

BMJ Open Effective strategies to motivate nursing home residents in oral healthcare and to prevent or reduce responsive behaviours to oral healthcare: a systematic review protocol

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ABSTRACT

Introduction: Oral healthcare in nursing homes is less than optimal, with severe consequences for residents' health and quality of life. To provide the best possible oral healthcare to nursing home residents, care providers need strategies that have been proven to be effective. Strategies can either encourage and motivate residents to perform oral healthcare themselves or can prevent or overcome responsive behaviours from residents when care providers assist with oral healthcare. This systematic review aims to identify studies that evaluate the effectiveness of such strategies and to synthesise their evidence.

Methods and analysis: We will conduct a comprehensive search in the databases MEDLINE, EMBASE, Evidence Based Reviews—Cochrane Central Register of Controlled Trials, CINAHL and Web of Science for quantitative intervention studies that assess the effectiveness of eligible strategies. 2 reviewers will independently screen titles, abstracts and retrieved full texts for eligibility. In addition, contents of key journals, publications of key authors and reference lists of all studies included will be searched by hand and screened by 2 reviewers. Discrepancies at any stage of the review process will be resolved by consensus. Data extraction will be performed by 1 research team member and checked by a second team member. 2 reviewers will independently assess methodological quality of studies included using 3 validated checklists appropriate for different research designs. We will present a narrative synthesis of study results.

Ethics and dissemination: We did not seek ethics approval for this study, as we will not collect primary data and data from studies included cannot be linked to individuals or organisations. We will publish findings of this review in a peer-reviewed paper and present them at an international peer-reviewed conference.

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INTRODUCTION

Providing oral healthcare to nursing home residents is complex and challenging for

Strengths and limitations of this study

- Rigorous protocol for a systematic review of intervention studies, following PRISMA-P guidelines.
- Review will provide evidence for the effectiveness of strategies care providers can use in their daily practice to (1) encourage residents to perform oral healthcare themselves or (2) to prevent or overcome residents' responsive behaviours to oral healthcare.
- Review will identify need for additional research.
- Effective, evidence-based strategies are crucial to improving quality of oral healthcare in nursing homes.
- Limited number, heterogeneity and low quality of eligible studies may make it challenging to pool data.

care staff. Baby boomers are entering nursing homes with more of their natural teeth and with more complex prostheses and bridges than previous generations, leading to increased and different care needs.¹ For example, regular and effective provision of oral hygiene care to residents with dental implants is crucial to prevent inflammations and to ensure long-term maintenance of these implants.² The large and rapidly growing number of nursing home residents with dementia³ further elevates those challenges. In Western countries, between 3% and 8% of people aged 65 years or older receive nursing home care.^{4 5} For example, total numbers of nursing home residents are 350 000 in Canada,⁶ 1.3 million in the USA⁷ and 2.9 million in Europe,⁴ and the demand for these services will increase in the future.^{4 8 9}

Providing the necessary extra assistance in oral care to these residents is time

consuming, and responsive behaviours of dementia often complicate oral healthcare.¹⁰ Responsive behaviours are defined as physical or verbal actions (such as grabbing onto people, general restlessness, agitation, resisting care) that can be challenging, disruptive and distressing for care providers.^{11 12} The term responsive behaviours highlights that those behaviours are meaningful responses to environmental stress or unmet needs rather than just neuropathological symptoms.^{11 12} Most of the direct care in nursing homes is provided by care aides with little or no formal training.^{13–15} Even regulated care providers often lack training in oral healthcare.^{16–20} International evidence-based best practice guidelines for oral healthcare of older adults are available^{21–24} and outline clearly what care providers should do, including regularly assessing residents' oral health status and providing, or supervising the provision of, oral care at least once daily. However, oral healthcare practices in nursing homes are less than optimal—up to 62% of nursing home residents have unacceptable oral hygiene.^{25–27} Barriers to providing appropriate oral healthcare in nursing homes include low priority of oral healthcare, insufficient resources, suboptimal organisation of care processes, deficient policy and documentation, caregivers' attitudes and lack of knowledge, disgust expressed by care providers, and responsive behaviours by residents.^{27–29}

Poor oral health can have serious consequences: increased healthcare costs; decreased quality of life for residents through unnecessary pain and suffering; elevated risk of malnutrition, aspiration pneumonia, atherosclerosis and premature death;^{29–32} and psychological and social repercussions from problems such as bad breath, changed dental aesthetics and altered speech.^{33 34} Between 44% and 76% of dentate nursing home residents have caries.^{35–41} Dental pain is present in 5–8% of all residents,^{38 42} 32–49% need periodontal treatment,^{38 39 42} 66–74% have gingivitis^{38 41} and 3.4% report pain or discomfort in their gums.³⁹

Improving oral healthcare of nursing home residents is therefore a pressing concern. Systematic reviews reveal numerous studies on the effectiveness of education programmes^{43 44} and implementation strategies⁴⁵ in changing care providers' oral healthcare practices and promoting or improving residents' oral health. Overall, these interventions are potentially effective but study quality is generally low, and comparability of results is limited due to heterogeneous interventions and study methods. Available studies often exclude residents with dementia, especially those with responsive behaviours, and educational programmes often focus on techniques and tools to provide oral healthcare while not systematically addressing management of responsive behaviours.^{43 46} In one review, Weening-Verbree *et al*⁴⁵ found that none of the studies included deliberately and systematically tailored their strategies in response to identified barriers, although such tailored change strategies are potentially effective.⁴⁷

Lack of cooperation by residents is a major barrier to provision of oral healthcare by nursing home care staff.^{20 46 48 49} In particular, residents with dementia may resist care by refusing to open their mouth, turning away their head, verbally assaulting the caregiver, spitting at or hitting the caregiver, etc. Evidence syntheses are available on the effectiveness of communication strategies^{50 51} and psychosocial treatments⁵² to reduce behavioural symptoms in residents with dementia. While some of these interventions effectively improve care providers' communication skills, evidence on intervention ability to change residents' behaviours is weak and inconclusive. Many of the interventions were not applied in daily care situations, but rather within planned sessions at defined times. Interventions applied in daily care situations did not refer specifically to situations of oral health care.^{50–52} Individual studies have assessed interventions to prevent or overcome responsive behaviours in situations of oral healthcare,^{53 54} but no systematic reviews have synthesised their evidence.

Care providers may also encounter challenges with residents who are physically and cognitively capable of performing their own oral healthcare but cannot be easily convinced to do so. Although the majority of the general adult population brushes teeth regularly, up to 27% do not regularly brush teeth at least twice a day^{55 56} and oral health literacy of the public is generally low.⁵⁷ Especially in older adults with low socioeconomic status, the lack of a history of dental care and negative attitudes towards oral health result in low priority for oral health; specific strategies to promote their oral health are required.^{58–62} Renz *et al*⁶³ synthesised the evidence on psychological interventions to improve adherence to oral hygiene instructions in adults with periodontal diseases. Although the four studies included are low quality and results could not be pooled due to great heterogeneity of models and outcomes used, they provide tentative evidence that psychological interventions can positively influence behaviours related to oral hygiene. Cascaes *et al*⁶⁴ assessed the evidence from studies that applied motivational interviewing to improve oral health outcomes. However, none of the 10 studies included focus specifically on older adults or nursing home residents and the evidence is inconclusive. Four studies indicate positive effects of motivational interviewing on oral health outcomes, four studies show no effect and two studies do not report sufficient detail to draw any conclusion.

To provide the best possible oral healthcare to nursing home residents, care providers need strategies with proven effectiveness to either encourage and motivate residents in performing oral healthcare themselves or to prevent or overcome responsive behaviours from residents when care providers assist them with oral healthcare. This review aims to identify and synthesise the evidence from studies assessing the effectiveness of interventions that meet these needs.

METHODS AND ANALYSIS

Review design

We will conduct a systematic review of quantitative intervention studies, then generate a narrative synthesis of the available evidence on the effectiveness of strategies that nursing home care providers can apply to

- A. Encourage and motivate residents in performing their own oral healthcare;
- B. Prevent or overcome responsive behaviours from residents when care providers assist them with oral healthcare.

Our review methods and presentation of results will follow the Cochrane Handbook of Systematic Reviews of Interventions⁶⁵ and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.⁶⁶ The review is scheduled to be completed between December 2016 and March 2017.

Search strategy

We will search the databases MEDLINE, EMBASE, Evidence Based Reviews—Cochrane Central Register of Controlled Trials, CINAHL and Web of Science. A search strategy combining terms related to oral health with terms related to care providers and residents in residential long-term care facilities (nursing homes) was developed and pretested with an expert scientific librarian for each database (see online supplementary file 1

for details). We will limit our search to studies published in English but will not limit year of publication; we will retrieve all findings starting with the earliest reference available in the respective database. We will further select 3–5 key journals and 8–10 key authors based on the number and relevance of their published papers to our research topic. We will search contents of key journals and publications of key authors by hand. Finally, we will screen reference lists of studies included to ensure that all articles relevant to this review are retrieved.

Data management

Results of the literature searches will be imported into Zotero—an open source literature management software that allows online collaboration of researchers.⁶⁷ All references including abstracts and retrieved full texts will be managed using Zotero, and each of two review team members will independently carry out the title, abstract and full-text screenings, using this software (details see study identification). Before the screening process, all review team members will receive training in using Zotero, and we will undertake a calibration exercise to improve application of the inclusion and exclusion criteria.

Inclusion and exclusion criteria

Table 1 lists our inclusion and exclusion criteria. We will not exclude any reference based on year of publication.

Table 1 Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Study type	<ul style="list-style-type: none"> ▶ Primary, empirical, quantitative studies (survey studies, randomised controlled trials, non-randomised trials with or without control group, cohort or case control studies, cross-sectional studies) assessing the effectiveness of an eligible strategy ▶ Mixed-methods studies assessing the effectiveness of an eligible strategy quantitatively ▶ Systematic reviews and meta-analyses on the effectiveness of an eligible strategy 	<ul style="list-style-type: none"> ▶ Non-empirical work (editorials, opinion texts, theoretical discussions) ▶ Non-systematic (selective) reviews, qualitative studies (qualitative interviews, focus groups, ethnographic observations, qualitative case studies)
Intervention	<ul style="list-style-type: none"> ▶ Strategies that formal care providers can apply to motivate nursing home residents in performing oral healthcare themselves ▶ Strategies that formal care providers can apply to prevent or overcome nursing home residents' responsive behaviours towards oral healthcare provided by formal care staff 	<ul style="list-style-type: none"> ▶ Oral healthcare tools such as tooth brushes, flossing tape, interdental brushes ▶ Tooth pastes, fluorides and other substances ▶ Oral healthcare techniques such as brushing, flossing or rinsing
Setting	<ul style="list-style-type: none"> ▶ Residential facilities that provide care for frail older adults over a prolonged time period (nursing homes, personal care homes, special or complex care homes, residential long-term care facilities, residential facilities, skilled nursing facilities, etc) 	<ul style="list-style-type: none"> ▶ Residential facilities providing care for relatively healthy and independent residents (assisted living, supportive living, retirement homes, senior housing) ▶ Day or night care facilities ▶ Hospitals, home care, primary care, care housing
Participants	<ul style="list-style-type: none"> ▶ Formal, paid care providers providing oral healthcare in nursing homes (care aides, registered nurses, licensed practical nurses, dental hygienists, etc) and ▶ Nursing home residents 	<ul style="list-style-type: none"> ▶ Unpaid caregivers, volunteers, family members

We will include all types of published works listed in the databases searched. This will primarily include articles published in peer-reviewed journals. Non-peer-reviewed articles, textbooks, reports and thesis publications (ie, 'grey' literature) identified in the search (electronic data bases, hand search of key journal contents and key author publications, reference lists of included publications) will be included if they report quantitative studies assessing effectiveness of an eligible intervention (see [table 1](#) for details on eligible study types and eligible interventions). We will include intervention studies with or without a control group. Control interventions can be either usual care (no control intervention) or any kind of placebo intervention, such as unspecific communication in the control group vs a specific motivational communication strategy in the intervention group. We will include studies that assess outcomes of residents' oral health (such as tooth decay, tooth status, periodontal issues and oral hygiene status), outcomes indicating an increase in residents' self-performed oral healthcare (such as number of times residents brush or floss teeth, or clean dentures), or outcomes indicating a decrease in residents' responsive behaviours towards oral healthcare provided by staff (such as voluntarily opening mouth, acceptance of staff brushing or flossing teeth, acceptance of staff taking out or putting back dentures, not showing verbally or physically aggressive behaviour during oral care, or not being anxious or nervous during oral care). Details on eligible settings and participants are given in [table 1](#). We refer to eligible institutions as nursing homes, but various terms are used across countries and jurisdictions to describe these facilities.⁶⁸ Important criteria to define them are:^{68–70}

- ▶ They accommodate mainly older people with complex health and care needs, who are unable to remain at home or in a supportive living environment;
- ▶ They provide 24 h support and assistance with activities of daily living and nursing care;
- ▶ They typically deliver healthcare over an extended time period (often until the resident dies).

Study identification

(1) After removal of duplicate studies, two review team members will independently screen titles and abstracts of all retrieved studies for inclusion, using Zotero. Each reviewer will assign screened studies to one of three categories: inclusion, exclusion or full text needed to decide. At all screening steps, reviewers will discuss discrepancies in assignment of screened studies until consensus is reached. Full texts will be retrieved for all studies included based on their titles and abstracts and for screened studies with insufficient information in titles or abstracts to decide on inclusion. Two review team members will screen full texts independently for inclusion. (2) Hand search of key author publications will be carried out using the same method for inclusion or

exclusion of studies retrieved. (3) Hand search of key journals will be carried out by one review team member and a second team member will independently check the studies included. (4) Two team members will independently screen the reference lists of all included studies.

Quality appraisal

Two members of the review team will independently assess methodological quality of studies (risk of bias). They will discuss discrepancies until consensus is reached. The full research team will discuss results of this step for each study in detail. To evaluate study quality, we will apply validated checklists as appropriate to study design.

- ▶ Systematic reviews and meta-analyses—Assessment of Multiple Systematic Reviews (AMSTAR) tool.⁷¹ AMSTAR is a reliable and valid instrument^{72–74} that assesses study quality in the categories of definition of an a priori design, study selection and data extraction, literature search, inclusion and exclusion criteria, list of studies included and excluded, characteristics and scientific quality of studies included, appropriateness of conclusions and methods used to combine findings, publication bias and conflict of interest.
- ▶ Clinical studies with or without control group and with or without randomised allocation of participants—Quality Assessment Tool for Quantitative Studies (QATQS).⁷⁵ Reliability and validity of the QATQS have been demonstrated.^{75 76} It assesses the categories of selection bias, study design, confounders, blinding, data collection methods, withdrawals and drop-outs, intervention integrity, and analyses.
- ▶ Cross-sectional studies—Estabrooks' Quality Assessment and Validity Tool for Cross-Sectional Studies. This tool was developed based on Cochrane guidelines⁷⁷ and other evidence-based criteria.^{78 79} Reviewers assess methodological quality of studies on 12 items in the categories of sampling, measurement and statistical analyses.

All three tools have been used and described in detail in previous systematic reviews.^{80–84} We will rate the overall quality of each study with a scoring method developed by de Vet *et al*.⁸⁵ that was also used in those previous reviews. We will calculate the ratio of the obtained score to the maximum possible score, which varies with the checklist used and the number of checklist items applicable. Based on this quality score with a possible range of 0–1, we will rank studies as weak (≤ 0.50), low moderate (0.51–0.66), high moderate (0.67–0.79) or strong (≥ 0.80). We will not exclude studies based on their quality scores. We will report quality scores for each study and discuss study results in context of the study's quality score.

Data extraction

One team member will extract the following study details into an Excel spread sheet template: first author,

year of publication, title, journal (or type of reference, eg, thesis, report, text book), country of study, study purpose(s), study design, study sample (numbers and types of facilities, care providers, and residents included), strategies studied (including control conditions, if applicable), outcomes assessed (including assessment tools, if applicable) and main results. A second team member will double-check data extraction for each study and discrepancies will be resolved by consensus.

Analyses

We will statistically pool results of quantitative studies, using random-effects meta-analysis if we are able to include a sufficient number of studies reporting similar outcomes. We will then use the χ^2 test for homogeneity (significance level set at $\alpha=0.10$) and the I^2 statistic to assess statistical heterogeneity (variation beyond chance) and inconsistency of study results.⁸⁶ To assess if a small sample bias is present in the published literature (ie, higher effect sizes in studies with smaller samples), we will compare the estimates of fixed-effects and random-effects models, as the latter ones are more accurate when small sample bias is present. To assess reporting bias, we will check if for randomised controlled trial, a study protocol was published before participants were recruited. We will compare those study protocols to the published studies. In case we are able to include 10 or more comparable studies (eg, similar designs, settings, outcomes), we will use funnel plots to assess publication bias. If the included studies are too heterogeneous to pool results statistically, we will construct a narrative synthesis of the outcomes reported in the selected studies. This will include a summary of the study designs used, the interventions and control interventions (if applicable) assessed, the resident and provider outcomes studied, and the effect sizes found. Our pretests of the search strategies and our preliminary findings in the title and abstract screenings indicate that we will very likely not be able to conduct statistical syntheses of study findings due to a small number of eligible studies and great heterogeneity of study interventions and outcomes.

ETHICS AND DISSEMINATION

We will not collect primary data from individuals or organisations in this study. Data in studies included in this systematic review will be de-identified and cannot be linked to individuals or organisations. Therefore, we did not seek ethics approval for this study. We will publish findings of this review in a peer-reviewed journal article and present findings at an international peer-reviewed conference. Results of this review will significantly contribute to improving oral healthcare practices in nursing homes—either by suggesting effective strategies that care providers can use to improve residents' daily oral healthcare routines or by demonstrating the need for such interventions and informing their development.

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Contributors MH and MY developed the research question, the systematic review design, planned and designed the study protocol, and are leading the systematic review project. MH wrote the first draft of the manuscript. AK and NK assisted with drafting parts of the manuscript and will carry out the abstract and full-text screening. All authors critically read and commented on the manuscript and have approved its submission.

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REFERENCES

- McNally ME, Matthews DC, Clovis JB, *et al.* The oral health of ageing baby boomers: a comparison of adults aged 45–64 and those 65 years and older. *Gerodontology* 2014;31:123–35.
- Louropoulou A, Slot DE, Van der Weijden F. Mechanical self-performed oral hygiene of implant supported restorations: a systematic review. *J Evid Based Dent Pract* 2014;14(Suppl 1):60–9. e1.
- Alzheimer's Disease International. *World Alzheimer Report 2015: the global impact of dementia—an analysis of prevalence, incidence, cost and trends*. London: ADI, 2015.
- European Commission. *Long-term care for the elderly: provisions and providers in 33 European countries*. Luxembourg: Publications Office of the European Union, 2012.
- OECD Health Statistics 2015. <http://stats.oecd.org/Index.aspx?QueryId=30140> (accessed 8 Jan 2016).
- Statistics Canada. Living arrangements of seniors: Families, households and marital status. Structural type of dwelling and collectives, 2011 Census of Population. Ottawa, ON: Statistics Canada, 2011.
- Harrington C, Carrillo H, Garfield R. *Nursing facilities, staffing, residents and facility deficiencies, 2009 Through 2014*. Menlo Park, CA: The Henry J. Kaiser Family Foundation, 2015.
- Alzheimer Society of Canada. *Rising tide: the impact of dementia on Canadian society*. Toronto, ON, 2010.
- Congress of the United States—Congressional Budget Office. *Rising demand for long-term services and supports for elderly people*. Washington DC: CBO, 2013.
- Jablonski RA, Kolanowski AM, Litaker M. Profile of nursing home residents with dementia who require assistance with mouth care. *Geriatr Nurs* 2011;32:439–46.
- Speziale J, Black E, Coatsworth-Puspoky R, *et al.* Moving forward: evaluating a curriculum for managing responsive behaviors in a geriatric psychiatry inpatient population. *Gerontologist* 2009;49:570–6.
- Alzheimer Society Ontario. What are responsive behaviours. <http://www.alzheimer.ca/en/on/We-can-help/Resources/Shifting-Focus/What-are-responsive-behaviours> (accessed 12 Feb 2016).
- Berta W, Laporte A, Deber R, *et al.* The evolving role of health care aides in the long-term care and home and community care sectors in Canada. *Hum Resour Health* 2013;11:25.
- Estabrooks CA, Squires JE, Carleton HL, *et al.* Who is looking after Mom and Dad? Unregulated workers in Canadian long-term care homes. *Can J Aging* 2015;34:47–59.
- Bureau of Labor Statistics. Occupational employment statistics: May 2014 national industry-specific occupational employment and wage estimates, NAICS 623100—nursing care facilities (skilled nursing facilities). http://www.bls.gov/oes/current/naics4_623100.htm-29-0000 (access 22 Sep 2015).
- Blinkhorn FA, Weingarten L, Boivin L, *et al.* An intervention to improve the oral health of residents in an aged care facility led by nurses. *Health Educ J* 2012;71:527–35.

17. Young BC, Murray CA, Thomson J. Care home staff knowledge of oral care compared to best practice: a West of Scotland pilot study. *Br Dent J* 2008;205:E15; discussion 450-1.
18. Preston AJ, Kearns A, Barber MW, *et al*. The knowledge of healthcare professionals regarding elderly persons' oral care. *Br Dent J* 2006;201:293-5; discussion 89; quiz 304.
19. Vanobbergen JN, De Visschere LM. Factors contributing to the variation in oral hygiene practices and facilities in long-term care institutions for the elderly. *Community Dent Health* 2005;22:260-5.
20. Wårdh I, Jonsson M, Wikström M. Attitudes to and knowledge about oral health care among nursing home personnel—an area in need of improvement. *Gerodontology* 2012;29:e787-92.
21. Registered Nurses' Association of Ontario (RNAO). Oral health: nursing assessment and interventions. Toronto, ON: RNAO, 2008.
22. De Visschere LM, van der Putten GJ, Vanobbergen JN, *et al*. An oral health care guideline for institutionalised older people. *Gerodontology* 2011;28:307-10.
23. Johnson VB. Evidence-based practice guideline: oral hygiene care for functionally dependent and cognitively impaired older adults. *J Gerontol Nurs* 2012;38:11-19.
24. O'Connor LJ. Oral health care. In: Boltz M, Capezuti E, Fulmer T, Zwicker D, eds. *Evidence-based geriatric nursing protocols for best practice*. 4th edn. New York: Springer, 2012:409-18.
25. Coleman P, Watson NM. Oral care provided by certified nursing assistants in nursing homes. *J Am Geriatr Soc* 2006;54:138-43.
26. Zuluaga DJM, Ferreira J, Montoya JAG, *et al*. Oral health in institutionalised elderly people in Oslo, Norway and its relationship with dependence and cognitive impairment. *Gerodontology* 2012;29:e420-6.
27. Chami K, Debout C, Gavazzi G, *et al*. Reluctance of caregivers to perform oral care in long-stay elderly patients: the three interlocking gears grounded theory of the impediments. *J Am Med Dir Assoc* 2012;13:e1-4.
28. Miegel K, Wachtel T. Improving the oral health of older people in long-term residential care: a review of the literature. *Int J Older People Nurs* 2009;4:97-113.
29. MacEntee MI. Muted dental voices on interprofessional healthcare teams. *J Dent* 2011;39(Suppl 2):S34-40.
30. Raghoonandan P, Cobban SJ, Compton SM. A scoping review of the use of fluoride varnish in elderly people living in long term care facilities. *Can J Dent Hygiene* 2011;45:217-22.
31. Haumschild MS, Haumschild RJ. The importance of oral health in long-term care. *J Am Med Dir Assoc* 2009;10:667-71.
32. MacEntee MI. Missing links in oral health care for frail elderly people. *J Can Dent Assoc* 2006;72:421-5.
33. Locker D, Slade G. Oral health and the quality of life among older adults: the oral health impact profile. *J Can Dent Assoc* 1993;59:830-3, 37-8, 44.
34. Slade GD, Spencer AJ, Locker D, *et al*. Variations in the social impact of oral conditions among older adults in South Australia, Ontario, and North Carolina. *J Dent Res* 1996;75:1439-50.
35. Wyatt CC. Elderly Canadians residing in long-term care hospitals: part II. Dental caries status. *J Can Dent Assoc* 2002;68:359-63.
36. Shimazaki Y, Soh I, Koga T, *et al*. Relationship between dental care and oral health in institutionalized elderly people in Japan. *J Oral Rehabil* 2004;31:837-42.
37. Chalmers JM, Carter KD, Fuss JM, *et al*. Caries experience in existing and new nursing home residents in Adelaide, Australia. *Gerodontology* 2002;19:30-40.
38. Matthews DC, Clovis JB, Brilliant MGS, *et al*. Oral health status of long-term care residents: a vulnerable population. *J Can Dent Assoc* 2012;78:c3.
39. Arpin S, Brodeur JM, Corbeil P. Dental caries, problems perceived and use of services among institutionalized elderly in 3 regions of Quebec, Canada. *J Can Dent Assoc* 2008;74:807-7.
40. Maupome G, Wyatt CC, Williams PM, *et al*. Oral disorders in institution-dwelling elderly adults: a graphic representation. *Spec Care Dentist* 2002;22:194-200.
41. Patrick DL, Murray TP, Bigby JA, *et al*. *The Commonwealth's high-risk senior population: results and recommendations from 2009 statewide oral health assessment*. Boston, MA: Massachusetts Department of Public Health, Office of Oral Health, 2010.
42. Adegbenbo AO, Leake JL, Main PA, *et al*. The effect of dental insurance on the ranking of dental treatment needs in older residents of Durham Region's homes for the aged. *J Can Dent Assoc* 2002;68:412-18.
43. Coker E, Ploeg J, Kaasalainen S. The effect of programs to improve oral hygiene outcomes for older residents in long-term care: a systematic review. *Res Gerontol Nurs* 2014;7:87-100.
44. de Lugt-Lustig KH, Vanobbergen JN, van der Putten GJ, *et al*. Effect of oral healthcare education on knowledge, attitude and skills of care home nurses: a systematic literature review. *Community Dent Oral Epidemiol* 2014;42:88-96.
45. Weening-Verbree L, Huisman-de Waal G, van Dusseldorp L, *et al*. Oral health care in older people in long term care facilities: a systematic review of implementation strategies. *Int J Nurs Stud* 2013;50:569-82.
46. Jablonski RA, Therrien B, Kolanowski A. No more fighting and biting during mouth care: applying the theoretical constructs of threat perception to clinical practice. *Res Theory Nurs Pract* 2011;25:163-75.
47. Baker R, Camosso-Stefinovic J, Gillies C, *et al*. Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2010;(3):CD005470.
48. Chalmers J, Pearson A. Oral hygiene care for residents with dementia: a literature review. *J Adv Nurs* 2005;52:410-19.
49. Mancini M, Grappasonni I, Scuri S, *et al*. Oral health in Alzheimer's disease: a review. *Curr Alzheimer Res* 2010;7:368-73.
50. Vasse E, Vernooij-Dassen M, Spijker A, *et al*. A systematic review of communication strategies for people with dementia in residential and nursing homes. *Int Psychogeriatr* 2010;22:189-200.
51. McGilton KS, Boscart V, Fox M, *et al*. A systematic review of the effectiveness of communication interventions for health care providers caring for patients in residential care settings. *Worldviews Evid Based Nurs* 2009;6:149-59.
52. O'Connor DW, Ames D, Gardner B, *et al*. Psychosocial treatments of behavior symptoms in dementia: a systematic review of reports meeting quality standards. *Int Psychogeriatr* 2009;21:225-40.
53. Jablonski RA, Therrien B, Mahoney EK, *et al*. An intervention to reduce care-resistant behavior in persons with dementia during oral hygiene: a pilot study. *Spec Care Dentist* 2011;31:77-87.
54. Sloane PD, Zimmerman S, Chen X, *et al*. Effect of a person-centered mouth care intervention on care processes and outcomes in three nursing homes. *J Am Geriatr Soc* 2013;61:1158-63.
55. Health Canada. *Report on the findings of the oral health component of the Canadian Health Measures Survey 2007-2009*. Ottawa: Health Canada, 2010.
56. Ganss C, Schlueter N, Preiss S, *et al*. Tooth brushing habits in uninstructed adults—frequency, technique, duration and force. *Clin Oral Investig* 2009;13:203-8.
57. Institute of Medicine of the National Academies. *Advancing oral health in America*. Washington DC: The National Academies Press, 2011.
58. Yao CS, MacEntee MI. Inequity in oral health care for elderly Canadians: part 3. Reducing barriers to oral care. *J Can Dent Assoc* 2014;80:e11.
59. McGrath C, Zhang W, Lo EC. A review of the effectiveness of oral health promotion activities among elderly people. *Gerodontology* 2009;26:85-96.
60. Petersen PE, Yamamoto T. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2005;33:81-92.
61. Institute of Medicine and National Research Council of the National Academies. *Improving access to oral health care for vulnerable and underserved populations*. Washington DC: The National Academies Press, 2011.
62. Canadian Academy of Health Sciences. *Improving access to oral health care for vulnerable people living in Canada*. Ottawa, ON: CAHS, 2014.
63. Renz A, Ide M, Newton T, *et al*. Psychological interventions to improve adherence to oral hygiene instructions in adults with periodontal diseases. *Cochrane Database Syst Rev* 2007;(2):CD005097.
64. Cascaes AM, Bielemann RM, Clark VL, *et al*. Effectiveness of motivational interviewing at improving oral health: a systematic review. *Rev Saude Publica* 2014;48:142-53.
65. Higgins JPT, Green S, eds. *Cochrane handbook for systematic reviews of interventions Version 5.1.0 [updated March 2011]*. The Cochrane Collaboration, 2015.
66. Moher D, Liberati A, Tetzlaff J, *et al*. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 2009;6:e1000097.
67. Zotero. <https://www.zotero.org/> (accessed 12 Feb 2016).
68. McGregor MJ, Ronald LA. *Residential long-term care for Canadian seniors: nonprofit, for-profit or does it matter?* Montreal, QC: Institute for Research on Public Policy, 2011.
69. Jansen I, Murphy J. *Residential long-term care in Canada: our vision for better seniors' care*. St. Laurent, 2009.

70. Canadian Healthcare Association. *New directions for facility-based long term care*. Ottawa, ON, 2009.
71. Shea BJ, Grimshaw JM, Wells GA, *et al*. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Methodol* 2007;7:10.
72. Shea BJ, Bouter LM, Peterson J, *et al*. External validation of a measurement tool to assess systematic reviews (AMSTAR). *PLoS ONE* 2007;2:e1350.
73. Shea BJ, Hamel C, Wells GA, *et al*. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. *J Clin Epidemiol* 2009;62:1013–20.
74. Kang D, Wu Y, Hu D, *et al*. Reliability and external validity of AMSTAR in assessing quality of TCM systematic reviews. *Evid Based Complement Alternat Med* 2012;2012:732195.
75. Thomas BH, Ciliska D, Dobbins M, *et al*. A process for systematically reviewing the literature: providing the research evidence for public health nursing interventions. *Worldviews Evid Based Nurs* 2004;1:176–84.
76. Armijo-Olivo S, Stiles CR, Hagen NA, *et al*. Assessment of study quality for systematic reviews: a comparison of the Cochrane Collaboration risk of bias tool and the effective public health practice project quality assessment tool: methodological research. *J Eval Clin Pract* 2012;18:12–18.
77. Clarke M, Oxman AD, eds. *Cochrane Reviewers' Handbook 4.1.4 (October 2001)*. Oxford, UK: The Cochrane Library, 2001.
78. Kmet L, Lee R, Cook L. *Standard quality assessment criteria for evaluating primary research papers from a variety of fields*. Edmonton, AB: Heritage Foundation for Medical Research, 2004.
79. Khan KS, ter Riet G, Popay J, *et al*. Stage II conducting the review: phase 5 study quality assessment. In: Centre of Reviews and Dissemination UoY, ed. *Undertaking systematic reviews of research effectiveness CDC's guidance for those carrying out or commissioning reviews*. 2001:1–20.
80. Kajermo KN, Boström AM, Thompson DS, *et al*. The BARRIERS scale—the barriers to research utilization scale: a systematic review. *Implement Sci* 2010;5:32.
81. Squires JE, Estabrooks CA, Gustavsson P, *et al*. Individual determinants of research utilization by nurses: a systematic review update. *Implement Sci* 2011;6:1.
82. Squires JE, Hutchinson AM, Boström AM, *et al*. To what extent do nurses use research in clinical practice? A systematic review. *Implement Sci* 2011;6:21.
83. Squires JE, Hoben M, Linklater S, *et al*. Job satisfaction among care aides in residential long-term care: a systematic review of contributing factors, both individual and organizational. *Nurs Res Pract* 2015;2015:157924.
84. Hoben M, Buscher I, Berendonk C, *et al*. Scoping review of nursing-related dissemination and implementation research in German-speaking countries: mapping the field. *Int J Health Prof* 2014;1:34–49.
85. de Vet HCW, de Bie RA, van der Heijden GJMG, *et al*. Systematic reviews on the basis of methodological criteria. *Physiotherapy* 1997;83:284–9.
86. Higgins JP, Thompson SG, Deeks JJ, *et al*. Measuring inconsistency in meta-analyses. *BMJ* 2003;327: 557–60.