed. Special attention was paid when examining studies that employed specific admission policies or operational protocols.

Data analysis

Many of the instruments that examine behavioural outcomes in SCU studies produce data that are continuous in nature, such as the scores of the Cohen-Mansfield Agitation Inventory (CMAI, Cohen-Mansfield 1986) (Table 1). When the outcomes are standardized measures across studies, the weighted mean difference (WMD) was used. The standardized mean difference was used for outcomes measured differently across studies. The odds ratio (OR) was used for dichotomous data.
The test of heterogeneity was performed if appropriate to check for the presence of significant differences between the results of studies. If heterogeneity was not indicated, a fixed effect approach would be adopted in the analysis. If significant differences were observed, a subgroup analysis will be used to explore the differences.
In SCU studies of a longer duration when the results were presented for different follow-up periods, a number of different outcomes (e.g., selected primary and secondary outcomes) based on the follow-up periods were intended for performing separate analyses. The other option to obtain individual patient data and perform a time-to-event analysis that employs the whole follow-up for each patient was not performed due to the difficulties related to obtaining individual patient data from each reported study.
The statisticians of the universities were consulted on the appropriateness of the statistical analysis used for this systematic review. Statistical support was also sought from CDCIG.

Drafting the review

Data was entered into RevMan according to the guidelines in the Cochrane Handbook for Systematic Reviews of Interventions

Version 4.2.5 (Higgins 2005). Upon completion and publication, updates will be conducted every two years.

RESULTS

Description of studies

The aforementioned searches located 28 studies. One of these was a duplicate (Swanson 1993; Swanson 1994). After going through the abstracts, 13 studies unrelated to the review topic were excluded. Seven other studies investigated the effects of an intervention and clinical conditions other than dementia, or were not concerned with SCU care. Three studies examined an intervention model rather than comparing SCU and traditional nursing home outcomes and therefore did not meet the criteria (Matteson 1997; Lawton 1998; Warren 2001). Four prospective cohort studies (Frisoni 1998; Leon 1999; Nobili 2006; Swanson 1993; Swanson 1994) examined the outcomes of SCU care as opposed to traditional nursing home care.

No randomized controlled trials were identified that met our criteria. Swanson 1993 was the only attempted RCT found. They investigated the effects of the SCU on the behaviours of residents with AD as compared with the effects of care of residents with AD in traditional units of a long-term care facility over a 24-month study period. Initially, the subjects were randomly assigned to an SCU, a traditional unit, and a control group to replace subjects lost from the experimental or traditional groups. Randomization was not maintained due to attrition mainly because of death. The causes of death were not mentioned. Intention-to-treat analysis was not mentioned.The study thus became a quasi-experimental non-equivalent groups design.

Rationale for including non-RCTs in review

No RCTs are found and therefore the review team examined the available evidence from non-RCTs. A number of factors render the random allocation of subjects in a controlled trial of SCU care highly challenging. First, in the US people with dementia admitted to an SCU are also more likely to be entering under private pay arrangements (Leon 1999). Many SCUs charge residents a higher sum (Rovner 1990). Residents and families self-select into these settings, thus compromising random allocation. Unless there are specially funded demonstration projects, finding adequate controls is difficult because, in the US, nursing homes are primarily businesses (Rovner 1990).

The other reason was ethical. SCUs have a number of special features believed to be good for residents with dementia. Ethical considerations precluded the possibility of randomizing admissions (Reimer 2004). It would be challenging to try to obtain informed consent from families to agree to have their loved ones be randomly allocated to SCUs or traditional care, when the general assumption is that SCU provides better care. People's perception does influence their willingness to participate in non-SCU.

The last reason is practical. Facilities that have SCUs but did not necessarily charge more, e.g., Swanson 1993, were unable to maintain random allocation because of deaths occurring among the treatment and control groups. There were no adequate waiting list residents as replacements. Reimer 2004 had the same experience, that there was an insufficient number of people waiting to be admitted to the SCU within the window of time allotted for study recruitment. The above reasons need to be noted when evaluating the quality of evidence studying SCU care.

The same protocol and criteria were used in identifying the non-RCTs to be included for analysis. The non-RCTs had to have matched controls and with pre and post measures in order to be considered for inclusion. That is to say, the included studies are controlled before and after (CBA) studies.

The literature search conducted by the review team was done in accordance with the search strategies as stated in the aforementioned protocol up to 10 September 2007. There were 110 results out of 495,002 records for: "special care units in Title, Abstract or Keywords or SCU in Title, Abstract or Keywords in The Cochrane Central Register of Controlled Trials". Among the 110 results, seven were duplicates and 87 were eliminated by title since they were not related to SCUs for people with dementia, resulting in 16 potentially relevant studies. Among these 16 studies, eight were eliminated after going through their abstracts or full text either because they did not meet the types of studies, types of participants, and/or types of outcome measures stipulated. Eight potentially relevant studies remained. Apart from the above Cochrane search, further studies were searched from reference lists of the above identified articles and from Scopus (http://www.scopus.com), a citation database that locates studies citing the identified articles since 1996. A total of 29 studies were located in this round of searches. Table 2 tabulates the search results for this non-RCT review. Table 3 accounts for the number of eligible studies. Only four extra studies - Chappell 2000; Reimer 2004; Webber 1995; Weyerer 2005 - were identified outside of the search of the Cochrane database. Together with the four studies identified from the CDCIG search (Frisoni 1998; Leon 1999; Nobili 2006; Swanson 1993), a total of eight non-RCTs were therefore included in this review.

Non-randomized studies with matched controls - description of studies

Swanson 1994 examined the occurrence of agitated behaviour. Agitated behaviour was measured by the agitation scale of the Functional Abilities Checklist (FAC). The FAC had five scales but only aggregated scores were reported and they were unavailable. Swanson 1993 was a quasi-experimental study examining the effects of a SCU on the incidence of catastrophic reactions and other

behaviours with a sample of 13 SCU and nine traditional unit residents. Bimonthly data on catastrophic reactions and social interactions was collected for 12 months both prior to, and post-admission into the SCU. The outcomes were assessed by frequency counts and the data was available. Swanson 1993 was included but the data reported in Swanson 1994 could not be included.

Webber 1995 compared the outcomes of residents with AD newly admitted to SCU and to traditional nursing homes in Northern California, US. Four SCUs and four traditional nursing homes participated in the study and the recruited sample had 22 residents. Both the residents and their caregivers were interviewed to measure the quality of care at the facility level and to assess resident outcomes for behavior, cognitive, and physical functioning. Data were collected at admission and again within six months. The authors used the Mini-Mental State Examination (MMSE; Folstein 1975) to assess cognitive functioning, the Global Deterioration Scale (GDS; Reisberg 1982) to assess staging of the disease, CMAI to assess agitation, and Minimum Data Set (MDS) subscales to assess activities of daily living. An in-house instrument was developed to document the level of resident participation in activities. Information on the use of physical and pharmacological restraints was obtained by chart reviews.

Frisoni 1998 was a multi-national (Italy, France and Sweden) case-controlled study comparing the effectiveness of SCUs with more traditional nursing home in the management of behavioral disturbances in residents with dementia. Only the participants in Italy were reported in this paper. Thirty-one cases in the SCUs and 35 controls in traditional nursing homes were recruited from 43 long-term care facilities. The subjects were assessed seven to 14 days and three months after admission. Cognitive status was recorded using the MMSE. Behavioural status was assessed using the Neuropsychiatric Inventory (NPI; Cummings 1994) and the CMAI. Other instruments for evaluation included the Bedford Alzheimer's nursing severity scale (Volicer 1994c), Barthel Index (Mahoney 1965), Cornell Scale for Depression in Dementia (Alexopoulos 1988), and the Cumulative Illness Rating Scale (CIRS; Parmelee 1995. The assessments were performed by the same assessor whenever possible.

Leon 1999 studied a nationally representative sample of SCUs. They examined a sample of newly admitted nursing home residents with dementia from 1992 to 1994 for 18 months to investigate whether SCUs were more effective in reducing physically aggressive behaviours within 6-months of placement. Data were collected through baseline assessment and 6-month telephone interviews with family members and facility staff, and a review of medical records. The outcome measures included a seven-item subscale developed from the CMAI, and the use of physical restraint and psychotropic medication.

Chappell 2000 compared the five dimensions of care (preadmission and admission procedures, staff training and education, nonuse of physical and chemical restraints, flexible care routines and resident relevant activities, and the environment) between SCUs and non-SCUs settings. The primary purpose of their study was to examine whether these dimensions of care clustered in SCUs or non-SCUs. They also investigated the outcomes of dementia sufferers in these two different settings over a period of 12 months. The sample had 501 subjects in 77 intermediate care facilities throughout the province of British Columbia, Canada. The outcome measure for agitation was the 14-item CMAI and for mood, the Feeling Tone Questionnaire (Toner 1991).

Reimer 2004 compared the effect of SCUs with that of traditional nursing homes on the quality of life (QOL) of residents with middle- to late-stage dementia over a one-year period. It had a prospective, matched-group design assessing QOL every three months for a year. Twenty-four long-term care centres and four designated assisted living environments in an urban centre in western Canada were recruited. The sample had 185 residents, with 62 in the intervention group and 123 in the traditional nursing home group. QOL outcomes included the Brief Cognitive Rating Scale (BCRS, Reisberg 1988a), Functional Assessment Staging (Reisberg 1988b), the CMAI, the Pleasant Events Scale - AD (Logsdon 1997), the Multidimensional Observation Scale of Elderly Subjects (MOSES, Helmes 1988), and the Apparent Affect Rating Scale (Lawton 1996).

Weyerer 2005 was a prospective cohort study that examined two main questions. First, the authors aimed to find out the degree to which the quality of life and care for patients with dementia differed according to the type of care provided (segregative versus integrative approaches in nursing homes. Second, they would like to examine the differences between SCUs care in Hamburg, Germany, as opposed to the traditionally integrative care of dementia patients in Mannheim, Germany. Hamburg was the intervention site whereas Mannheim was the control site. Participants were patients with moderate to severe dementia, aged 65 and above and with behavioural problems. When the study began, there were 594 participants from 28 care homes in Hamburg and 573 participants from 11 care homes in the control site. One hundred and thirty-one new admissions were recruited in the intervention site over a period of one year, and for the control group, 222 new recruits. Information about the measures used were limited. The authors discussed the outcomes in the following areas: the involvement of volunteers, social contacts between the residents and staff and families, expressed positive feelings of the residents, use of physical restraints, whether psychiatric treatment was required, and drug use. The participants were followed up for approximately six months.

Nobili 2006 was a prospective observational study to compare the characteristics and clinical outcomes of a sample of patients with dementia admitted to either SCUs or nursing homes without SCU randomly selected from an accredited list of these facilities in the Lombardy Region of Italy. The 10 most recently admitted residents with dementia were recruited and followed up at a six-month interval for 28 months. Socio-demographic, clinical, cognitive, functional, and behavioural data, and information on medications

used were collected. The outcome measures included mortality, hospitalization at six months, use of physical restraints, falls, and exposure to antipsychotic drugs.

Risk of bias in included studies

Selection bias

Swanson 1993: The authors reported the demographic variables of the sample as a whole rather than differentiating them into SCU and traditional unit groups. It is not therefore known whether the two groups had any systematic differences between them to begin with. In another report from the same study, Swanson 1994 noted that the SCU subjects were more cognitively impaired at baseline although the two groups did not differ in their functional abilities pre-test.

Webber 1995: Reportedly, Webber's sample was similar to the profile of institutionalized dementia patients in US (US Congress, Office of Technology Assessment US OTA 1990). Although the demographic profile of the sample may be similar to that of the national profile, the differences between the SCU and non-SCU groups showed that they were not equivalent in a number of dimensions (refer to Risk of Bias Table).

Frisoni 1998: On admission, the cases and controls had similar socio-demographic status, cognition, diagnoses, somatic health, and psychotropic drug use, but the SCU cases tended to have more severe behavioural disturbances and to be less restrained (19 versus 46%) over the first week after admission.

Leon 1999:

More of the admissions to SCUs had disruptive behaviour and also of higher levels of disruption (44%) compared with non-SCU admissions (33%).

Among those with disruptive behavior, 37% of the disruptive admissions to SCUs presented extremely high levels of disruption compared to 30% for the non-SCU facilitates. There was no mention of whether these figures reached statistical significance. Those admitted to SCUs were more likely to be entering under private pay arrangements.

Chappell 2000: The authors conducted a survey on all long-term care institutions in the province that cared for persons with dementia prior to the collection of outcome data. The facilities were stratified into SCUs and non-SCUs. The author's post-facto analysis revealed no significant differences between units included in the study and those excluded on the aspects of staff education, flexible care, use of restraints, or assessment.

Reimer 2004: The residents consented to being moved to the new special care facilities and this induced a self-selection bias. A protocol governed inclusion of the residents into the three groups. The authors found no statistically significant differences between the groups in age, sex, GDS or age-adjusted co-morbidities. Also the pattern of psychotropic drug use did not vary between the three groups.

Weyerer 2005: Selection bias is a major confound of this study.

Nobili 2006: A comparison of the baseline information revealed significant differences between the two groups, suggesting selection biases in the study design. These findings suggest that both the SCU and non-SCU groups were different to begin with.

Performance bias

Swanson 1993: The SCU was specially designed, with special staffing. Also, the staff were trained in geriatric or dementia care and the activities were specially programmed. The traditional units were units located within various location of the same facility.

Webber 1995: An interesting observation was that the SCUs in this sample ranked lower than the comparison facilities on four measures of environmental quality as assessed by Webber and colleagues.

Frisoni 1998: There was no particular information on how the SCUs were set up or different from traditional units.

Leon 1999: There was no discussion on the set up of the SCUs or traditional units. The facilities were differentiated into SCUs, religious, and large facilities, adding a further dimension to the comparison which could also be a confounding factor.

Chappell 2000 defined the SCU as a unit that served primarily dementia residents, identified itself as a specialized unit for people with dementia, was separated from the rest of the facility by closed doors, and satisfied at least one of the following criteria: specially trained staff, special programme activities, or individual assessment and care planning.

Reimer 2004: This special care facility is rather different from other SCUs in general, compromising the validity of comparing the outcomes among studies. The authors also reported that almost all of the comparison groups (MTIFs and STIFs) had implemented some changes within the constraints of their institutional layouts and staffing to enhance the suitability of their physical and social environments for residents with dementia. Their resemblance to traditional nursing homes was again, therefore, hard to compare. The authors reported a short strike of personal care attendants in the STIF, which might have contributed to the dropouts at times 4 and 5 of the measurement points.

Weyerer 2005 The information available from the English abstract and the translated report (from German to English) was limited.

Nobili 2006: Information about the set up and care management of the SCU was not available.

Attrition bias

Swanson 1993: Subject attrition was mostly because of death and disability. Details of attrition were not provided.

Webber 1995: Not discussed.

Frisoni 1998: Attrition was not reported.
Leon 1999: Ninety-one residents were not in the final sample. Among them, 31 had died and 68 had been discharged prior to six months. The authors regarded their attrition percentage as reasonable compared with other reports.
Chappell 2000: Most of the dropouts (62%) were due to death, with the remaining 38% dropping out from the study due to transfer, discharge, hospital admission, and facility dropout (two facilities dropped out of the study). The dropouts were 1.8 years younger in age and had greater functional dependency by 3 points on a 36-point scale. The authors characterized these as statistically significant but substantively small differences. No other significant differences between the sample and the dropouts in cognitive function, affect, or agitation at t1 were found.
Reimer 2004: Seven newly admitted SCF residents were enrolled to replace the 17 who died in the intervention group during the recruitment year. The authors reported that no one was lost to follow up.
Weyerer 2005 Information unavailable.

Nobili 2006: In an early stage of the study, four SCUs and three non-SCU wards left the study for organizational reasons. Later, seven more SCUs abandoned the project. The reasons were not given. During the course of the study, only three residents were lost to FU (two in SCUs and one in non-SCU).

Detection bias

Swanson 1993: The authors reported an elaborate data collection process. Baseline data were collected on all dependent measures at time of assignment to the experimental and control groups, then every two months for the 12 months before the opening of the SCU, and for the 12-month period beginning with the fifth month after the SCU had opened. Data was not collected during the first four months after the opening of the SCU to control for relocation effects. Because staff were not blinded to participants' allocation, the researcher conducted inter-rater reliability testing between the staffs and used an independent rater for 10% of the residents in each data collection period. The inter-rater agreement between the staff who collected the data ranged from 85 to 97%. Concerning the validity and reliability of outcome measures, a number of new measures were developed by the authors: the Functional Abilities Checklist (FAC) and the Individual Incident Report (IIR), which had not yet been adequately tested for its validity and reliability.
Webber 1995 used more widely accepted outcome measures of improvement in patient behavioural, cognitive and physical functioning identified through an extensive literature review. The participants were assessed as soon as possible after admission. Post-testing was completed at a maximum six-month interval following baseline data collection. Staff informants were interviewed at the time of baseline resident data collection in the facility. A number of in-house instruments were developed and pre-tested to measure areas such as: baseline demographic data, health history and comorbid conditions, level and type of activities provided in the facility, and use of physical and pharmacological restraint. Other measures used include the MMSE for Cognitive functioning, the GDS for staging the disease, the CMAI for behavior, the Feeling Tone instrument for mood because CMAI does not include an assessment of positive mood, and the MDS-ADL for daily physical functioning. Reportedly the authors tested these instruments extensively, but there was no information on the training of the research personnel who collected data.
Frisoni 1998: The subjects were assessed seven to 14 days after admission (as baseline) and three months afterwards. The MMSE and the Clinical Dementia Rating (CDR, Morris 1993) scale were used for the assessment of cognitive status. Functional status was assessed using the Bedford Alzheimer's Nursing Severity Scale (Volicer 1994b), the Barthel Index (BI), and the Tinetti Balance and Gait Scale (Tinetti 1986). Behavioural disturbances were assessed using the NPI, the CMAI, and the Cornell Scale for Depression in Dementia (Alexopoulos 1988). The CIRS was used to evaluate the presence of concurrent diseases. Data on drug use, the occurrence of falls and restraint use were also documented.
Leon 1999: Data was collected at baseline and six-month follow-up. The outcome measures included Disruptive Behaviour - a 10-point scale using six disruptive behaviour items from the Minimal Data Set (MDS), which included: wandering verbal and physical abuse, disruptive behaviour, and resistance to take medications, or receive help for his activities of daily living (ADL). Other measures included the MDS-Cognition Scale (MDS-COGS) and MDS-ADL Self-Performance Index, psychotropic medication use and patterns of physical restraints use. Only the statistical management of data was discussed, and the data collection methods were not. It is not known who collected the data or how was it collected.
Chappell 2000: The 14-item CMAI (short-form) was used to assess agitation. Mood was measured with the affect scale of the Feeling Tone Questionnaire (FTQ) (Toner 1991) but reliability statistics on the FTQ were not available at the time of the study and thus were not reported in the paper. The Multi-focus Assessment Scale-Revised, originally developed by Crockett 1991, was a tool to assess cognitive and behavioural functioning and has seven sub-scales. Social behaviour skills (0-11 point scale) and expressive language skills (3-15 point scale) were the sub-scales considered as part of the QOL measures because they could potentially be affected by quality of care. Change scores (t1 minus t2) were calculated to produce each outcome score rendering comparison of the results easier.
Reimer 2004: The measures used include the BCRS, Functional Assessment Staging, the Cohen-Mansfield Agitation Inventory, the Pleasant Event Scale-AD, the MOSES, and the Apparent Affect Rating Scale. Measurements were taken at baseline, three, six, nine, and 12 months and were not blinded. Some assessments were done presumably "objectively" - by a trained rater with direct observation of resident behaviours. Other assessments asked staff

or families about behaviours in the previous week, therefore there could be the biases of not knowing the whole picture and problems with memory ratings. This was the only study that clearly indicated their use of intention-to-treat strategy. The authors pointed out that the interactive (BCRS) and observational (AARS) measures were limited by whether it was a 'good day' and the varying circumstances under which the five-min observation occurred.

Weyerer 2005 The authors had qualified nursing staffs to collect data in order to obtain "the most complete picture possible" (Abstract, p.85) Information about the details of outcome measures used, and their validity and reliability, was unavailable.

Nobili 2006: An individual, usually a ward doctor, was in charge of data collection and liaison with the two coordinators of the study. In maintaining data quality, training was carried out for all those involved at the various centres prior to the study. Moreover, during the two years of study, the two study coordinators visited each centre every six months for quality assurance purposes. Data was checked for errors, coherence, and missing information. Socio-demographic, cognitive, functional, behavioural, clinical status, and medications used were collected. The instruments used for clinical evaluation were the MMSE, the Severe MMSE (SMMSE), the BI, the NPI, and the CIRS. These are commonly used instruments and have been extensively tested for their psychometric properties.

It is somewhat surprising to the review team to see that after two decades of SCU research and development, this area of study is still limited in terms of evidence to inform research and practice. Given the proliferation of SCUs in many advanced countries in Europe and America, we need documentation of unequivocal outcomes to point the way ahead. While reported studies in the 1980s and 1990s had a number of methodological problems, more recent ones have been better designed and described clearer study protocols.

Effects of interventions

The data were not retrievable for the studies by Chappell 2000, Leon 1999, and Reimer 2004. Chappell 2000 published aggregate outcomes combining both SCU and non-SCU subjects and separate group data was unavailable. Reimer 2004 published graphical information (charts) instead of numerics in presenting their outcomes. Weyerer 2005 provided only limited data at baseline. Their results at 6 months were narrative. Frisoni 1998 and Leon 1999 did not include mean change scores and pooled standard deviations in the published report, and again only limited data was available for analysis. For Swanson 1993, only the mean values of the pre- and post- outcomes (measured bimonthly a total of six times) were reported.

In some Cochrane meta-analyses, the reviewers assume a zero correlation between the measurements at baseline and subsequent assessment points when changes from baseline scores are not reported. This, however, can lead to erroneous conclusions. For example, Frisoni's SCU group had a baseline CMAI score of 40.7 (SD 24.6) and a three months CMAI score of 36.4 (SD 17.8). The overall change (not mean change) from the baseline to three months would be -4.3 (pooled SD not reported). Frisoni's non-SCU group had a baseline CMAI of 31.2 (SD 14.3) and a three months CMAI of 26.7 (SD 11.8). The overall change from baseline to three months would be -4.5 (pooled SD not reported). The difference between the overall change scores of the SCU and non-SCU groups at three months was only 0.2. When a zero correlation is assumed in comparing the CMAI scores at three months, the difference between the SCU and non-SCU groups becomes 9.7, greatly inflating the between-group differences. Such a strategy is therefore not adopted in this review. A randomly assigned sample does not guarantee equivalence between the experimental and the control groups. It only assures that if the groups are not equivalent, the differences are likely due to random errors.

Table 4 summarizes the overall effects of outcome measures over time from the included non-RCTs at 3, 6, 12, and 18 months. There were more studies that measured outcomes at six months.

Effect on agitation

The most commonly used outcome measures for agitation were the NPI and the CMAI. There were no significant changes in outcomes at three months. There were some small but significant improvements that favoured the SCU group over time: WMD -4.30 (95% CI -7.22 to -1.38), z = 2.88 (P = 0.004), WMD -5.90 (95% CI -8.99 to -2.81), z = 3.74 (P = 0.0002), and WMD -5.40 (95% CI -9.16 to -1.65), z = 2.82 (P = 0.005), measured at the time points at 6, 12, and 18 months respectively.

Effects on mood and affect

Data for measuring the effect on mood was available only from Frisoni 1998 at three months, which showed a small but significant difference: WMD -6.30 (95% CI -7.88 to -4.72), z = 7.81 (P < 0.00001). Outcomes for mood and affect were not available from other studies for pooled analysis.

Effects on related QoL measures

Webber 1995 counted the number of participants who took part in activity participation. No significant differences were observed at six months. Swanson 1993 counted the mean number of participants' interaction with staff and families at 12 months. It was not mentioned how an incident of interaction was defined, or how the data was collected and by whom. Pooled standard deviations were unavailable for analysis.

Effect on the use of psychotropic drugs

Only Frisoni 1998 reported psychotropic drug use at three months and no significant differences were observed. A small but significant difference in the post-treatment scores that favours the con-

trol group was observed in Nobili's sample at six months: WMD 0.20 (95% CI 0.00 to 0.40), z = 1.96 (P = 0.05). Webber 1995 reported the number of participants on regular and PRN psychotropic drugs at six months and no significant effects were observed. No statistically significant changes in the use of anti-psychotics in both groups were found at 12 and 18 months.

Effect on the use of physical restraints

Small but significant differences favouring SCU care were observed at 6 and 12 months: odds ratio (OR) 0.46 (95% CI 0.27 to 0.80), z = 2.75 (P = 0.006) and OR 0.49 (95% CI 0.27 to 0.88), z = 2.36 (P = 0.02). At 3 and 18 months the outcomes were close to reaching significance: OR 0.23 (95% CI 0.05 to 1.19), z = 1.75 (P = 0.08) and OR 0.54 (95% CI 0.29 to 1.03), z = 1.88 (P = 0.06), respectively.

It is important to note that all of the results discussed above were generated mostly from a single study except for "physical restraint use" at six months, which included data from both Nobili 2006 and Webber 1995.

DISCUSSION

The number of studies that can be pooled for analysis is limited. Nobili's findings, which at first sight, seemed to favour SCU care, need to be interpreted with caution. As the authors highlighted, the two groups were significantly different from each other at baseline along a number of dimensions. Those admitted to the SCUs were considerably younger, better educated, more cognitively and functionally able, and had a lower comorbidity index. The SCU group was behaviourally more disturbed at baseline. Because the two groups were different, the comparison between the groups as to whether SCU benefited them became doubtful. Another factor that might have affected the results was related to residents' time of admission. Although the study protocol was to recruit only newly admitted participants, residents recruited in the non-SCUs had stayed in the unit for 26.5 months (versus 13.6 months in SCUs, P = 0.0001). Nobili pointed out that such a wide variation in the time-since-admission to a nursing home could have influenced the baseline assessments.

It needs to be mentioned that Nobili only included completed cases in his statistical calculations at each time point. Sensitivity analysis was not performed and because only the outcomes of completed cases were analysed, a skewed estimation in favour of SCUs could have been induced.

Frisoni's study observed the outcomes of SCU and non-SCU participants over a period of three months. Their SCU participants were found to be significantly less depressed. This outcome, however, needs to be considered in terms of a person's reactions to relocation in the first few months after placement. In Webber's 1995 study, both SCU and non-SCU participants had an improvement in mood after an initial period of adjustment. Moreover, Frisoni's sample was small (SCU n = 31, non-SCU n = 35). Although Frisoni tried to match the characteristics of the two groups, the baseline scores of a number of outcome measures had a fairly large between-group difference, e.g., the NPI and CMAI had a difference of 10 and 9.2 points respectively. In addition, a three months pre- and post-intervention time point has been considered as too short a period to observe for meaningful outcome changes. Porell 1998 argued that even six months was probably too short for evaluation of the impact of long-term care.

Last, there were positive results shown in favour of SCU care in the use of physical restraints. Yet, the evidence from only two non-RCTs cannot be considered as definitive.

SCUs were developed based on the assumption that a supportive specialized environment would improve the QOL and mitigate the challenging behaviours of people with dementia. Yet SCU are highly heterogeneous in terms of their philosophy, set up, staffing and programming. Although our review protocol specifies the components of a SCU to be considered for inclusion, in reality, details about the SCU in each published report were not always forthcoming. If these reports were excluded, then probably even less eligible studies would be available for review. Also, the comparison of SCUs as an intervention across diverse settings located in different countries does not make the results very convincing.

In the following, the four other studies that had acceptable methodological quality but no data available for a pooled analysis (Chappell 2000; Leon 1999; Reimer 2004; Swanson 1993) are briefly discussed as supplementary information. Because Weyerer 2005 had no data at 6 months in the published report to support their findings, their conclusions are not included.

Chappell's 2000 study was conducted between 1996 and 1998. The sample (N = 510) was drawn from long-term care institutions throughout the province of British Columbia in Canada, a fairly extensive sample. Their study reported clear guidelines in data collection and management. Because the aim of Chappell was to examine whether dimensions clustered by facility type (SCU or non-SCU), their analysis did not differentiate between the outcome scores of SCU and non-SCU cases over the course of 12 months. What Chappell found was that there was no clustering of dimensions of care along SCU or non-SCU lines. Neither SCU status nor any single dimension being examined was highly predictive of outcomes. Rather, the residents' affect at baseline emerged as a characteristic that was significantly correlated with other outcomes. Unlike Nobili's study, their SCU and non-SCU groups had no significant differences in terms of cognitive, affect, or agitation at baseline.

Leon 1999: The sample (N = 596) was drawn from a nationally representative group of 106 SCUs and 47 non-specialized comparison facilities in the US. Participants' outcomes were observed over

a period of six months. Data was collected from December 1992 to June 1994. Their results indicated that when differences in age and baseline levels of disruptive behaviour were controlled, SCU placement showed no positive or negative effect on the frequency of aggressive behaviour. In Leon's study, it was the increased use of psychotropic medications and the reduction in the use of physical restraints that showed a relationship with lower levels of physically aggressive behaviour. In this review, the control group used slightly less psychotropic medications but more of them were restrained at six months.

Leon 1999 cautioned us not to jump to the conclusion that SCUs were not worthwhile components of SCU care. He stated that while not absolutely reducing the level of physical aggression, SCU placement did not lead to increased combative behaviour which would be expected if the resident was not under skilful care. This assumption, again needs to be tested.

The participants in Reimer's (2004) study (N = 185) came from a smaller convenience sample of 24 long-term care centres and four designated assisted living environments in an urban centre in western Canada. The focus of Reimer's study was to compare the effects of SCUs and traditional institutional facilities on QOL measures over a one-year period. No differences between groups in concentration, memory, orientation, depression, or social withdrawal were found. However, the authors reported that the SCU group demonstrated less decline in ADL, more sustained interest in the environment, and less negative affect than residents in the traditional institutional facilities. Reimer considered that a purpose-built special care facility could enhance QOL over time for adults with middle- to late-stage dementia. It needs to be pointed out that in Reimer's study, the intervention group resided in a purpose-built special care facility, which was rather different from other SCUs in general, compromising the validity of the comparison between the two types of care.

Swanson 1993 reported that there was a greater reduction in catastrophic reactions among the SCU participants. Their study sample is small (N = 22), and again, the authors reported that the SCU group was more agitated and behaviorally disruptive to begin with. Their claim therefore was not convincing.

The practical challenge of randomizing patients, the non-equivalence of groups at baseline, the heterogeneity of SCUs in the controlled trials being reviewed, the diversity in context (studies were conducted in different countries) and the limited studies available do not permit a definitive reply as to which of the two settings is more suitable for the treatment and care of a person with dementia.

AUTHORS' CONCLUSIONS

Implications for practice

The effectiveness of SCU care for people with dementia lacks substantial evidence. Chappell 2000 found that many non-SCUs were implementing a similar quality of care to that found within SCUs. One of the possible reasons was the "spilled over" effect from SCU to traditional home care when certain innovations became popular, or it could have been that many SCUs were simply implementing best practice dimension of care (Chappell 2000). As early as 1992, a report completed by the US Congress Office of Technology Assessment (US OTA 1992) reported that it was difficult to find measurable differences in staff, resident or family caregivers outcomes between SCU and integrated (standard) nursing facilities. This does not seem to deter the rapid expansion of SCUs in both the public and private sectors (Porell 1998). In a statewide survey of long-term care facilities in Arkansas, Gerdner 2001 observed that those facilities with SCUs offered virtually the same services as those without SCUs. To protect the consumer, consistency is needed in what a consumer can expect when a facility advertises having a SCU (Gerdner 2001).

Lawton 1998 raised an interesting question about the value of SCUs - If a somewhat more expensive programme was only capable of increasing positive time use and counteracting detriment in positive affect, but unable to diminish negative behaviours, would the investment be justified? The result of this review is unable to answer this question. There was no evidence showing that the SCU group had a better quality of life in terms of more social interactions with others. Consequently, other issues follow -

if no measurable benefits for SCU care can be found, then we need to consider whether it is appropriate to place persons with dementia in a designated unit, with the likely unavoidable stigma of being a difficult group than the rest of the population in a NH.

Ohta 1988 discussed who were the primary beneficiaries in SCU care, noting that special care can be beneficial to those who are not demented but need to reside in long-term care. Reportedly, cognitively intact people were distressed when they shared the same living space with those who were demented. This aspect, however, is beyond the focus of this review.

Donovan 2000 reported in their survey that the feelings of personal space, personhood, and an unforced routine were the significant elements in SCU care as perceived by families and staff. Some may suggest that the appraisal of SCU care by family and staff is just as important in evaluating SCU outcomes. If it is found that family and staff had benefited, then SCU care may still be worthwhile. Yet, studies on family and staff perceptions of SCU care are even fewer than those that examined patient outcomes. The included non-RCTs in this review did not investigate this aspect.

Apparently, SCUs and traditional nursing units admit residents with different clinical and socio-demographic profiles. Different types of care facilities can therefore be viewed as integral parts of

a continuum of care for residents in different stages of dementia. Instead of marketing SCU care as better care for people with certain diagnostic groups, it seems more suitable to promote SCU care as appropriate care for people with dementia who are relatively younger and functionally more able.

There is no simple conclusion in terms of recommending practice in SCU care. To come back to the review question, the assumption that the SCU can better manage behavioural problems lacks substantial grounds. It seems that it is more important to implement best practice than to provide a specialized care environment.

Implications for research

Research about SCU care and its impact on outcomes will require an examination of a wide spectrum of special units, a comprehensive assessment of the characteristics of each unit, and a decision as to what aspects of SCU care are related to outcomes. A study of rigour should have a clear taxonomy of unit characteristics, information about the types of dementing disorders of participants, and assessors who are blinded to group allocation. A nonequivalent control group design in which a control condition is present but participants are not randomly assigned may be unavoidable in SCU research.

Selection bias is a major confound for non-RCTs and therefore needs to be better controlled in future studies. Because random assignment may not be feasible in studies on SCU outcomes, the control of differences in the characteristics of individuals within different settings thus becomes crucial.

Certain factors will need to be better controlled in order to obtain quality data. For instance, some studies controlled for transitions - the time between admission into a nursing home and adjusting to nursing home life (e.g., Reimer 2004; Swanson 1993) - but others did not.

A balanced decision concerning the choice of instruments is crucial in order to collect trustworthy data. Albeit time-consuming and subject to rater bias, direct observational data does have value over secondary data collected through, for example, caregiver interviews. Given the variability in nursing home services and the self-report nature of the data collected, more observational studies are warranted (Magaziner 1994). Both the NPI and the CMAI are commonly used assessments of residents' agitation, but they use information solicited from caregiver interviews. The appropriateness of using sub-scales, individual items, or overall scores as outcome measures (e.g. NPI) still lacks consensus among researchers in the field, not to mention the scalability of these tools. All of these issues deserve our further attention. Targeting research for different stages of dementing illness and in different settings will also be useful.

There is a need for editors of scientific journals to demand a more consistent format of reporting in clinical trials. Many studies reviewed do not provide the key information needed for meta-analysis, e.g., pooled standard deviations. In addition, many of them do not report how missing data was managed and whether intention-to-treat and sensitivity analyses were performed.

In 1994, Leon already pointed out that it is important to recognize that the population of SCU is continually expanding and that their programmatic features are perpetually changing. Over time, the development of specialized dementia care has progressed into a multitude of settings; community care and group living are becoming more popular. Future research should be not only directed at larger and more generalizable samples, but also conducted in a variety of settings such as day care, group living and other community care models. Such a development will make study designs more complex and challenging. But it is not something that is avoidable.

The measurement of specific outcomes in SCUs should continue to be a goal of anyone interested in these facilities (Parker-Oliver 2005). The issue about potential benefits for both formal and informal caregivers should also be examined. If the assumption underlying care in these units is that it is superior for the populations they are designed for, if family members continue to pay additional fees for this care (Maas 1998), and if society as a whole, and not just the operators and stake holders, invests more when providing SCU care, then policy makers and consumers need to ask for empirical data measuring the benefits of these units.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Chappell 2000

Methods	A prospective cohort study Followed up at 12 months
Participants	SCU n=260 and NH n=250 at baseline, SCU n=165 and NH n=158 at 12 months Sample drawn from 77 intermediate care facilities (51 SCUs and 101 integrated units) throughout the province of British Columbia, Canada Only participants with documented evidence of dementia, who were unlikely to die or move from the unit in the 12 months following their admission, who had the ability to communicate in English, and who were at least 65 years of age were recruited. Response rate 88% of eligible subjects To control for the likelihood that SCU tend to have residents with higher levels of dementia, and to allow for comparisons among facilities, the authors screened only those identified by the directors of nursing of the participating facilities as suffering from at least moderate dementia There was no mention of whether the sample was inclusive of the entire LTC population in British Columbia. A definition of intermediate care was not provided. It is therefore difficult to gauge whether these intermediate care facilities were similar to traditional nursing homes Female: 67% of sample
Interventions	SCUs must have at least one of the following: specially trained staff, special programme activities, or individual assessment or care planning
Outcomes	Agitated behaviour: CMAI Mood and/or affect: Feeling Tone Quetionnaire, social behavior subscale and expressive language subscale of the Multi-Focus Assessment Scale-Revised Use of physical restraint: facility level data
Notes	A study in British Columbia, Canda The aim of the study was to compare five dimension of care (preadmission and admission procedures, staff training and education, non-use of physical and chemical restraints, flexible care routines and resident relevant activities, and the environment) between SCU and non-SCU settings

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not reported; non-RCT
Allocation concealment (selection bias)	High risk	Unlikely

Chappell 2000 (*Continued*)

Blinding (performance bias and detection bias) All outcomes	High risk	Unlikely; the data were collected by specially trained research personnel from residents themselves, medical charts, families, and staff. Blinding was not discussed
Incomplete outcome data (attrition bias) All outcomes	Low risk	There were 187 dropouts after 12 months. The percentages of recruited participants in SCUs and non-SCUs remained the same at the two measurement points - 51% and 49% respectively. Attrition and exclusion were reported. The sample size at t2 had sufficient power (98%) for each regression equation
Selective reporting (reporting bias)	Low risk	The authors had a clear account of the variables being tested and also reported outcomes relevant to their study questions
Other bias	Low risk	A well designed study addressing the authors' questions - (dimensions of care in long-term care for dementia sufferers in relation to outcomes) but it did not provide direct information to the topic (SCU care) being reviewed

Frisoni 1998

Methods	A prospective case controlled study Followed up at 3 months
Participants	SCU n=31, NH n=35; the sample were recruited from 43 long-term care facilities within the same geographical district in Italy Had a carefully thought out and executed protocol with 1st and 2nd level screening. All were confirmed cases of dementia, about two-thirds of whom had probable or possible AD Females: 76%
Interventions	Not described
Outcomes	Agitated behaviour: NPI, CMAI Mood and/or affect: Cornell Depression Scale Psychotropic drug use &/or use of physical restraint: Frequency counts
Notes	An international study - Italy, France, Sweden; Study only reported data collected in Italy

Risk of bias

Frisoni 1998 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Non-RCT; but a detailed standard protocol was in place to ensure recruitment of intervention and control group subjects met the inclusion and exclusion criteria
Allocation concealment (selection bias)	High risk	Unlikely
Blinding (performance bias and detection bias) All outcomes	High risk	Same assessor collected data from subjects whenever possible but no blinding
Incomplete outcome data (attrition bias) All outcomes	High risk	Outcomes were reported in detail; attrition was not reported. Missing data not mentioned
Selective reporting (reporting bias)	Low risk	The authors had a clear account of the variables being tested and also reported all relevant outcomes
Other bias	High risk	There might have been significant differences between those nursing homes that opted for or not joining the study SCU subjects tended to have more severe behavioural disturbances and to be less restrained (19 versus 46%) over the first week after admission There was no information concerning how were the SCUs set up or different from traditional units

Leon 1999

Methods	A prospective matched cohort study recruited over a period of 18 months with a response rate of 75.6% Followed up at 6 months
Participants	SCU n=432, NH n=164; the sample consisted of newly admitted residents drawn from a nationally representative group of 106 SCUs and 47 non-specialized comparison facilities in the US; recruitment criteria not discussed Female: 71%
Interventions	The authors discussed the study venue as a representative sample of SCUs but there was no clear description of the set up of the SCUs. The representativeness of traditional nursing homes was also not discussed

Outcomes	Agitated behaviour: Disruptive behavior drawn from 6 items from the MDS, Psychotropic drug use and use of physical restraint: Frequency counts	
Notes	An US study	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not reported; non-RCT
Allocation concealment (selection bias)	High risk	Unlikely
Blinding (performance bias and detection bias) All outcomes	High risk	Unlikely. Data collection methods not described.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Regression models were used in testing for the outcomes of the study The authors described their use of SUDAAN, a statistical software package for the analysis of correlated data encountered in complex sample surveys. The software utilizes a derived system of weights to avoid a biased estimate of standard errors. In their statistical model, weights were created at both the facility and individual levels. Their regression model is presented as a series of four weighted regression equations run in SUDAAN, with each successive equation introducing an additional category of explanatory variables. The authors reported that the series of equations was run to provide a clearer picture of the impact of each set of variables on physically aggressive behaviour and the inter-relationships of the variables Yet statistical data of outcome variables at baseline were unavailable to compare against outcomes at 6 months Attrition was described. Data of drop-outs not included in analysis and reasons not provided. No information about the management of missing data
Selective reporting (reporting bias)	High risk	Difficult to determine and therefore I would say no. From the description of the

		study methods, the researchers collected lots of data from family and staffs, and also from reviewing medical records. Only 11 variables grouped into 4 categories were reported. The rationale in the selection of these variables were not provided. It was possible that the authors simply tried to report what were pertinent in answering their research question without giving excessive details
Other bias	High risk	When comparing admissions between SCUs and non-SCU admissions (limited data was provided), 44% admitted to SCUs presented with disruptive behavior (vs. 33% admitted to non-SCUs). Among those with disruptive behaviour, 37% of the disruptive admissions to SCUs presented extremely high levels of disruption compared to 30% for the non-SCU facilities. Also more private patients were admitted into SCUs indicating that the two groups might have significant differences to begin with It is not known who collected the data or how was it done There was no information concerning how were the SCUs set up or different from traditional units

Nobili 2006

Methods	A prospective cohort study Followed up for 18 months In Italy, RSA means Residenze Sanitario Assistenziali, for which the patient, especially in the more advanced stages and at the onset of behavioural disturbances, can be placed permanently. The randomization in this study as done with the list of RSA with or without SCU accredited by the region of Lombardy in Italy, on a ratio of 4 to 1
Participants	SCU n=349, NH n=81; the sample was recruited from 58 randomly chosen long-term care facilities (SCU and NH) from 439 RSA in the Lombardy Region, Italy; participants were newly admitted residents recruited from the random sampled RSA Female: 80%
Interventions	Not described.
Outcomes	Agitated behaviour: NPI Psychotropic drug use: Frequency count

Notes	A study in the Lombardy region of Italy	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Non-RCT; but a random sample was drawn from a list of nursing homes in the region, and every ward was asked to select the last 10 patients admitted with dementia according to a set of selection criteria
Allocation concealment (selection bias)	High risk	
Blinding (performance bias and detection bias) All outcomes	High risk	
Incomplete outcome data (attrition bias) All outcomes	High risk	Outcomes were reported in detail; attrition was reported but exclusions in the analysis not explained. The results only consisted of completed cases. The reasons for the nursing homes that dropped out were not given. Information about missing data was not provided
Selective reporting (reporting bias)	Low risk	The authors had a clear account of the variables being tested and also reported all relevant outcomes
Other bias	High risk	Information about the set up and care management of the SCU was not available Selection bias a major confound of this study. There were significant baseline differences between the two groups: i) non-SCU residents had a higher mean age than SCU residents (84.5 vs. 81.2; P = 0.0001) ii) non-SCUs residents had an average longer stay (26.5 vs. 13.6 month, P = 0. 0001) iii) SCU residents had more years of education (5.8 vs. 5.0 years, P = 0.02) iv) non-SCU residents had greater cognitive impairments (mean MMSE 1.7 vs. 7. 1, P = 0.0001) v) non-SCU residents more functionally impaired (mean BI score 31 vs. 43 in the

		SCU cases, P = 0.0005) vi) non-SCU residents had a higher level of comorbidity (mean CIRS score 4.3 vs. 3.5 in SCU, P=0.003) vii) non-SCU residents took a higher mean number of medications although not reaching a statistically significant level (4.6 meds vs. 4.1 in SCU, P = 0.08) viii) SCU cases showed a greater prevalence NPI score in behavioural disturbances (33.9 in SCU and 17.1 in non-SCU, P = 0.0001)

Reimer 2004

Methods	A prospective matched cohort study Followed at 3, 6, 9, and 12 months
Participants	SCU n=62, NH n=123; NH further differentiated into multiple (MTIF) and single institutions (STIF) with the sample sizes of SCU n=62, MTIF n=64, and STIF n=59; all participants were either relocated to the new SCU or transferred to another NH unit mimicking relocation The selection criterion was residents with mid- to late-stage dementia in stage 5 of the Global Deterioration Scale or greater The SCU group consisted of residents eligible for care through the regional, publicly-funded continuing care system who were non-smokers Female: 73.5%
Interventions	A specially designed award winning facility developed based on an ecological home-like model. The SCU facility has semi-attached bungalows, each with its own small garden. There was integrated programming throughout the day rather than having episodic therapist interventions
Outcomes	All measures regarded as quality of life measures: Brief Cognitive Rating Scale, Functional Assessment Staging, CMAI, Pleasant Event Scale-Alzheimer's disease, Multidimensional Observation Scale of Elderly Subjects, Apparent Affect Rating Scale
Notes	A study in Canada

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Non-RCT; the original design of the study was a randomized controlled trial but there was an insufficient number of people waiting to be admitted to the new SCU. The

		study was then changed to a matched groups design
Allocation concealment (selection bias)	High risk	Unlikely
Blinding (performance bias and detection bias) All outcomes	High risk	
Incomplete outcome data (attrition bias) All outcomes	Low risk	Replacement of attrited subjects and management of missing data reported. There was only a small percentage of missing data (0.1 to 1.2% of key measures). Missing data were managed by imputing the propensity scores method using SOLAS 3 and the analyses were also repeated using the last-value carried-forward approach as an alternate method for imputing the missing data This was the only study in this review that used intention-to-treat principles in data analysis
Selective reporting (reporting bias)	High risk	Results were shown only in graphs instead of tables; also only p-values of ANCOVA examining effect of group-by-assessment interaction were reported
Other bias	High risk	One group transferred to a new SCF while another group mimicked transfer (moved to live in another MTIF). The last group was traditional care with no transfer The residents who met the specific admission criteria (non-smoker) and who consented to being moved to the new special care facilities could have induced self-selection biases The SCU in this study was developed based on an ecological home-like model, a specially designed (award winning design) facility. Again, introducing a special dimension about the comparability of the intervention

Swanson 1993

Methods	A quasi-experimental study Bimonthly data was collected for 12 months both prior to, and post-admission into the study
Participants	SCU n=13, NH n=9; both groups were newly admitted residents recruited from the same facility All residents with irreversible dementia confirmed by a neuropsychological examination were potential participants. The subjects had no history of major psychiatric illness or mental retardation, and had a Global Deterioration Scale of score 3-6, a score > 20 on the cognitive subscale and a score > 10 on the non-cognitive subscale of Alzheimer's Disease Assessment (ADAS; Rosen 1984), and no history of major psychiatric illness or mental retardation before the onset of AD Male: 91%
Interventions	The SCU was specially designed, with special staffing and programming. Also, the staff were trained in geriatric or dementia care
Outcomes	Agitated behaviour: Frequency count of catastrophic reactions Quality of life: Frequency count of unscheduled interactions with staff and family
Notes	A study in a long-term care facility for veterans in the Midwest, US

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	The initial protocol of random assignment with replacement was not maintained due to attrition
Allocation concealment (selection bias)	High risk	
Blinding (performance bias and detection bias) All outcomes	High risk	
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition reported but no explanation given for excluding the attrited case in analysis The Individual Incident Record include 3 key categories of outcome variables: catestrohic rections, unscheduled activities, and wandering. Limited information could be found about how were they collected and assessed. The mean and SD were not always reported in the outcome variables discussed
Selective reporting (reporting bias)	High risk	The authors reported an elaborate data collection process but information about the

		outcome variables - how were they constructed, validated, and measured - were limited
Other bias	High risk	In another report from the same study, Swanson 1994 noted that the two groups did not differ in their functional abilities pre-test but the SCU subjects were more cognitively impaired before the SCU opened (baseline) The Individual Incident Report (the major outcome measure) had not yet been adequately tested for its validity and reliability The traditional units were units located within various location of the same facility. Basically it is an intra-facility comparison. In this case, many institutional variables might have been comparable. But the sample was small and the majority were male subjects, rendering this study distinct from other studies in this review

Webber 1995

Methods	A prospective cohort study Followed up at 6 months
Participants	SCU n=12; NH n=10; the eight participating facilities (4 SCUs and 4 NHs) were chosen from a list of nursing homes in three health service regions; participants were newly admitted residents that had a diagnosis of age-related dementia using a symptom checklist developed based on the Global Deterioration Scale. Residents with a history of psychiatric problems, head trauma, AIDS-related dementia and alcoholism were excluded Female: 64%
Interventions	An SCU must have three of the five following criteria 1) a geographically distinct area; 2) a locked and secured unit; 3) specialized activities programming; 4) specially trained staff and/or enriched staffing pattern; and 5) diagnosis-specific admission and/or discharge criteria. The control site: admit dementia patients; facilities that had an SCU on site were excluded Both SCUs and non-SCUs provided dementia training to staff
Outcomes	Agitated behaviour: CMAI (However, results not reported) Mood and/or affect: Feeling Tone Interview Instrument Psychotropic drug use and use of physical restraints: Frequency count
Notes	A study in Northern California, US
Risk of bias	

Webber 1995 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	non-RCT
Allocation concealment (selection bias)	High risk	Unlikely
Blinding (performance bias and detection bias) All outcomes	High risk	Unlikely
Incomplete outcome data (attrition bias) All outcomes	High risk	Attrition and exclusions, if any, not reported
Selective reporting (reporting bias)	Low risk	The authors had a detail discussion of their choice of outcome measures and all of them were included in the report
Other bias	High risk	Out of the 12 facilities that agree to participate, eight were selected as the final sample. It was unclear why were those eight selected Only 70% of the control group participants had a diagnosis of AD as compared to 100% of the SCU participants There were twice as many residents who were on Medicaid in the control facilities than in SCUs. That is, SCUs took on patients who were private paid. The two groups were likely to be different in terms of socio-economic status Also SCUs were noted to admit patients with more problem behaviors than in traditional nursing units. Therefore the intervention and control groups were not equivalent to begin with There was no information about the training of research personnel who collected data

Weyerer 2005

Methods	A prospective cohort study Followed up at approximately 6-month
Participants	SCU n=725; NH n=698; SCU group from 28 care homes in Hamburg and NH group from 11 care homes in Mannheim
Interventions	Unclear; limited information from the translated excerpt

Outcomes	Mood and/or affect: positive feelings Quality of life: social contact Use of psychotropics and physical restraint use (measures not described)	
Notes	A study in Germany	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	non-RCT; also lacking sufficient information
Allocation concealment (selection bias)	Unclear risk	But unlikely
Blinding (performance bias and detection bias) All outcomes	Unclear risk	But unlikely
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	The authors had qualified nursing staffs to collect data in order to obtain "the most complete picture possible." Information about the details of outcome measures used, and their validity and reliability, was unavailable
Selective reporting (reporting bias)	Unclear risk	Lacking sufficient material to make an informed judgment
Other bias	High risk	No explanation about how the SCU care homes was selected.The control sites were randomly selected but details were not provided Residents who were already living at the care homes and those who were newly admitted over a one-year period were recruited The control sites in Mannheim (a city in Germany) delivered traditional integrative care but the SCU sites in Hamburg delivered both segregative and integrative care, it is unclear how the datasets were compared, but the results might have been compromised No discussion about how did the authors control for the different levels of behavioural problems in the participants

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Chafetz 1991	Convenience sampling with no matched controls
Holmes 1990	Holmes 1990 Convenience sampling; lacking matched controls
Lawton 1998	Evaluated the outcomes of care of a 'stimulation-retreat' intervention model in two SCU, not comparing against non-SCU
Lichtenberg 2005	Tested a behavioral intervention in two SCU, not comparing against SCU and non-SCU
Mathew 1988	Surveyed the characteristics of SCU and SCU residents with dementia, no comparison group
Mathew 1991	Reporting the same study as Mathew 1988.
Matteson 1997	Sample included demented and non-demented subjects, intervention group included both SCU and non-SCU subjects. Studied an intervention model rather than the SCU
Phillips 2000	A retrospective review of medical records that analyzed the use of restraints and psychotropic medication in SCU, residents' outcome not tracked over time
Rovner 1996	A randomized trial that investigated the effect of a special program for dementia care in a nursing home, not comparing SCU and non-SCU
Sand 1992	Surveyed SCUs and non-SCU characteristics and residents' statuses using a postal questionnaire
Volicer 1994a	The outcomes of interest were discomfort and costs. All patients admitted to the SCU had advance proxy planning. This sample of residents who were in an advanced stage of dementia would be different from those included in the review
Warren 2001	Compared residential care centers (a social model of care) against SCU, not comparing against traditional nursing home settings
Wells 1987	Evaluate outcomes of SCU with community care, not with traditional nursing homes

DATA AND ANALYSES

Comparison 1. Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Behavior	1	132	Mean Difference (IV, Fixed, 95% CI)	-1.05 [-5.08, 2.99]
1.1 CMAI	1	66	Mean Difference (IV, Fixed, 95% CI)	0.20 [-7.62, 8.02]
1.2 NPI	1	66	Mean Difference (IV, Fixed, 95% CI)	-1.50 [-6.21, 3.21]
2 Mood and/or Affect	1	66	Mean Difference (IV, Fixed, 95% CI)	-6.3 [-7.88, -4.72]
2.1 Cornell Depression Scale	1	66	Mean Difference (IV, Fixed, 95% CI)	-6.3 [-7.88, -4.72]
3 Psychotropic Drug Use	1	66	Mean Difference (IV, Fixed, 95% CI)	-0.1 [-0.50, 0.30]
3.1 Mean number of Psychotropic Drugs	1	66	Mean Difference (IV, Fixed, 95% CI)	-0.1 [-0.50, 0.30]
4 Use of Physical Restraint	1	66	Odds Ratio (M-H, Fixed, 95% CI)	0.23 [0.05, 1.19]
4.1 Use of Physical Restraint (All types)	1	66	Odds Ratio (M-H, Fixed, 95% CI)	0.23 [0.05, 1.19]

Comparison 2. Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Behavior	1	337	Mean Difference (IV, Fixed, 95% CI)	-4.3 [-7.22, -1.38]
1.1 NPI	1	337	Mean Difference (IV, Fixed, 95% CI)	-4.3 [-7.22, -1.38]
2 Behavior at 6 months (change scores not available)	1	596	Mean Difference (IV, Fixed, 95% CI)	0.74 [-0.34, 1.82]
2.1 CMAI	1	596	Mean Difference (IV, Fixed, 95% CI)	0.74 [-0.34, 1.82]
3 Mood and/or Affect			Other data	No numeric data
3.1 Feeling Tone Score - Verbal			Other data	No numeric data
3.2 Feeling Tone Score - Non verbal			Other data	No numeric data
4 Quality of Life	1	88	Odds Ratio (M-H, Fixed, 95% CI)	0.90 [0.36, 2.22]
4.1 Activity Participation - Formal	1	22	Odds Ratio (M-H, Fixed, 95% CI)	7.35 [0.31, 173.13]
4.2 Activity Participation - Informal	1	22	Odds Ratio (M-H, Fixed, 95% CI)	0.09 [0.01, 0.65]
4.3 Exercise	1	22	Odds Ratio (M-H, Fixed, 95% CI)	1.25 [0.14, 10.94]
4.4 Individual	1	22	Odds Ratio (M-H, Fixed, 95% CI)	2.33 [0.40, 13.61]
5 Psychotropic Drug Use	1	340	Mean Difference (IV, Fixed, 95% CI)	0.20 [0.00, 0.40]
5.1 Mean number of Psychotropic Drugs	1	340	Mean Difference (IV, Fixed, 95% CI)	0.20 [0.00, 0.40]
6 Regular Use of Psychotropic Medications	1	88	Odds Ratio (M-H, Fixed, 95% CI)	1.52 [0.49, 4.69]
6.1 Antipsychotic	1	22	Odds Ratio (M-H, Fixed, 95% CI)	1.17 [0.19, 7.12]

6.2 Antidepressant	1	22	Odds Ratio (M-H, Fixed, 95% CI)	5.0 [0.21, 117.21]
6.3 Antianxiolytic	1	22	Odds Ratio (M-H, Fixed, 95% CI)	3.0 [0.26, 34.57]
6.4 Other	1	22	Odds Ratio (M-H, Fixed, 95% CI)	0.25 [0.01, 6.94]
7 PRN Use of Psychotropic Medication	1	88	Odds Ratio (M-H, Fixed, 95% CI)	2.84 [0.41, 19.89]
7.1 Antipsychotic	1	22	Odds Ratio (M-H, Fixed, 95% CI)	1.80 [0.14, 23.37]
7.2 Antidepressant	1	22	Odds Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
7.3 Antianxiolytic	1	22	Odds Ratio (M-H, Fixed, 95% CI)	5.0 [0.21, 117.21]
7.4 Other	1	22	Odds Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
8 Use of Physical Restraint	2	354	Odds Ratio (M-H, Fixed, 95% CI)	0.46 [0.27, 0.80]
8.1 Use of Physical Restraint at 6 months (Change scores not available)	2	354	Odds Ratio (M-H, Fixed, 95% CI)	0.46 [0.27, 0.80]

Comparison 3. Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Behaviour	1	282	Mean Difference (IV, Fixed, 95% CI)	-5.9 [-8.99, -2.81]
1.1 NPI	1	282	Mean Difference (IV, Fixed, 95% CI)	-5.9 [-8.99, -2.81]
2 Quality of Life	1	44	Mean Difference (IV, Fixed, 95% CI)	5.49 [-2.17, 13.16]
2.1 Mean Number of Interactions with Staff	1	22	Mean Difference (IV, Fixed, 95% CI)	235.90 [161.93, 309.87]
2.2 Mean Number of Interactions with Family	1	22	Mean Difference (IV, Fixed, 95% CI)	2.99 [-4.72, 10.70]
3 Psychotrophic Drug Use	1	282	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.12, 0.32]
3.1 Mean number of Psychotropic Drugs	1	282	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.12, 0.32]
4 Use of Physical Restraint	1	285	Odds Ratio (M-H, Fixed, 95% CI)	0.49 [0.27, 0.88]
4.1 Use of Physical Restraint	1	285	Odds Ratio (M-H, Fixed, 95% CI)	0.49 [0.27, 0.88]
5 Other Behaviour - Catastrophic Reactions			Other data	No numeric data

Comparison 4. Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Behaviour	1	242	Mean Difference (IV, Fixed, 95% CI)	-5.4 [-9.15, -1.65]
1.1 NPI	1	242	Mean Difference (IV, Fixed, 95% CI)	-5.4 [-9.15, -1.65]
2 Psychotropic Drug Use	1	268	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.12, 0.32]
2.1 Mean number of Psychotropic Drugs	1	268	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.12, 0.32]
3 Use of Physical Restraint	1	242	Odds Ratio (M-H, Fixed, 95% CI)	0.54 [0.29, 1.03]
3.1 Use of Physical Restraint	1	242	Odds Ratio (M-H, Fixed, 95% CI)	0.54 [0.29, 1.03]

Analysis 1.1. Comparison 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month, Outcome 1 Behavior.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month

Outcome: 1 Behavior

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 CMAI							
Frisoni 1998	31	-4.3 (14.88)	35	-4.5 (17.51)		26.6 %	0.20 [-7.62, 8.02]
Subtotal (95% CI)	**31**		**35**			**26.6 %**	**0.20 [-7.62, 8.02]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.05 (P = 0.96)							
2 NPI							
Frisoni 1998	31	-10.2 (10.88)	35	-8.7 (8.28)		73.4 %	-1.50 [-6.21, 3.21]
Subtotal (95% CI)	**31**		**35**			**73.4 %**	**-1.50 [-6.21, 3.21]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.62 (P = 0.53)							
Total (95% CI)	**62**		**70**			**100.0 %**	**-1.05 [-5.08, 2.99]**
Heterogeneity: Chi^2 = 0.13, df = 1 (P = 0.72); I^2 =0.0%							
Test for overall effect: Z = 0.51 (P = 0.61)							
Test for subgroup differences: Chi^2 = 0.13, df = 1 (P = 0.72), I^2 =0.0%							

Analysis 1.2. Comparison 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month, Outcome 2 Mood and/or Affect.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month

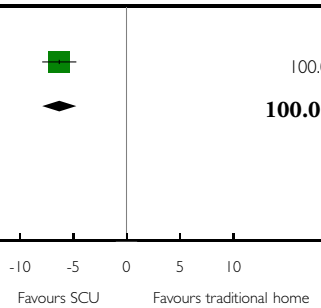
Outcome: 2 Mood and/or Affect

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Cornell Depression Scale							
Frisoni 1998	31	-2.3 (2.78)	35	4 (3.75)		100.0 %	-6.30 [-7.88, -4.72]
Total (95% CI)	**31**		**35**			**100.0 %**	**-6.30 [-7.88, -4.72]**

Heterogeneity: not applicable

Test for overall effect: Z = 7.81 (P < 0.00001)

Test for subgroup differences: Not applicable



Analysis 1.3. Comparison 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month, Outcome 3 Psychotropic Drug Use.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month

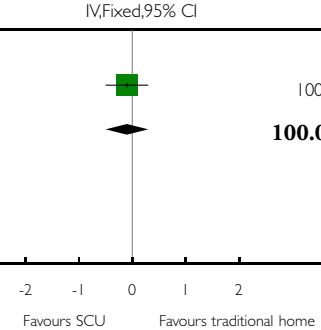
Outcome: 3 Psychotropic Drug Use

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Mean number of Psychotropic Drugs							
Frisoni 1998	31	0.1 (0.74)	35	0.2 (0.91)		100.0 %	-0.10 [-0.50, 0.30]
Total (95% CI)	**31**		**35**			**100.0 %**	**-0.10 [-0.50, 0.30]**

Heterogeneity: not applicable

Test for overall effect: Z = 0.49 (P = 0.62)

Test for subgroup differences: Not applicable



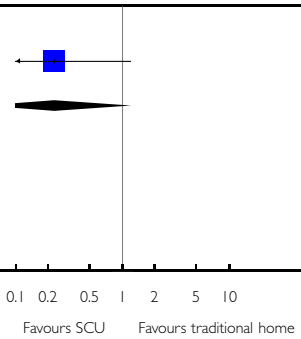
Analysis 1.4. Comparison 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month, Outcome 4 Use of Physical Restraint.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 1 Special Care Units versus Traditional Nursing Homes, Outcomes at 3-month

Outcome: 4 Use of Physical Restraint

Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Use of Physical Restraint (All types)					
Frisoni 1998	2/31	8/35		100.0 %	0.23 [0.05, 1.19]
Total (95% CI)	**31**	**35**		**100.0 %**	**0.23 [0.05, 1.19]**
Total events: 2 (SCU), 8 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.75 (P = 0.081)					
Test for subgroup differences: Not applicable					



Analysis 2.1. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 1 Behavior.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

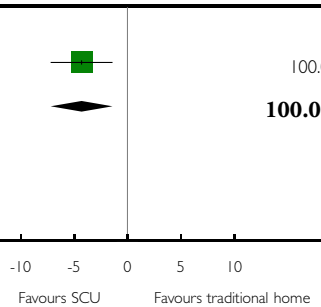
Outcome: 1 Behavior

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 NPI							
Nobili 2006	273	-5.1 (17.3)	64	-0.8 (8.5)		100.0 %	-4.30 [-7.22, -1.38]
Total (95% CI)	**273**		**64**			**100.0 %**	**-4.30 [-7.22, -1.38]**

Heterogeneity: not applicable

Test for overall effect: Z = 2.88 (P = 0.0039)

Test for subgroup differences: Not applicable



Analysis 2.2. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 2 Behavior at 6 months (change scores not available).

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

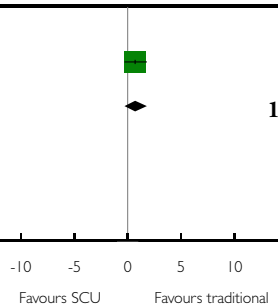
Outcome: 2 Behavior at 6 months (change scores not available)

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 CMAI							
Leon 1999	432	4.84 (6.37)	164	4.1 (5.88)		100.0 %	0.74 [-0.34, 1.82]
Total (95% CI)	**432**		**164**			**100.0 %**	**0.74 [-0.34, 1.82]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.34 (P = 0.18)

Test for subgroup differences: Not applicable



Analysis 2.3. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 3 Mood and/or Affect.

Mood and/or Affect

Study	**SCU Mean pre-test score (SD not reported)**	**Traditional NH Mean pre-test score (SD not reported)**	**SCU Mean post-test score (SD not reported)**	**Traditional NH Mean post-test score (SD not reported)**	**SCU Mean change score (Pooled SD not reported)**	**Traditional NH Mean change score (Pooled SD not reported)**
Feeling Tone Score - Verbal						
Webber 1995	n=12	n=10	n=12	n=10	n=12	n=10
Webber 1995	7.6	8.4	6.5	4.7	-1.1	-3.7
Feeling Tone Score - Non verbal						
Webber 1995	n=12	n=10	n=12	n=10	n=12	Tn=10
Webber 1995	55.7	38.9	42.0	36.4	-13.7	-2.5

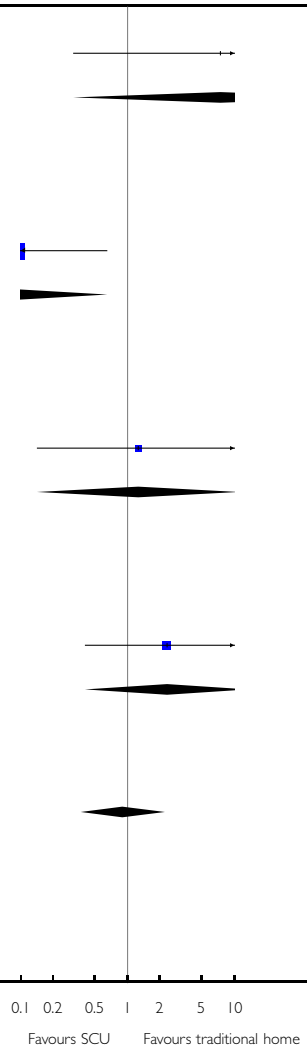
Analysis 2.4. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 4 Quality of Life.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

Outcome: 4 Quality of Life

Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Activity Participation - Formal					
Webber 1995	12/12	8/10		3.6 %	7.35 [0.31, 173.13]
Subtotal (95% CI)	**12**	**10**		**3.6 %**	**7.35 [0.31, 173.13]**
Total events: 12 (SCU), 8 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.24 (P = 0.22)					
2 Activity Participation - Informal					
Webber 1995	2/12	7/10		64.9 %	0.09 [0.01, 0.65]
Subtotal (95% CI)	**12**	**10**		**64.9 %**	**0.09 [0.01, 0.65]**
Total events: 2 (SCU), 7 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 2.37 (P = 0.018)					
3 Exercise					
Webber 1995	10/12	8/10		14.8 %	1.25 [0.14, 10.94]
Subtotal (95% CI)	**12**	**10**		**14.8 %**	**1.25 [0.14, 10.94]**
Total events: 10 (SCU), 8 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.20 (P = 0.84)					
4 Individual					
Webber 1995	6/12	3/10		16.7 %	2.33 [0.40, 13.61]
Subtotal (95% CI)	**12**	**10**		**16.7 %**	**2.33 [0.40, 13.61]**
Total events: 6 (SCU), 3 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.94 (P = 0.35)					
Total (95% CI)	**48**	**40**		**100.0 %**	**0.90 [0.36, 2.22]**
Total events: 30 (SCU), 26 (Traditional NH)					
Heterogeneity: Chi^2 = 8.05, df = 3 (P = 0.05); I^2 =63%					
Test for overall effect: Z = 0.24 (P = 0.81)					
Test for subgroup differences: Chi^2 = 8.04, df = 3 (P = 0.05), I^2 =63%					



Analysis 2.5. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 5 Psychotropic Drug Use.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

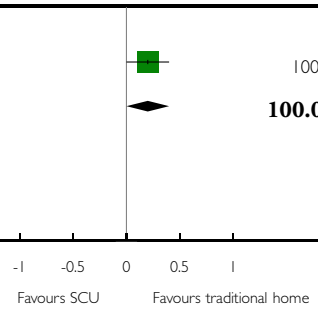
Outcome: 5 Psychotropic Drug Use

Study or subgroup	SCU N	SCU Mean(SD)	Traditional NH N	Traditional NH Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Mean number of Psychotropic Drugs							
Nobili 2006	274	0.8 (0.9)	66	0.6 (0.7)		100.0 %	0.20 [0.00, 0.40]
Total (95% CI)	**274**		**66**			**100.0 %**	**0.20 [0.00, 0.40]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.96 (P = 0.050)

Test for subgroup differences: Not applicable



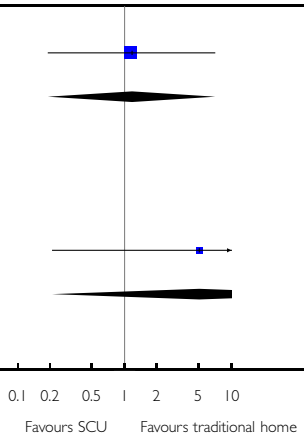
Analysis 2.6. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 6 Regular Use of Psychotropic Medications.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

Outcome: 6 Regular Use of Psychotropic Medications

Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Antipsychotic					
Webber 1995	4/12	3/10		43.6 %	1.17 [0.19, 7.12]
Subtotal (95% CI)	**12**	**10**		**43.6 %**	**1.17 [0.19, 7.12]**
Total events: 4 (SCU), 3 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.17 (P = 0.87)					
2 Antidepressant					
Webber 1995	2/12	0/10		8.8 %	5.00 [0.21, 117.21]
Subtotal (95% CI)	**12**	**10**		**8.8 %**	**5.00 [0.21, 117.21]**
Total events: 2 (SCU), 0 (Traditional NH)					



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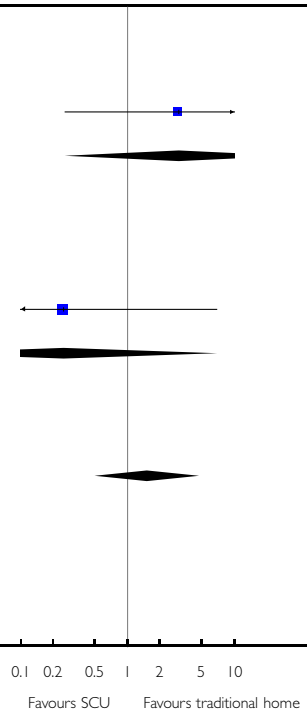
Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Heterogeneity: not applicable					
Test for overall effect: Z = 1.00 (P = 0.32)					
3 Antianxiolytic					
Webber 1995	3/12	1/10		16.4 %	3.00 [0.26, 34.57]
Subtotal (95% CI)	**12**	**10**		**16.4 %**	**3.00 [0.26, 34.57]**
Total events: 3 (SCU), 1 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.88 (P = 0.38)					
4 Other					
Webber 1995	0/12	1/10		31.3 %	0.25 [0.01, 6.94]
Subtotal (95% CI)	**12**	**10**		**31.3 %**	**0.25 [0.01, 6.94]**
Total events: 0 (SCU), 1 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.81 (P = 0.42)					
Total (95% CI)	**48**	**40**		**100.0 %**	**1.52 [0.49, 4.69]**
Total events: 9 (SCU), 5 (Traditional NH)					
Heterogeneity: Chi^2 = 2.05, df = 3 (P = 0.56); I^2 =0.0%					
Test for overall effect: Z = 0.72 (P = 0.47)					
Test for subgroup differences: Chi^2 = 2.05, df = 3 (P = 0.56), I^2 =0.0%					



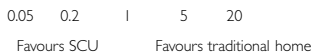
Analysis 2.7. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 7 PRN Use of Psychotropic Medication.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

Outcome: 7 PRN Use of Psychotropic Medication

Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Antipsychotic					
Webber 1995	2/12	1/10		67.5 %	1.80 [0.14, 23.37]
Subtotal (95% CI)	**12**	**10**		**67.5 %**	**1.80 [0.14, 23.37]**
Total events: 2 (SCU), 1 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.45 (P = 0.65)					
2 Antidepressant					
Webber 1995	0/12	0/10			Not estimable
Subtotal (95% CI)	**12**	**10**			**Not estimable**
Total events: 0 (SCU), 0 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
3 Antianxiolytic					
Webber 1995	2/12	0/10		32.5 %	5.00 [0.21, 117.21]
Subtotal (95% CI)	**12**	**10**		**32.5 %**	**5.00 [0.21, 117.21]**
Total events: 2 (SCU), 0 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.00 (P = 0.32)					
4 Other					
Webber 1995	0/12	0/10			Not estimable
Subtotal (95% CI)	**12**	**10**			**Not estimable**
Total events: 0 (SCU), 0 (Traditional NH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**48**	**40**		**100.0 %**	**2.84 [0.41, 19.89]**
Total events: 4 (SCU), 1 (Traditional NH)					
Heterogeneity: Chi^2 = 0.25, df = 1 (P = 0.62); I^2 =0.0%					
Test for overall effect: Z = 1.05 (P = 0.29)					
Test for subgroup differences: Chi^2 = 0.24, df = 1 (P = 0.62), I^2 =0.0%					



Analysis 2.8. Comparison 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month, Outcome 8 Use of Physical Restraint.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 2 Special Care Units versus Traditional Nursing Homes, Outcomes at 6-month

Outcome: 8 Use of Physical Restraint

Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Use of Physical Restraint at 6 months (Change scores not available)					
Nobili 2006	127/267	43/65		93.0 %	0.46 [0.26, 0.82]
Webber 1995	2/12	3/10		7.0 %	0.47 [0.06, 3.56]
Total (95% CI)	**279**	**75**		**100.0 %**	**0.46 [0.27, 0.80]**

Total events: 129 (SCU), 46 (Traditional NH)

Heterogeneity: Chi^2 = 0.00, df = 1 (P = 1.00); I^2 =0.0%

Test for overall effect: Z = 2.75 (P = 0.0059)

Test for subgroup differences: Not applicable

Analysis 3.1. Comparison 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month, Outcome 1 Behaviour.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month

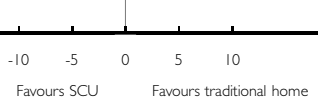
Outcome: 1 Behaviour

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 NPI							
Nobili 2006	224	-7.2 (17.8)	58	-1.3 (7.9)		100.0 %	-5.90 [-8.99, -2.81]
Total (95% CI)	**224**		**58**			**100.0 %**	**-5.90 [-8.99, -2.81]**

Heterogeneity: not applicable

Test for overall effect: Z = 3.74 (P = 0.00019)

Test for subgroup differences: Not applicable



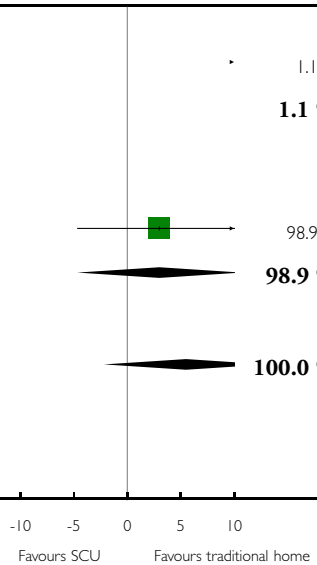
Analysis 3.2. Comparison 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month, Outcome 2 Quality of Life.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month

Outcome: 2 Quality of Life

Study or subgroup	SCU N	SCU Mean(SD)	Traditional NH N	Traditional NH Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Mean Number of Interactions with Staff							
Swanson 1993	13	283 (75.44)	9	47.1 (94.22)		1.1 %	235.90 [161.93, 309.87]
Subtotal (95% CI)	**13**		**9**			**1.1 %**	**235.90 [161.93, 309.87]**
Heterogeneity: not applicable							
Test for overall effect: Z = 6.25 (P < 0.00001)							
2 Mean Number of Interactions with Family							
Swanson 1993	13	6.1 (8.85)	9	3.11 (9.22)		98.9 %	2.99 [-4.72, 10.70]
Subtotal (95% CI)	**13**		**9**			**98.9 %**	**2.99 [-4.72, 10.70]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.76 (P = 0.45)							
Total (95% CI)	**26**		**18**			**100.0 %**	**5.49 [-2.17, 13.16]**
Heterogeneity: Chi^2 = 37.68, df = 1 (P<0.00001); I^2 =97%							
Test for overall effect: Z = 1.40 (P = 0.16)							
Test for subgroup differences: Chi^2 = 37.68, df = 1 (P = 0.00), I^2 =97%							



Analysis 3.3. Comparison 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month, Outcome 3 Psychotrophic Drug Use.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month

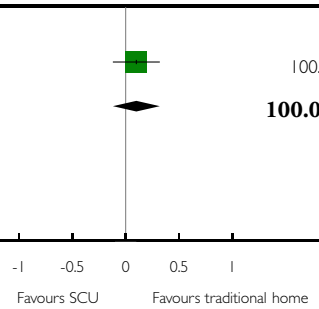
Outcome: 3 Psychotrophic Drug Use

Study or subgroup	SCU N	SCU Mean(SD)	Traditional NH N	Traditional NH Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Mean number of Psychotropic Drugs							
Nobili 2006	224	0.8 (0.9)	58	0.7 (0.7)		100.0 %	0.10 [-0.12, 0.32]
Total (95% CI)	**224**		**58**			**100.0 %**	**0.10 [-0.12, 0.32]**

Heterogeneity: not applicable

Test for overall effect: Z = 0.91 (P = 0.36)

Test for subgroup differences: Not applicable



Analysis 3.4. Comparison 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month, Outcome 4 Use of Physical Restraint.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month

Outcome: 4 Use of Physical Restraint

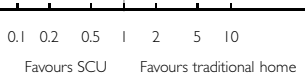
Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Use of Physical Restraint					
Nobili 2006	111/225	40/60		100.0 %	0.49 [0.27, 0.88]
Total (95% CI)	**225**	**60**		**100.0 %**	**0.49 [0.27, 0.88]**

Total events: 111 (SCU), 40 (Traditional NH)

Heterogeneity: not applicable

Test for overall effect: Z = 2.36 (P = 0.018)

Test for subgroup differences: Not applicable



Analysis 3.5. Comparison 3 Special Care Units versus Traditional Nursing Homes, Outcomes at 12-month, Outcome 5 Other Behaviour - Catastrophic Reactions.

Other Behaviour - Catastrophic Reactions

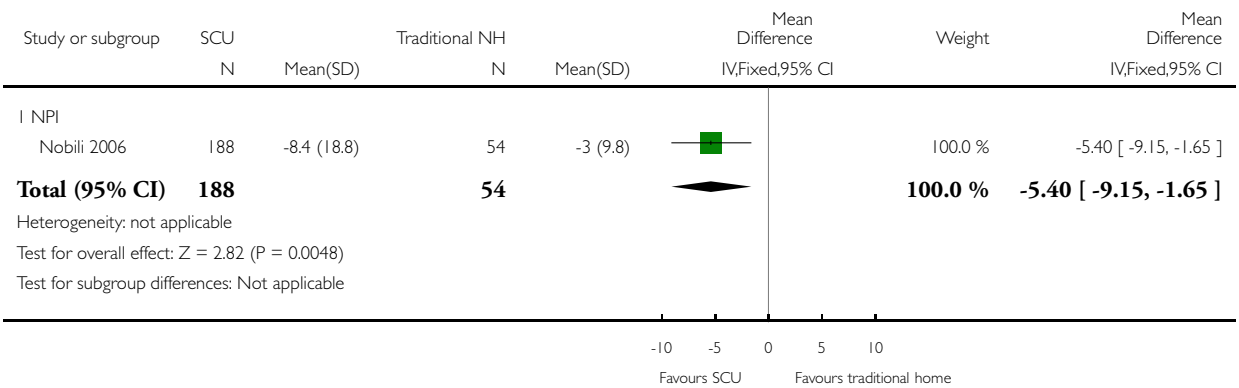
Study	**SCU Mean no. of times pre-intervention**	**SCU Mean no. of times post-intervention**	**SCU Change: pre- and post-intervention**	**Traditional NH units Mean no. of times pre-intervention**	**Traditional NH units Mean no. of times post-intervention**	**Traditional NH units Change: pre- and post-intervention**	**P-value**
Swanson 1993	n=13	n=13 Mean no. of times	n=13	n=9 Mean no. of times pre-intervention	n=9 Mean no. of times post-intervention	n=9 Change from pre- to post-intervention	Reported p-value comparing pre- and post-intervention
Swanson 1993	156	48	- 108	82	46	-36	0.035

Analysis 4.1. Comparison 4 Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month, Outcome 1 Behaviour.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 4 Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month

Outcome: 1 Behaviour



Analysis 4.2. Comparison 4 Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month, Outcome 2 Psychotropic Drug Use.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 4 Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month

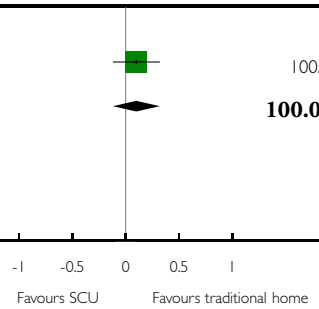
Outcome: 2 Psychotropic Drug Use

Study or subgroup	SCU N	Mean(SD)	Traditional NH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Mean number of Psychotropic Drugs							
Nobili 2006	214	0.8 (0.9)	54	0.7 (0.7)		100.0 %	0.10 [-0.12, 0.32]
Total (95% CI)	**214**		**54**			**100.0 %**	**0.10 [-0.12, 0.32]**

Heterogeneity: not applicable

Test for overall effect: Z = 0.88 (P = 0.38)

Test for subgroup differences: Not applicable



Analysis 4.3. Comparison 4 Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month, Outcome 3 Use of Physical Restraint.

Review: Special care units for dementia individuals with behavioural problems

Comparison: 4 Special Care Units versus Traditional Nursing Homes, Outcomes at 18-month

Outcome: 3 Use of Physical Restraint

Study or subgroup	SCU n/N	Traditional NH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Use of Physical Restraint					
Nobili 2006	98/188	36/54		100.0 %	0.54 [0.29, 1.03]
Total (95% CI)	**188**	**54**		**100.0 %**	**0.54 [0.29, 1.03]**

Total events: 98 (SCU), 36 (Traditional NH)

Heterogeneity: not applicable

Test for overall effect: Z = 1.88 (P = 0.060)

Test for subgroup differences: Not applicable

ADDITIONAL TABLES

Table 1. Outcome Measures Used in Included Studies

Name of measure	Source	Descriptioin	Maximum score	How to complete
Cohen-Mansfield Agitation Inventory (CMAI)	Cohen-Mansfield et al. 1989	Assess agitated behaviours, 29 items using a 7-point scale. There is also a short form (14 items)	203; maximum 70 for CMAI short-form; higher score means higher level of agitation	Caregiver rating the frequency of occurrence in the last 14 days
Neuropsychiatric Inventory	Cummings et al. 1994	Assess the presence, frequency and severity of 12 neuropsychiatric behaviours in the previous month	144	Caregiver rating
Cornell Scale for Depression in Dementia	Alexopoulos 1988	A 19-item scale measuring depressive symptoms	0-38	Caregiver and patient interviews
Feeling Tone Interview Instrument	Toner 1991	A 16-items questionnaire assessing an individual's affect	16-80	Patient interview

Table 2. Search Results for Non-RCT review

Category	CDCIG search	Subsequent search
Irrelevant, not related to SCU	13	2
Studies related aspects of dementia care but irrelevant to the review topic, e.g., an intervention	7	5
Excluded because studies did not compare between SCU and non-SCU	3	6
Excluded because of methodological concerns, e.g., postal questionnaire, retrospective chart audit, biased sample	-	7
Included (Referring to the same study: (i) Swanson 1993 & 1994; (ii) Gozzetti & Frisoni	5	9
Total	28	29

Table 3. Number of Eligible Non-RCTs for Review

Category	CDCIG Search	Subsequent Search
Eligible studies	5 (Frisoni 1998; Leon 1999; Nobili 2006; Swanson 1993 & 1994)	9 (Chappell 2000; Frisoni 1998; Gozzetti 1999; Nobili 2006; Reimer 2004; Swanson 1993 & 1994, Weyerer 2005)
Referring to the same study	Swanson 1993 & 1994	Frisoni 1998 & Gozzetti 1999
Overlaps between CDCIG and subsequent search	4 (Frisoni 1998; Nobili 2006; Swanson 1993 & 1994)	4 (Frisoni 1998; Nobili 2006; Swanson 1993 & 1994)
Total number of eligible non-RCTs for review = 8	4 (Frisoni 1998; Leon 1999; Nobili 2006; Swanson 1993)	4 (other than those already located by CDCIG search - Chappell 2000; Reimer 2004; Webber 1995; Weyerer 2005)

Table 4. Special care units versus traditional nursing homes: summary of overall effect

Outcome measure	3-month WMD (95% CI)	3-month z score (P)	6-month WMD (95% CI)	6-month z score (P)	12-month WMD (95% CI	12-month z score (P)	18-month WMD (95% CI	18-month z score (P)
Agitation (NPI & CMAI) Agitation (NPI & CMAI)	-1.05 (-5.08, 2.99)	0.51 (p=0.61)	-4.30 (-7.22, -1.38)	2.88 (p=0.004) *	-5.9 (-8.99, -2.81)	3.74 (p=0.0002) *	-5.40 (-9.16, -1.65)	2.82 (p=0.005) *
Agitation (CMAI at 6-month) Agitation (CMAI at 6-month)	-	-	0.74 (-0.34, 1.82)	1.34 (p=0.18)	-	-	-	-
Agitation (Catastrophic reactions)	-	-	-	-	No analysable data	No analysable data	-	-
Mood &/or Affect (Cornell Scale)	-6.30 (-7.88, -4.72)	7.81 (p<0.00001) *	Not estimable	Not estimable	-	-	-	-

Table 4. Special care units versus traditional nursing homes: summary of overall effect (*Continued*)

QOL (Activity participation and interactions) QOL (Activity participation and interactions)	-	-	OR: 0.90 (0.36, 2.22)	0.24 (P=0.81)	5.49 (-2.17, 13.16)	1.40 (p=0.16)	-	-
Psychotropic Drug Use	-0.10 (-0.50, 0.30)	0.49 (p=0.62)	0.20 (0.00, 0.40)	1.96 (p=0.05) †	0.10 (0.12, 0.32)	0.91 (p=0.36)	0.10 (0.12, 0.32)	0.88 (p=0.38)
Regular Psychotropic Drug Use	-	-	OR: 1.52 (0.49, 4.69)	0.72 (p=0.47)	-	-	-	-
PRN Psychotropic Drug Use	-	-	OR: 2.84 (0.41, 19.89)	1.05 (p=0.29)	-	-	-	-
Physical Restraint Use	OR (95% CI) 0.23 (0.05, 1.19)	1.75 (p=0.08)	OR (95% CI) 0.46 (0.27, 0.80)	2.75 (p=0.006) *	OR (95% CI) 0.49 (0.27, 0.88)	2.36 (p=0.02) *	OR (95% CI) 0.54 (0.29, 1.03)	1.88 (p=0.06)

WMD: Weighted mean difference.
OR: Odds ratio.
PRN: Pro re nata "As needed".
* Favours treatment group.
† Favours control group.
Note: All results shown were computed from only one study except for "Physical Restraint Use" at six months, which included the results from Nobili 2006 and Webber 1985.

WHAT'S NEW

Last assessed as up-to-date: 22 September 2008.

Date	Event	Description
12 April 2012	Amended	Additional table(s) linked to text.

HISTORY

Protocol first published: Issue 2, 2007

Review first published: Issue 4, 2009

Date	Event	Description
22 September 2008	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

CL: all correspondence, search for trials, extraction of data, obtaining hard copy

VM: search for trials, obtaining hard copy

CL, VM, JHMY: Selection of trials for inclusion/exclusion

JHMY: entry of data into RevMan, extraction of data

CL, CI, VM, JHMY: drafting review versions, interpretation of data analysis

Consumer editor: Ivan Wong

Contact editors: Mario Fioravanti and Frans Verhey

DECLARATIONS OF INTEREST

None known. Lai and Chi work in the academia while Yeung and Mok are neurologists working in public hospitals. None of them have work engagement or financial involvement with any SCUs.

SOURCES OF SUPPORT

Internal sources

- School of Nursing, The Hong Kong Polytechnic University, Hong Kong.

The School supported this review through allowing time and the use of other resources, including access to library facilities, statistical consultations, and technical editing..

External sources

- CDCIG, Not specified.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The protocol was designed to evaluate the quality of evidence from RCTs. No RCTs were found. The reviewers therefore decided to evaluate available evidence on the topic and review the non-RCTs.

INDEX TERMS

Medical Subject Headings (MeSH)

*Hospitals, Special; Alzheimer Disease [psychology]; Dementia [*psychology]; Home Nursing; Mental Disorders [*therapy]; Psychomotor Agitation [therapy]; Restraint, Physical

MeSH check words

Aged; Humans