Effectiveness of professional oral health care intervention on the oral health of residents with dementia in residential aged care facilities: a systematic review protocol

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Review question/objective

The objective of this review is to critically appraise and synthesize evidence on the effectiveness of professional oral health care intervention on the oral health of aged care residents with dementia.

More specifically the objectives are to identify the efficacy of professional oral health care interventions on general oral health, the presence of plaque and the number of decayed or missing teeth.

Background

Dementia poses a significant challenge for health and social policy in Australia. The quality of life of individuals, their families and friends is impacted by dementia. Older people with dementia often have other health comorbidities resulting in the need for a higher level of care. From 2009 to 2010, 53% of permanent residents in Residential Aged Care Facilities (RACFs) had dementia on admission. Older Australians are retaining more of their natural teeth, therefore residents entering RACFs will have more of their natural teeth and require complex dental work than they did in previous generations. Data from the Australian Institute of Health and Welfare showed that more than half the residents in RACFs are now partially dentate with an average of 12 teeth each. Furthermore, coronal and root caries are significant problems, especially in older Australians who are cognitively impaired.

Residents in aged care facilities frequently have poor oral health and hygiene with moderate to high levels of oral disease and overall dental neglect. This is reinforced by aged care staff who acknowledge that the demands of feeding, toileting and behavioral issues amongst residents often take precedence over oral health care regimens. Current literature shows that there is a general reluctance on the part of aged care staff to prioritize oral care due to limited knowledge as well as existing psychological barriers to working on another person’s mouth. Although staff routinely deal with residents’ urinary and fecal incontinence, deep psychological barriers exist when working on someone’s mouth due to their own personal values of oral health or their views that residents should be looking after their own teeth or dentures. Furthermore, residents with behavioral issues

associated with dementia frequently have their oral hygiene neglected as they may be resistant and violent towards receiving oral care from aged care staff.\textsuperscript{10} Studies have shown that residents with dementia will often refuse to open their mouth or partake in oral hygiene care by aged care staff.\textsuperscript{11-13} The aged care staff in return often do not pursue an oral care regimen for these “difficult” residents, perpetuating the cycle of oral neglect and resultant disease.\textsuperscript{12}

Dental hygienists are qualified oral health professionals who are specifically trained to develop individualized oral health care plans and preventative programs to reduce oral health disease in the community.\textsuperscript{14} Residents with dementia in aged care facilities have the right to live their lives comfortably and free of oral discomfort or pain. A Victorian study conducted by Hopcraft et al. investigated the ability of a dental hygienist to undertake a dental examination/screening for residents in aged care facilities, to develop a preventative and periodontal treatment plan and to refer patients appropriately to a dentist.\textsuperscript{15} Results from this study demonstrated that there was an excellent agreement between the dentist and dental hygienist regarding the decision to refer residents to a dentist for treatment, demonstrating high sensitivity (99.6\%) and high specificity (82.9\%). Residents from 31 Victorian RACFs (n=510) were examined by a single experienced dental epidemiologist and one of four dental hygienists using a simple mouth mirror and probe.\textsuperscript{15} Hopcraft et al. concluded that hygienists should be utilized more widely in providing holistic oral health care to residents in aged care facilities.\textsuperscript{15}

Recently, Lewis et al.\textsuperscript{16} discussed the need to develop models of care to improve access to dental care for frail and functionally dependent elderly people in aged care facilities, with the model of care involving dental hygienists/oral health therapists having merit.

The concept of professional oral care involves an oral health professional such as a dental hygienist or oral health therapist supervising or assisting residents with their oral care. Oral care involves the mechanical removal of plaque and food debris using a toothbrush, interproximal brush and floss.

In 2014, Morino et al.\textsuperscript{17} explored the efficacy of short term professional oral care from dental hygienists once a week after breakfast for one month. In this study, the dental hygienists did not perform dental scaling but brushed subjects’ teeth using a toothbrush and interdental brush. Dental plaque scores decreased significantly (Fisher’s two-tailed tests, p<0.05) in the professional oral health intervention group. Interestingly, the positive effects of this short term intervention were sustained for the following three months (Wilcoxon test, p<0.05).

A pilot study in Arkansas was conducted by Amerine et al.\textsuperscript{18} and utilized the dental hygienist as the “oral health champion” in the residential aged care facility using the Oral Health Assessment Tool (OHAT) and Geriatric Oral Health Assessment Index (GOHAI) scores to measure oral health. The results from this study showed improvements in three measured areas (tongue health, denture status and oral cleanliness) in the dental hygiene champion group. These findings suggest that the presence of a dental hygiene champion in long term care facilities may positively impact the oral health of residents requiring assistance with their oral care. However, the authors noted further research in this concept is required.

Van Der Putten GJ et al. explored the effectiveness of a supervised implementation of an oral health care guideline in care homes.\textsuperscript{19} In each ward of the care homes, a nurse who acted as the ward oral health care organizer (WOO) was appointed. The dental hygienist and an investigator would attend the RACFs every six weeks to support them. The dental hygienist would train the WOO, and the WOO would train the ward nurses and nurse assistants. Participants were allocated into an intervention or a control group. The intervention group received supervised oral care. Statistically
significant differences in mean dental and denture plaque scores at six months in both groups occurred (student t-test, p < 0.0001). This research study implemented an intervention using the train-the-trainer approach and although improvements in dental and denture plaque scores were seen in the six-month period, the long-term effects of this intervention are unknown. Further studies exploring the long-term effects of staff training on oral health education are needed as well as ongoing staff training in aged care facilities.

A systematic review on oral health and aspiration pneumonia conducted by Vander Maarel-Wierink et al. has suggested that, in the frail elderly, the best intervention to reduce the incidence of aspiration pneumonia is brushing of teeth after each meal, cleaning dentures once a day, and receiving professional oral health care once a week.

The need to advocate for a new model of geriatric dentistry is critical. A holistic multi-disciplinary approach to health care for residents entering aged care homes is imperative to achieve better oral health and comfort for residents, especially with Australia’s ageing dentate population. A dental examination and assessment on admission to a RACF should be conducted by a Registered Nurse (RN), followed by an oral health professional such as a dentist, dental hygienist or oral health therapist. Current practice in the majority of Australian government funded nursing homes is that the RN or the Assistant in Nursing (AIN) conduct the oral health assessment as part of the aged care funding instrument (ACFI). Ongoing oral health care supported by an oral health professional is important throughout the individual's residency and eventual palliation whilst in an aged care facility.

No systematic reviews conducted on the impact of professional oral care on the oral health of elderly people living in residential aged care facilities could be located, despite extensive searching of Medline, CINAHL, EMBASE, Web of Science, Cochrane Central Register of Trials and Dentistry & Oral Sciences Source (DOSS) databases. A JBI systematic review was conducted in 2004, titled, “Oral hygiene care for adults with dementia in residential aged care facilities”; however, this review examined the prevalence, incidence and increments of oral diseases; the use of assessment tools to evaluate oral health; preventative oral hygiene care strategies; and the provision of dental treatment and so had a different clinical focus.

Twenty studies were included for analysis in the review conducted by Weening-Verbree et al. The studies in this review addressed oral health knowledge of aged care staff and mostly were conducted as an educational session delivered by dental hygienists or dentists.

Overall, the current evidence available on interventions to improve oral health for residents living in aged care facilities is inadequate and should be explored further.

**Keywords**

aged care home; Alzheimer’s disease; cognitive impairment; dementia; dental care; dental hygienist; dental professional; dentist; elderly; institutionalized elders; nursing home; oral health care; oral health professional; oral health therapist; oral health; oral hygiene; residential aged care

**Inclusion criteria**

**Types of participants**

This review will consider studies that include residents with a formal diagnosis of dementia currently residing in permanent care in RACFs.
This review will exclude participants that have not received a formal diagnosis of dementia as well as those who are not living as a permanent admission in RACFs. Studies conducted on community dwelling individuals with a formal diagnosis of dementia will be excluded.

**Types of intervention(s)/phenomena of interest**

This review will consider studies that evaluate the efficacy of professional oral health care (POHC) performed by a dental hygienist. These studies involve POHC performed by a dental hygienist using a toothbrush, interdental brushes, floss and hand scalers if necessary to remove plaque and food debris and in some instances hardened calculus or tartar.\textsuperscript{17,24-28} If there are studies involving the POHC being performed by dentists or a combination of dentists and dental hygienists they will be included in the analysis.

This review will exclude interventions involving staff training interventions and interventions performed by nurses/assistant nurses.

**Types of outcomes**

This review will consider studies that include the following outcomes: oral health in terms of plaque deposits, general oral health and decayed and/or missing teeth as measured by plaque, OHAT and Decayed Missing Filled Teeth (DMFT) scores.

Oral health as measured by:

- **OHAT scores**: The Oral Health Assessment Tool (OHAT) has been reported as a valid and reliable measure of assessing aspects of oral health.\textsuperscript{29} The OHAT is also a useful tool in residents with dementia.\textsuperscript{30} The scores range from 0 to 16, with a score of 0 indicating a very healthy mouth and a score of 16 indicating a very unhealthy mouth.

- **Plaque scores**: The Silness and Loe plaque index\textsuperscript{31} is a measurement of the state oral hygiene by recording the amount of soft debris on the teeth. The scores range from 0 to 3.
  
  0 = no plaque
  1 = film of plaque adhering to the gum line
  2 = moderate accumulation of soft debris
  3 = abundance of soft debris

- **DMFT scores**: The decayed, missing and filled teeth (DMFT) score involves a visual inspection to assess the prevalence of dental caries and dental treatment needs. The scores range from 0 to 32.

**Types of studies**

This review will include any experimental study designs including randomized controlled trials, non-randomized controlled trials, quasi-experimental studies, before and after studies, prospective and retrospective cohort studies, case control studies and analytical cross sectional studies.

This review will also consider descriptive epidemiological study designs including case series, individual case reports and descriptive cross sectional studies for inclusion.

**Search strategy**

The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of MEDLINE and CINAHL will be
undertaken followed by an analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies.

Studies published in English will only be considered for inclusion in this review as we are unable to translate any other languages at this stage.

Studies published during the period of 1990-2015 will be considered for inclusion in this review. This time period was chosen due to the number of publications on this topic that were being published in the literature.

The databases to be searched include: MEDLINE, EMBASE, CINAHL, Web of Science, Cochrane Central Register of Trials and Dentistry & Oral Sciences Source (DOSS) databases.

The search for unpublished studies will include: Dissertations and thesis on ProQuest, Mednar and Google Scholar.

Initial keywords to be used:
oral health; aged care home; dementia; dentist; oral hygiene; nursing home; Alzheimer’s disease; dental hygienist; dental care; residential aged care; elderly; oral health therapist; oral health care; cognitive impairment; oral health professional; institutionalized elders; dental professional

Assessment of methodological quality

Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data extraction

Data will be extracted from papers included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix II). The data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives.

Data synthesis

Quantitative data will, where possible be pooled in statistical meta-analysis using from Review Manager 5.2. All results will be subject to double data entry. Effect sizes expressed as odds ratio (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis Heterogeneity will be assessed statistically using the standard Chi-square and also explored using subgroup analyses based on the different study designs included in this review. Additional subgroup analyses will be conducted, if sufficient data is available, to investigate the differences in residents who are able to communicate verbally versus residents who cannot communicate verbally, the differences in residents who are able to perform oral care themselves, those who require supervision and those who require full assistance. If there is sufficient data, comparisons amongst residential aged care facilities that are not for profit and for profit will be investigated as well as differences in staffing models. Where statistical pooling is not possible the
findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

**Conflicts of interest**

The author(s) declare that there are no known conflicts of interest.

**Acknowledgements**

The author(s) would like to acknowledge the contributions of Associate Professor Jane Taylor from the University of Newcastle, Dr Janet Wallace from the University of Newcastle and Professor Clive Wright from the University of Sydney and CERA, the Centre for Education Research and Ageing.
References


Appendix I: Appraisal instruments

MAStARI appraisal instrument

**JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
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<tr>
<td>Was the assignment to treatment groups truly random?</td>
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<td>Were participants blinded to treatment allocation?</td>
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<td>Was allocation to treatment groups concealed from the allocator?</td>
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<td>Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>Were those assessing outcomes blind to the treatment allocation?</td>
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<td>Were the control and treatment groups comparable at entry?</td>
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<td>Were groups treated identically other than for the named interventions</td>
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<td>Were outcomes measured in the same way for all groups?</td>
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<td>Were outcomes measured in a reliable way?</td>
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<tr>
<td>Was appropriate statistical analysis used?</td>
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Overall appraisal: Include □ Exclude □ Seek further info. □

Comments (Including reason for exclusion)
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__________________________________________________________________________
**JBI Critical Appraisal Checklist for Descriptive / Case Series**

Reviewer ______________________________ Date ______________________________

Author ______________________________ Year __________ Record Number ______

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
<th>Not Applicable</th>
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<tbody>
<tr>
<td>1. Was study based on a random or pseudo-random sample?</td>
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<td>2. Were the criteria for inclusion in the sample clearly defined?</td>
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<td>3. Were confounding factors identified and strategies to deal with them stated?</td>
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<td>4. Were outcomes assessed using objective criteria?</td>
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<td>5. If comparisons are being made, was there sufficient descriptions of the groups?</td>
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<td>6. Was follow up carried out over a sufficient time period?</td>
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<td>7. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>8. Were outcomes measured in a reliable way?</td>
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<td>9. Was appropriate statistical analysis used?</td>
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Overall appraisal: Include ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

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## JBI Critical Appraisal Checklist for Comparable Cohort/Case Control

Reviewer: __________________________ Date: __________________________

Author: __________________________ Year: ______ Record Number: ______

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<tr>
<td>1.</td>
<td>Is sample representative of patients in the population as a whole?</td>
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<td>2.</td>
<td>Are the patients at a similar point in the course of their condition/illness?</td>
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<td>3.</td>
<td>Has bias been minimised in relation to selection of cases and of controls?</td>
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<td>4.</td>
<td>Are confounding factors identified and strategies to deal with them stated?</td>
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<td>5.</td>
<td>Are outcomes assessed using objective criteria?</td>
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<td>6.</td>
<td>Was follow up carried out over a sufficient time period?</td>
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<td>7.</td>
<td>Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>8.</td>
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<td>9.</td>
<td>Was appropriate statistical analysis used?</td>
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Overall appraisal: Include ☐ Exclude ☐ Seek further info. ☐

Comments (Including reason for exclusion)
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Appendix II: Data extraction instruments

MAStARI data extraction instrument

JBI Data Extraction Form for Experimental / Observational Studies

Reviewer _______________________________ Date _______________________________

Author _______________________________ Year _______________________________

Journal, _______________________________ Record Number _______________________________

Study Method
RCT ☐ Quasi-RCT ☐ Longitudinal ☐
Retrospective ☐ Observational ☐ Other ☐

Participants
Setting

Population

Sample size
Group A ________________ Group B ________________

Interventions
Intervention A

Intervention B

Authors Conclusions:


Reviewers Conclusions:


### Study results

#### Dichotomous data

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#### Continuous data

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