Approaches for adult nursing and residential care homes on promoting oral health, preventing dental health problems and ensuring access to dental treatment.

Draft Review 1: Effectiveness (Appendices)

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[1] http://www.cardiff.ac.uk/insrv/libraries/sure/index.html

Appendix A – Evidence Tables

Study details	Population and Setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
First author and year: Altabet 2003 **Study Design :** RCT **Quality score:** + **External validity score:** +	**Aim of study:** To examine whether individualised oral care plans were effective in improving the oral hygiene of people with learning difficulties. **Setting:** Greeneville, Tennessee, USA. Urban. State residential care facility for clients with learning difficulties. **Participants:** 79 people (44.3% female); Average age 39.5; 30% mild-moderate disability, 70% severe-profound disability. Single institution. **Inclusion:** In state residential care as above **Exclusion:**	**Method of allocation:** 79 patients were randomly selected for either the 'treatment' or 'no treatment' groups from the entire facility populate (341). Confounders not considered. **Intervention(s):** Training on good oral care strategies as well as an individualised oral care plan which included onsite instruction regarding correct technique, use of correct materials, and regular attendance at dental appointments. Delivered by primary care giver under guidance of OH professional. Raters were blind to group allocations. (est [RC] 2h) **Control:** Training on good oral care strategies. **Sample sizes:** I:39; C:40	**Primary outcomes:** Oral hygiene was rated in five grades from very poor to excellent. Inter-rater agreement = 85% **Secondary outcomes:** - **Follow-up periods:** Varied from one month to quarterly assessments over a 12month period (March 20, 1999 – March 20, 2000). **Method of analysis:** ANOVA (analysis of variance) and paired *t* tests.	**Primary:** Significant improvement in OH rating within 'I' group of p <.001. Significant difference yielded between 'C' and 'I' groups of p=<.005 as 'I' group showed greater improvement in OH rating. **Secondary:** - **Attrition:** 100% implied but not stated.	**Limitations (author):** Did not measure degree to which training on general procedures was implemented. **Limitations (review team):** Confounders not considered. Contamination was possible as care staff were trained while the control group were on the waiting list. No information given regarding the oral care plan content. Lack of baseline data. Cannot calculate precision of effect sizes from the data provided. **Evidence gaps:** Extended tracking of oral health ratings required to determine if the observed improvement is maintained

	- **Water fluoridation:** Not reported	**Baseline comparisons:** No statistically significant differences **Study power:** Not reported. **Intervention delivery:** Dental professional trained direct support staff.			and enhanced. Investigation of personal characteristics - facilitators or barriers. Monitoring of direct care staff compliance rates. **Funding sources:** Not reported. **Conflicts of interest:** Not reported. **Applicable to UK?** Yes, USA comparable to UK settings
First author and year: Amerine 2013 **Study Design :** CBA **Quality score:** - **External validity score:** -	**Aim of study:** To examine the impact of onsite support by a dental hygiene champion (DHC) on oral health and quality of life (QOL) of elderly residents in three long-term care facilities (LTCFs). **Setting:** Arkansas, USA. Urban. Three commercial long-term residential care facilities for elderly clients. **Participants:** Elderly population, details not	**Method of allocation:** Coin toss assignment of each facility to one of the two intervention groups or the control group. **Intervention(s):** CNAs in Facility A received standardized oral health education/materials with onsite DHC support. Facility B CNAs received education/materials only. Intervention groups received one hour presentation followed by discussion. One intervention group (Facility A) received eight hours per week hands-on support, for duration	**Primary outcomes:** Oral health was assessed using the Oral Health Assessment Tool (OHAT), measuring the condition lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral cleanliness, and dental pain. (Scoring assessment by blinded dental hygienist/research assistant: 0 = healthy, 1 = changes, and 2 = unhealthy.) Geriatric Oral Health Assessment Index (GOHAI) was also performed and	**Primary:** No significant difference in OHAT baseline ratings between the 3 facilities. OHAT post-intervention data in Facility A showed significant improvement: tongue health (p = .011), dent ure status (p = .025), and oral cleanliness (p = .046); Facility B: tongue health (p = .008); Facility C: none. No significant differences were found in GOHAI scores across facilities (p = .119).	**Limitations (author):** Participating institutions for-profit only. Pilot study only - small sample size. **Limitations (review team):** Coins toss not appropriate method of randomisation. No demographic data. GOHAI assessment not blind, performed by PI. Baseline differences. Confounders not adjusted. Data highlighted significance at p≤0.05 but did not give actual values or confidence intervals.

	reported. **Inclusion:** Acceptable cognitive impairment status. Willingness and interest in taking part. Dependence on Certified nursing assistants (CNAs) for activities of daily living (ADLs). **Exclusion:** Patients with restricting cognitive impairments (decided by facility administrative staff). **Water fluoridation?:** Not reported	of intervention (eight weeks). **Control:** Facility C; No educational program, oral health care protocol, or onsite support was provided until after conclusion of the study. **Sample sizes:** Facility A (n = 27), Facility B (n = 31), Facility C (n = 20) **Baseline comparisons:** Higher VPI in control group at baseline (97.9% vs 85.4%) **Study power:** No power calculation, pilot study. **Intervention delivery:** Academic (PI)	comprised of a 12-item questionnaire with a six-point Likert-type answer format (0 = never, 1 = seldom, 2 = sometimes, 3 = often, 4 = very often, and 5 = always). **Secondary outcomes:** - **Follow-up periods:** 8 weeks **Method of analysis:** Wilcoxon-signed rank tests (OHAT) and repeated measures ANOVA (GOHAI).	**Secondary:** - **Attrition:** Facility A – 70% Facility B – 87% Facility C – 100%	Low uptake; 30% drop out in facility A; Convenience sample. **Evidence gaps:** **Funding sources:** Not reported **Conflicts of interest:** Not reported **Applicable to UK?** Yes, USA study, UK applicable.
First author and year: Arvidson-Bufano 1996 **Study Design :** UBA **Quality score:** +	**Aim of study:** To determine if instruction in how to perform the MDS (Minimum Data Set) oral health assessment and RAP (Resident Assessment Protocol) summary required by federal regulations will improve nurses' accuracy of the assessments.	**Method of allocation:** UBA design **Intervention(s):** A 30-minute training session for staff nurses was completed that demonstrated how to perform an oral examination, including hands-on practice under a dentist's supervision. Staff nursed completed	**Primary outcomes:** Improve accuracy of nurses' accuracy with regard to determining oral health status and treatment needed using the MDS (Minimum Data Set) oral health assessment and RAP (Resident Assessment Protocol) Summary.	**Primary:** For the six MDS items and the RAP Summary (combined into one dependent variable) there were significantly more agreements with the dentist for assessments completed after (mean = 6.16 ± 0.87) than before the lecture (mean = 4.3 ±1.32) (t = 3.768, p ≤.001).	**Limitations (author):** Pilot only. Evaluation is needed to determine the validity of the oral health component of the MDS/RAP screening tool. **Limitations (review team):** Small sample size.

External validity score: **+**	**Setting:** Three not for profit residential nursing homes in Maryland, USA. Urban. **Participants:** 18 staff nurses (14 RN's, 4 LPNs) completed MDS assessments of 50 residents admitted to one of the facilities <90 days prior to nurse staff instruction. Patients; 74% female; average age 81. **Inclusion:** Residents admitted to one of the facilities <90 days prior to nurse staff instruction. **Exclusion:** Not reported. **Water fluoridation?:** Unknown	oral/dental status sections of MDS's and RAP's pre- and post- instruction on the same 50 patients. **Control:** A certified dentist completed oral/dental status sections of MDS's and RAP's independent and blind to the nurse assessments. **Sample sizes:** Nurses:18; Patients:50. **Baseline comparisons:** Not applicable **Study power:** Not applicable, pilot study **Intervention delivery:** Healthcare professional (staff nurses; RN's/LPN's)	**Secondary outcomes:** - **Follow-up periods:** 7-10 days post-intervention **Method of analysis:** Matched pairs t test for number of pre-post agreements (nurse v dentist) and chi squared for each of the items. 95% CI and p values.	The chi-square test evaluated each of the seven items. Nurses' agreed with the dentist reference significantly more frequently after than before training on six items ($p \leq .05$). **Secondary:** **Attrition:** 100% of participants accounted for.	Short-term follow-up period. **Evidence gaps:** Long-term effect of the intervention. Evaluation is needed to determine the validity of the oral health component of the MDS/RAP screening tool. **Funding sources:** Not reported. **Conflicts of interest:** Not reported. **Applicable to UK?** UK applicable country
First author and year: Avenali 2011 **Study Design :** nRCT **Quality score:**	**Aim of study:** To evaluate the efficacy of educational programs targeted to disabled patients and their tutors/carers over time **Setting:** Rome, Italy. Urban.	**Method of allocation:** Not stated (though claimed *'random'*) **Intervention(s):** Education for patients and tutors: 20 mins. Hygiene and oral health using audiovisual devices and models	**Primary outcomes:** Visible Plaque Index (VPI), Gingivial Bleeding Index (GBI) Also microbiological analysis Examiners pre trained – inter-rater agreement = 95%	**Primary:** VPI improvement significant at 4 weeks – 19.7% I vs 79.2% C (p=0.002) but not at 6 months – 60.3% I vs 97.8% C (p=0.021) GBI not significant at 4 weeks – 28.9% I vs 45.8% C (p=0.410) or 6	**Limitations (author):** - **Limitations (review team):** Small population and not randomised. No ITT. Analysis only on completers. Objective

+ **External validity score:** +	Residential care facility for clients with psychophysical disabilities. ***Specialist population* Do not use for ES in Review 1.** **Participants:** 36. 41% female (in final sample). Average age 40.8 **Inclusion:** Age 18+ **Exclusion:** -	designed by the Dept. of Oral Health Science, Spaienza University, Rome **Control:** Education for tutors only: 20 mins as above **Sample sizes:** I: 18 study, C: 18 **Baseline comparisons:** Higher VPI in control group at baseline (97.9% vs 85.4%) **Study power:** Not reported **Intervention delivery:** Academic (oral health science)	**Secondary outcomes:** - **Follow-up periods:** 4 weeks & 6 months post intervention **Method of analysis:** Percentages for VPI+ and GBI+ with p values; chi squared test.	months – 70.7% I vs 86.7% C (p=0.360) Also microbiological analysis **Secondary:** - **Attrition:** I: 30% C: 25%	clinical measures but unclear if examiners were blind to treatment group. **Evidence gaps:** Further study needed using technological teaching aids **Funding sources:** Not reported **Conflicts of interest:** Not reported **Applicable to UK?** Yes, UK applicable
First author and year: Beck 2008 **Study Design :** nRCT **Quality score:** - Re oral health component + Re	**Aim of study:** To test the hypothesis that a multifaceted 11-wk intervention comprising nutrition, group exercise, and oral care would have a significant influence on nutrition and function in elderly nursing home residents. **Setting:**	**Method of allocation:** Pseudo-randomisation. By birthday (first vs second half of month) **Intervention(s):** 11 week multi-faceted intervention of chocolate, home-made supplements, exercise and oral care. Oral care component delivered by dental hygienist 1-2 times weekly:	**Primary outcomes:** Plaque Also nutritional status: weight, BMI, energy intake, protein intake, Berg's balance scale Also physical outcomes. **Secondary outcomes:**	**Primary:** Plaque: No difference reported but data not provided. *The prevalence of residents with plaque (up to 30% before starting) did not change.* Nutritional status improvements noted but essentially a nutrition programme. Also physical outcomes. **Secondary:**	**Limitations (author):** Nursing homes chosen had a specific interest in nutrition and possible that good general standards of care may have weakened the results. Oral care was not performed as often as planned in the protocol. **Limitations (review team):**

nutrition/exercise components **External validity score:** ++ **Linked papers:** Beck 2009, 2010	Denmark, seven selected nursing homes in Copenhagen area (all with an interest in nutritional interventions). **Participants:** 121; I: 68% female, C: 78% female; Mean age I: 87, C:86 **Inclusion:** ≥65 years, could be weighed, no terminal condition, living in nursing home. **Exclusion:** -	Teeth or denture cleaning; Interdental brushes between teeth; Advice. 67% of the oral health care planned was performed. *Estimated time [RC]:* 10 hours in total. **Control:** Usual care **Sample sizes:** I: 62, C: 59 **Baseline comparisons:** Similar other than stay in nursing home (longer for control group) **Study power:** 80% to detect a significant difference at the 5% confidence level (BMI change). **Intervention delivery:** University researchers with nursing home appointed persons. Dental hygienists delivered the oral care component.	- **Follow-up periods:** 4 months post intervention **Method of analysis:** % for plaque but detail not provided. Chi squared test.	- **Attrition:** I: 35% 6 drop-outs, 1 hospitalisation, 15 deaths C: 14% 8 deaths	No information provided re plaque and not possible to distinguish if the oral health intervention may have affected nutritional outcomes. **Evidence gaps:** - **Funding sources:** Health Insurance Foundation and Velux Foundation **Conflicts of interest:** Not reported **Applicable to UK?** UK applicable country but homes chosen had a specific interest in nutrition. May not be generalizable.
First author and year: Bellomo 2005	**Aim of study:** To assess the effectiveness of occupational therapists in	**Method of allocation:** Based on the buildings participants were residing in	**Primary outcomes:** Plaque Index (Silness and Loe), denture plaque index	**Primary:** A statistically significant improvement in plaque and denture	**Limitations (author):** Missing data in structured interviews, heterogeneity

Study Design : RCT **Quality score:** + **External validity score:** -	promoting independence of residents whilst undertaking daily living activities**.** **Setting:** Geneva Switzerland, LTC home **Participants:** 1 LTC 61 Participants; 72.1% female; Mean age 85.7 years **Inclusion:** Residents in the selected LTC **Exclusion:** **-** **Water fluoridation?** Not stated	**Intervention(s):** Independent residents (II): occupational therapy instruction on tooth and denture brushing (est RC 1h). Assisted (IA): same as above followed by weekly guidance and gesture education when brushing and re-education if necessary. (est RC 2h) **Control:** II: No intervention IA: occupational therapy using manicure as placebo **Sample sizes:** I: II: 16 I: IA: 13 C: II: 15 C: IA: 15 **Baseline comparisons:** Groups were matched for age and sex **Study power:** Not reported **Intervention delivery:** Dentist and occupational therapist	(Ambjornsen et al), brushing assessment, toothbrushing habits and Mini Mental State (MMS) assessment **Secondary outcomes:** **Follow-up periods:** 3 months **Method of analysis:** Mann–Whitney U-test, Wilcoxon sign test and Spearman's rank correlation test	index occurred in all groups but the most significant pre-post amelioration in plaque ($p<0.01$) and denture hygiene ($p<0.001$) occurred in the intervention-assisted experimental group. There was also a difference between the independent and assisted control subgroups but it was insignificant. Both intervention and control group had a significantly improved oral and denture hygiene and it was not reported whether there were significant between group differences. Mental state: Participants with the lowest cognitive capacity (Dementia) who were in the intervention-assisted group showed the most significant improvement in oral and denture hygiene. **Secondary:** **Attrition:** 3.3% loss due to death	of variables could weaken significance of conclusions. Participants shared common meals and could have discussed intervention. **Limitations (review team):** Randomisation method not appropriate, no mention of blinding of outcome assessors, possibility of contamination. No mention of how LTC or residents were recruited. **Evidence gaps:** - **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** yes

First author and year: Binkley 2014 **Study Design :** UBA **Quality score:** + **External validity score:** ++	**Aim of study:** To develop and pilot test a social science, theoretically based intervention strategy focussing on oral health. **Setting:** 11 group homes for adults with learning and/or developmental disabilities USA, Midwestern city, Urban. **Participants:** 44. ≥19 years, average age 45. 38% female. 68% white. 29% mild, 39% moderate, 21% severe, 0% profound disability. **Inclusion:** Group care home resident **Exclusion:** **Water fluoridation?:** Not stated	**Method of allocation:** Agreed to participate **Intervention(s):** Four part intervention involving (1) caregiver action plan for oral health agreed with dental hygienist (est RC 1 hour) (2) Education and coaching for carers (1.5-2 hours) (3) Environmental adaption oral health aids (e.g. toothbrushes, paste, floss), calming atmosphere for resident (4) reinforcement training two weeks later (0.5 h) Total est. (RC) = 4 hours **Control:** N/A **Sample sizes:** 21 caregivers 25 residents **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Academic. Dental hygienist to agree actions with caregivers. Dental examiner for clinical outcomes	**Primary outcomes:** Plaque index (O'Leary), Oral Assessment Guide (OAG) for dental hygiene, staff compliance, patient acceptance (qualitative assessment) **Secondary outcomes:** **Follow-up periods:** One week after one-month intervention **Method of analysis:** Effect size d across time (intent to treat) and t-test for cases with pre-post data	**Primary:** There were statistically significant pre-post improvements in O'Leary plaque score (100 [SD 2] -49 [29]%; p<0.01) and the OAG (1.60 [SD 0.26]-1.78 [0.22]; p<0.01). There were statistically significant improvements in two intermediate outcomes of % use of disclosing solution from 11-58% and % flossed from 14-44% (both p<0.01). There was no significant change in carer self-efficacy but caregivers' monitoring of residents' oral health approached significance with a change from 56% to 76%. **Secondary:** **Attrition:** 16/21 caregivers = 76% Residents = 100%	**Limitations (author):** Use of a general rather than oral health specific self-efficacy scale may have limited ability to detect an effect on carer self-efficacy. Implementation had to be in stages due to reorganisations. **Limitations (review team):** UBA so risk of confounding; small samples and very short follow up (pilot study only) but well conducted **Evidence gaps:** Efficacy study now planned with proposed improvements in self efficacy and clinical outcome measures **Funding sources:** National Institute of Dental and Craniofacial Research **Conflicts of interest:** Not reported **Applicable to UK?** Yes

First author and year: Boczko 2009 **Study Design :** UBA **Quality score:** + **External validity score:** +	**Aim of study:** To investigate the results of an education program provided by speech-language pathologists for certified nursing assistants (CNAs) **Setting:** USA. Urban long term care facility, single institution **Participants:** 120 residents (no demographic or SE information provided), 20 CNAs (mean years' experience 9.9 (SD 7.0)). **Inclusion:** Residents in long term care. No other information provided. **Exclusion:** **Water fluoridation?:** Unknown	**Method of allocation:** Random selection of CNAs (one per unit) and random selection of **Intervention(s):** The development of a 25-item oral health knowledge Test (OHKT) and an educational programme for care givers (CNAs) - one hour power point with handouts and diagrams, focussing on oral health care, risk factor identification, overlooked populations. **Control:** N/A UBA **Sample sizes:** 120 residents; 112 assessed (8 died) **Baseline comparisons:** N/A UBA **Study power:** Not provided **Intervention delivery:** Speech language pathologists	**Primary outcomes:** Knowledge (Oral Health Knowledge Test, OHKT), oral cavity assessment (4-point severity scale: lips, tongue, teeth, dentures, saliva and gingiva-oral mucosa) **Secondary outcomes:** **Follow-up periods:** No follow up. OHKT test two weeks in advance, and re-test immediately after training **Method of analysis:** Mean numbers correct answers and standard deviations	**Primary:** CNAs gained 5.29 points in the OHKT from pre to post-test: 16.65 (SD 2.44) to 21.94 (2.23), a significant improvement ($p<0.01$). Pre to post-test modest but significant improvements were noted in lips, teeth, tongue and saliva quality but a modest decline in gingival health (all p values <0.01). **Secondary:** **Attrition:** 6.7% through mortality	**Limitations (author):** Short term results only. The authors suggested that the negative findings in relation to gingival health may have related to excessive brushing of the teeth causing oral mucosa breakdown. **Limitations (review team):** Well conducted uncontrolled before and after study but no follow up means that clinical benefits not assessed. **Evidence gaps:** A longer term study needed. **Funding sources:** Not reported **Conflicts of interest:** None **Applicable to UK?** Yes

First author and year: Budtz-Jorgensen 2000 **Study Design :** RCT **Quality score:** + **External validity score:** ++	**Aim of study:** To evaluate the effectiveness of a preventive oral health programme on the prevalence or oral candidosis in frail or dependent residents in a long-term care facility **Setting:** Switzerland. Geriatric long-term care facility **Participants:** 237; Mean age 85.6±6.9 years (range 66-101); 68% women; 62.1% dentures; 20.4% natural teeth; 17.4% neither teeth nor dentures; 61% totally dependent **Inclusion:** Resident in a geriatric LTC facility **Exclusion:** Cognitive impairment **Water fluoridation?:** Not stated	**Method of allocation:** One group (5 wards) was randomly selected as the intervention group while the remaining 7 wards comprised the control group **Intervention(s):** Preventive oral health programme including initial treatment by dental hygienist (eg scaling of teeth), carer instruction (0.75h by dental hygienist), provision of toothbrush and fluoridated toothpaste to all residents and a recall programme for professional oral hygiene care. **Control:** Care as usual; Cleaning of teeth only if requested by dentist **Sample sizes:** I: 122 C: 115 **Baseline comparisons:** Good **Study power:** Not reported **Intervention delivery:** Dental hygienist to carers; Carers to residents	**Primary outcomes:** Erythematous lesions Also dryness and oral yeast. **Secondary outcomes:** **Follow-up periods:** 18 months **Method of analysis:** Chi-squared and t-tests.	**Primary:** There were no significant differences in mucosal lesions between groups. For other lesions there were no significant differences other than glossitis which decreased in the intervention group (from 9.9% to 4.9%) and increased in the control group (from 12% to 25%), p=0.005 Also oral yeast scores (significant improvement) **Secondary:** **Attrition:** N=78/237, 33%	**Limitations (author):** - **Limitations (review team):** No randomisation, no blinding, 33% attrition (though no surprising) **Evidence gaps:** - **Funding sources:** Swiss National Foundation for Research **Conflicts of interest:** None reported **Applicable to UK?** Yes

First author and year: Carr 1997 **Study Design :** RCT **Quality score:** + **External validity score:** +	**Aim of study:** To determine the efficacy of Interplak toothbrush compared to manual toothbrush in adults with mental retardation/developmental disabilities **Setting:** Franklin County Ohio, USA **Participants:** 56 residents from 4 nursing homes. Mean age: 36.8, 42.9% female **Inclusion:** All residents in the 4 nursing homes who chose to participate **Exclusion:** Residents requiring antibiotic pre-medication and those on <6 months recall **Water fluoridation?:** Not stated	**Method of allocation:** Group homes randomised but method not stated **Intervention(s):** Dental hygienist provided toothbrushing instruction to residents and staff and they were made to practice technique on a typodont (est time 1 h). Sessions were one-on-one or in groups for staff who could not attend individual sessions. Manufacturer's instructions regarding the use of Interplak were given. **Control:** Bass toothbrushing technique was utilized **Sample sizes:** I: Self-brushing:18, Assisted brushing:7 C: Self-brushing:19, Assisted brushing:12 **Baseline comparisons:** Not reported, but residents requiring assistance in control group had a higher calculus and debris index than those in the intervention group	**Primary outcomes:** Gingival Index (Loe) and Simplified Oral Hygiene Index (Greene and Vermillion) **Secondary outcomes:** **Follow-up periods:** 3, 6, 9 and 12 months **Method of analysis:** Means, standard deviations and a repeated measures ANOVA	**Primary:** No significant difference in gingival or calculus index for instruction vs usual care group but the gingival index at 12 months was 1.93 for those who used a manual toothbrush and 1.73 for those who used the Interplak (p=0.017). Marginal significant difference in debris index across time for the two brushing assistance status groups (p = 0.054) Using the ANOVA, intervention group had a significantly lower mean gingival index at 12 months. Residents who brushed independently had a significantly lower debris score compared with residents who were assisted at 12 months. **Secondary:** **Attrition:**	**Limitations (author):** Staff implementation of toothbrushing protocol could not be monitored. Interruption of protocol due to loss or malfunctioning of interplak toothbrush or due to hospitalisation of resident. **Limitations (review team):** Method of randomisation and significant baseline differences not mentioned. Provision of prophylaxes by dental hygienists at a University Affiliated program Centre. Type of prophylaxes was not stated, and it is possible this could have affected the overall results. No power calculation. **Evidence gaps:** More studies are needed to determine why persons who brushed independently had a lower index score than those who were assisted **Funding sources:**

		Study power: Not reported **Intervention delivery:** Dental hygienist delivered instructions; Caregivers assisted with toothbrushing for residents who were not capable of brushing by themselves.			Not stated **Conflicts of interest:** Not stated **Applicable to UK?** yes
First author and year: Chalmers 2009 **Study Design :** UBA **Quality score:** + **External validity score:** ++	**Aim of study:** To establish best practice oral health policies and procedures; trial the use by carers of an Oral Health Assessment Tool (OHAT) and an Oral Hygiene Care Plan (OHCP); test the reliability and validity of carers' use of the OHAT **Setting:** Australia 21 residential homes in three states (New South Wales, South Australia, Victoria). Urban/rural mix. **Participants:** 534. Av. Age 82.1 years. 56.5% with dementia, 88.9% were in Residential Care Services (RCS) 1–4; 68.7% >12 months residency **Inclusion:**	**Method of allocation:** N/A UBA **Intervention(s):** Development and introduction of an Oral hygiene assessment tool (National guidance adapted by carers) and care plan. 3h training at baseline. **Control:** N/A **Sample sizes:** 534 **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:**	**Primary outcomes:** OHAT use standards, oral hygiene (compared with **Plaque Index (Silness and Lőe),** Oral lesions (WHO)) Also focus group data (see Barriers & Facilitators Review) **Secondary outcomes:** **Follow-up periods:** 3, 6 months **Method of analysis:** Percentage agreement and Pearson correlation were analysed for each comparison using a significance level of $p<0.05$.	**Primary:** The total OHAT score fell from 2.71 at baseline to 2.50 at 3 months and 2.40 at six months follow up. Differences between baseline and 3 months and baseline and 6 months were significant ($p<0.01$ in both cases) but there was no significant difference between 3 and 6 months Also focus group data **Secondary:** **Attrition:** 14.8% at 6 months [largely deceased]	**Limitations (author):** - **Limitations (review team):** UBA so potentially confounded. **Evidence gaps:** Further evaluation in the long term needed **Funding sources:** National Health and Medical Research Council Strategic Research Development Committee; Australian Dental Research Foundation, with support from the Australian Research Centre for Population Oral Health, Hunter Health Services and Dental Health Services Victoria.

	Resident in care home **Exclusion:** - **Water fluoridation?:** Not stated	Concurrent validity assessment of the OHAT was conducted by first author (academic).			**Conflicts of interest:** None reported **Applicable to UK?** Yes
First author and year: Day 1998 **Study Design :** RCT **Quality score:** **+** **External validity score: ++**	**Aim of study:** To determine the efficacy of sonic toothbrush when compared with manual toothbrush in special needs residents requiring caregiver's assistance. **Setting:** Seattle WA, USA, Nursing and residential centre. **Participants:** 37 residents from 1 Home; I:76% & C: 90% Female; Mean age I:82.2, C:89.5 **Inclusion:** Between 40-90years, minimum of 16 natural teeth, have oral care provided by caregiver and do not need sedation for examination. **Exclusion:** Residents who require antibiotic prophylactic for	**Method of allocation:** Residents randomised but no description of method **Intervention(s):** Caregivers received training on oral hygiene and proper use of toothbrushes and brushing techniques. (est [RC] 1h) Residents' teeth were brushed twice a day for 2mins. No use of dental floss or mouthrinses. **Control:** Modified Bass technique of brushing was used. No use of dental floss or mouthrinses. **Sample sizes:** I: 17; C: 20 **Baseline comparisons:** Differences in age which was adjusted for **Study power:**	**Primary outcomes:** Dental plaque index (Silness and Lőe) **Secondary outcomes:** **Follow-up periods:** 2, 4 and 6 weeks **Method of analysis:** Means, standard deviations and errors, MANCOVA, and post hoc t test.	**Primary:** The mean plaque score was lower in the intervention group compared to the control group at 2, 4 and 6wks. Plaque index values (SD) from baseline to 6 weeks were 1.64 (0.72) to 1.01 (0.55) for the Sonicare group and 1.53 (0.63) to 1.44 (0.56) for the manual group (p=0.026). The post hoc t test indicated a statistically significant difference between baseline and the 4 and 6 weeks measurements in both groups. However, the difference was greater in the intervention group (38.3%) compared to the control group (6.0%). **Secondary:** **Attrition**: In the intervention group, 2 residents missed their appointment at 2 weeks and 1 at 4 weeks, but all were	**Limitations (author):** Inability to monitor caregivers' compliance to instructions. 3 residents withdrew at start of study due to intervention. **Limitations (review team):** Use of a 6-week evaluation period compared to 8 weeks used in most toothbrushing studies. Not stated how or why that center was selected. Method of randomisation unclear. Small sample size. Funded by Sonicare manufacturer. **Evidence gaps:** - **Funding sources:** Rehabilitation Services Administration, Department of Education

	dental care **Water fluoridation?:** Not stated	Not reported **Intervention delivery:** Caregivers		present at 6 weeks.	Grant #HI29T20021-94, and by the Optiva Corporation **Conflicts of interest:** None reported but the Optiva Corporation manufactures the Sonicare toothbrush. **Applicable to UK?** Yes
First author and year: De Visschere 2011 **Study Design :** cRCT (cluster design) **Quality score:** - **External validity score:** **++**	**Aim of study:** To explore the long-term effects of the implementation of an oral hygiene protocol in nursing homes. **Setting:** Ghent Belgium, nursing homes. **Participants:** 14 nursing homes (1393 participants); 75.9% female; mean age 84.8 years 77% wore dentures, of which 58% were complete denture. More than 30% had some natural dentition. The mean number of remaining teeth was 12.	**Method of allocation:** Nursing homes randomised but no description of method; Stratified cluster sampling of residents within the homes (no description of method) at each time point **Intervention(s):** Implementation of a standardised oral health hygiene protocol as residents arrived in the home. Components: Introduction (1h), oral health coordinator appointment (registered nurse), half day training, oral assessment of new arrivals, 'individualised plan for each'. *Estimated training time (RC):* 7 hours **Control:** Care as usual (intervention home)	**Primary outcomes:** Dental plaque index (Silness and Lőe) Denture plaque (Augsburger and Elahi) **Secondary outcomes:** **Follow-up periods:** 2 and 5 years **Method of analysis:** Means, standard deviations and p-values. Multivariate analysis, with random institution effect, to explore variables (eg presence of toothpaste).	**Primary:** No significant differences in dental or denture plaque levels were found between control and intervention patients at 2 or 5 years (no hard data to detect whether any trend) There were indications of a statistically significant pre-post improvement in intervention patients in denture plaque at 2 years (but not at 5 years) and dental plaque at 5 years (but not at 2 years). Lower dental plaque levels were observed in patients with lower degrees of dependency. Highest levels were observed when mouth rinse *was* present in bedrooms. A smaller home (50-99 versus 100+	**Limitations (author):** Important confounding factors were observed that influenced the findings. Staff moved between groups; It wasn't possible to monitor compliance to the protocol. **Limitations (review team):** Selection and randomisation process unclear, contamination quite possible, different time periods for intervention & control patients, cannot work out who was included and excluded from measures (Table 2), analysis very confusing. Repeated CSS

	14 homes initially selected from 36 by stratification **Inclusion:** Resident in nursing home for older people **Exclusion:** When verbal consent was impossible because of lack of communication with the residents or their proxies **Water fluoridation?** Not stated	Care as usual (control home) **Sample sizes:** I: 7 homes (211 intervention, 511 control residents) C: 7 homes (671 residents) **Baseline comparisons:** No significant differences in age, sex, dentition, dependency **Study power:** Not reported **Intervention delivery:** Registered nurse – oral health coordinator		beds) and the presence of toothpaste were independently associated with cleaner dentures. **Secondary:** - **Attrition:** None by care home	data and not the same population **Evidence gaps:** Further research is needed, including qualitative research, to find out how adequate oral hygiene levels in nursing homes can be achieved. **Funding sources:** Gaba International **Conflicts of interest:** None reported **Applicable to UK?** UK applicable country
First author and year: De Visschere 2012 **Study Design :** cRCT **Quality score:** ++ **External validity score:** ++	**Aim of study:** To compare a supervised versus non-supervised implementation of an oral health care guideline **Setting:** Belgium. Nursing home. **Participants:** 12 homes (with 30 participants in each). Mean age 84.8 (SD 8); 73.2%Female. Low dependency I: 12.8% C: 12.9%. Dementia I:	**Method of allocation:** Stratified random sample of 30 residents per home. **Intervention(s):** Supervised implementation of the Dutch guideline and its derived daily oral health care protocol. 2 h lecture, 1 h practical education, plus 1.5 h ward based education by oral health care organisers; plus six monitoring visits. Est. time [RC] = 10.5h	**Primary outcomes:** Plaque on natural teeth (Silness and Löe Index) Oral hygiene of dentures (Augsbuger and Elahi) Tongue plaque (Winkel tongue coating index, WTCI) **Secondary outcomes:** **Follow-up periods:** Six months **Method of analysis:**	**Primary:** The adjusted mean differences (95% CI) for intervention vs control groups showed a small positive trend of -0.07 (-0.91 to 0.77, p=0.87) for tongue plaque, -0.15 (-0.45 to 0.14, p=0.31) for dental plaque and -0.32 (-0.52 to -0.11) for denture plaque. Thus no significant differences other than for denture plaque but in the linear mixed regression models including a random institution effect, this was no longer significant.	**Limitations (author):** Process evaluation indicated some differences between institutions in compliance. Low baseline levels of plaque may have reduced effect. **Limitations (review team):** No allocation concealment but baseline measures similar (other than %female) and ITT used.

	27.3% C: 28.0%. Mean number of natural teeth 5.2 (7.6). No other SE detail. **Inclusion:** Written informed consent by resident or legal representative; Natural dentition or partial/complete dentures; Physically and cognitively suitable for examination **Exclusion:** In day care, short-term residency, coma, palliative care, terminally ill, oral examination-resistant. **Water fluoridation?:** Not stated	**Control:** Usual care (non-supervised national guideline) **Sample sizes:** **Baseline comparisons:** More male participants in the intervention group (31.6 vs 22.0%) - otherwise balanced. **Study power:** Estimated by authors but described as an 'achievable' sample size rather than one based on study power **Intervention delivery:** Oral health team - Institution project supervisor, oral health care organisers (nurses or nurse aides), a physician and (optionally) occupational or speech therapist. Supported by dental hygienist.	Mann Whitney U and Kruskal-Wallis tests for independent samples. Wilcoxon signed rank tests for paired samples over time. Correlation between independent variables by Spearman's rank correlation coefficient. ITT used. Adjustments for baseline variables.	**Secondary:** **Attrition:** 20%	**Evidence gaps:** More sensitive plaque scoring indices needed; Explore effects of institutional differences **Funding sources:** Oral health care products provided free from GABA International, Eureka Pharma Belgium, Oral-B Belgium, Johnson & Johnson **Conflicts of interest:** None **Applicable to UK?** Yes
First author and year: Fickert 2012 **Study Design :** UBA **Quality score:** -	**Aim of study:** To examine the effect of an educational program on caregiver knowledge, skill and compliance when providing care to individuals with intellectual and developmental disabilities **Setting:**	**Method of allocation:** Volunteers **Intervention(s):** Educational programme 'Overcoming Obstacles to Dental Health: A Training Program for Caregivers of People with Disabilities' adapted: Presentation, live demonstration, hands-on practical. 6 hours in all.	**Primary outcomes:** Knowledge/compliance – Oral Hygiene Skill Survey as assessed by observers **Secondary outcomes:** **Follow-up periods:** Immediately post education, 3 months	**Primary:** For the 50 caregivers completing the post-test, post-test scores increased by 8.23 (degree of freedom df, 49) ($p<0.001$). For the 29 caregivers completing the post- and 3 months test, scores post-test increased by 8.19 (df 28; $p<0.001$) but at three months the	**Limitations (author):** Small sample and no power calculation. One employment organisation only with a convenience sample of self-selected carers. The beliefs and attitudes of participants were not collected prior to the study.

External validity score: +	USA Pennsylvania. Community living arrangements or intermediate care facilities (six intermediate care facilities and 65 community living arrangement programs) **Participants:** 52. 86.5% female, 53.8% White, 32.7% Black, 44.2% high school graduate, 55.8% College/Degree; 11.5% <1 year and 5.8% >25 years' experience; 21.1% <1 year and 1.9% > 25 years' at institution All < 65 years old. **Inclusion:** ≥18 years old; Employed by the organisation; Assigned to work in a community living arrangement or intermediate care facility within the organisation; Responsible for providing oral hygiene to individuals with intellectual and developmental disabilities **Exclusion:** Temporary or provisional employment status **Water fluoridation?:**	Incentives offered for completion of training and post-tests. **Control:** N/A **Sample sizes:** 52 **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Dental hygienist	**Method of analysis:** Paired t-tests	difference was not significant at 1.98 (df 28) (p=0.057) **Secondary:** Total cost for participant training circa $3,000. **Attrition:** Re knowledge - 2/52 post training = 3.8% 21/52 at 3 months = 40.4% 48/52 post training = 92.3% 32/52 at 3 months = 61.5%	**Limitations (review team):** UBA so potential for confounding. Unclear if a representative sample of caregivers. High drop-out rate **Evidence gaps:** Re-examine the programme with a larger sample size **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** Yes

	Not stated				
First author and year: Fjeld 2014 **Study Design :** RCT **Quality score:** ++ **External validity score:** ++	**Aim of study:** To determine the effectiveness of electric toothbrush compared with manual toothbrush in nursing homes residents. To determine caregivers' evaluation of the use of electric toothbrushes **Setting:** Oslo, Norway; Urban; Residents and caregivers in long-term care facilities. **Participants:** 9 nursing homes; 180; 86.1±7.7yrs; 135 Female (75%) **Inclusion:** Stable health in intervention period; at least 6 natural teeth, and in long term care **Exclusion:** Residents requiring mouthwash rinse or gels containing plaque-inhibiting agents, or those who could not perform normal oral-hygiene care **Water fluoridation?**	**Method of allocation:** Computerized and individual randomisation was performed by an independent statistician **Intervention(s):** A dentist provided individual instructions to all patients and their nurses using illustrated cards (est. [RC] 1h). All participants were given the same toothpaste and instructed to perform dental hygiene procedures twice daily; and use of electric toothbrush **Control:** Instructions re manual toothbrush **Sample sizes:** I: 86 C: 94 **Baseline comparisons:** No significant differences between groups at baseline **Study power:** Not reported **Intervention delivery:** Dentist delivered the instruction Residents independently used toothbrushes, if they were not	**Primary outcomes:** Debris index (DI-S) from the Simplified Oral Hygiene Index (OHI-S) and Mucosal plaque index Use, utility value, time consumption and general opinion of electric toothbrush **Secondary outcomes:** Caregiver's evaluation of time use and usability of the electric toothbrush **Follow-up periods:** 2 months **Method of analysis:** Means, standard deviations, and p-values, t-test, chi-square test, regression analyses, and Wilcoxon signed-rank test	**Primary:** There was identical significant mean improvement in OHI-S in both groups at 2 months but no statistically difference between groups. In both groups the change was 1.27±0.63 at baseline and 1.01±0.53 at 2 months. Participants in intervention group who received assistance with dental hygiene had significantly better mean plaque scores than those who received no assistance. There was no difference in control group between participants who did or did not receive assistance. **Secondary:** Of 152 caregivers who responded to the questionnaire, 64.7% reported that the ET was either no different or easier to use than the MT (46.5% re patients with dementia). ET was less time-consuming compared with MT. 42 (27.6%) caregivers reported that residents complained about the sound and vibration from the ET. **Attrition:** 0%	**Limitations (author):** Little information on dropout. Reason for not participating in study could be that residents did not want to try electric toothbrush. It was impossible to control the use of electric toothbrush by participants. **Limitations (review team):** The study had a short follow-up time of 2 months. **Evidence gaps:** More research with assisted tooth cleaning needed. **Funding sources:** Oral B and Proctor & Gamble provided toothbrushes/toothpaste. **Conflicts of interest:** No conflicts of interest **Applicable to UK?** Yes

	Not stated	capable then staff assisted			
First author and year: Frenkel, 2001 **Study Design :** RCT **Quality score:** ++ **External validity score:** +	**Aim of study:** To assess whether oral health care education (OHCE) for nursing home caregivers would achieve improvements in clients' oral health. **Setting:** 22 nursing homes registered with Avon Health Authority as being designated for sick and infirm elderly people. **Participants:** 412 nursing home residents. Mean age in years: 84.0/ 84.9. % female participants: 75.8/ 81.1 Care assistants rather than Nurses were targeted for training. **Inclusion:** Any resident who wore dentures and/or had one or more natural teeth. General health permitted oral examination. **Exclusion:**	**Method of allocation:** Cluster randomisation by independent researcher not involved in data collection or delivery of intervention. **Intervention(s):** A 1hour OHCE session for caregivers employed in nursing homes was presented by a Health Promoter of 15 years' geriatric domiciliary dentistry. Toothbrushes were distributed to all clients to encourage oral hygiene activity. **Control:** Usual care **Sample sizes:** 22 nursing homes - I:11 C:11 378 residents – I:178 C:200 **Baseline comparisons:** Acceptable comparability between groups for key variables. A few slight imbalances occurred by chance in demographic variables including gender, mobility and time since last dental attendance. **Study power:** With 97% power and 95%	**Primary outcomes:** *Denture plaque:* Disclosed mature plaque was scored on each of four buccal surface and four mucosal surface segments, using a 0–4 scale. Each scale point represented a further 25% increment in surface plaque coverage. *Denture-induced stomatitis:* The denture bearing mucosa of each jaw was scored on a 0—3 scale according to the classification of Budtz-Jørgensen. *Dental plaque:* Buccal and lingual surfaces of all teeth were scored for dental plaque according to the 0–3 scale of the simplified Oral Hygiene Index (Greene & Vermillion). *Gingivitis:* Each jaw was divided into right and left posterior segments (containing molar and premolar teeth) and an anterior segment (containing canine and incisor teeth). Each segment was scored buccally and lingually on a 0–2 scale representing no	**Primary:** Statistically significant improvement in the intervention group's oral health scores. Reductions in denture plaque scores, denture-induced stomatitis prevalence, gingivitis. **Secondary:** Provider's costs approximately £6700 per year to deliver intervention to a Health Authority with 100 homes (Costs adjusted to correspond to those prevailing in 1999/2000). Caregivers indicated after the oral health care training that they thought more about the importance of oral care, felt more confident in performing it, and believed they were helping prevent oral problems for clients. **Attrition:** 96% of eligible consented. 8% dropped out before the trial started. Loss during trial = 41/378 = 10.8%	**Limitations (author):** Impossible to randomise individuals within nursing homes. It was only possible to achieve 66% attendance by caregivers at health education sessions. **Limitations (review team):** - **Evidence gaps:** . **Funding sources:** NHS Executive South West, Research and Development Directorate. **Conflicts of interest:** Not reported. **Applicable to UK?** Yes

	Clients with significant cognitive impairment. **Water fluoridation?:** Not reported	confidence, 120 denture-wearing subjects in each group allowed detection of a 0.6 difference in denture plaque scores. With 90% power and 95% confidence, 45 dentate subjects in each group allowed detection of a 0.4 difference in dental plaque scores. **Intervention delivery:** Educational session presented by Health Promotor which covered the role of plaque in oral disease, demonstrations of cleaning techniques for dentures/natural teeth, practice of these techniques by caregivers using a manikin head, models and other teaching aids.	inflammation, marginal gingivitis and severe gingivitis spreading to the attached gingiva. **Secondary outcomes:** Calculus, root caries and tooth mobility were recorded as absent/present. **Follow-up periods:** One month and six month post baseline assessment. **Method of analysis:** Group means or medians were calculated for main outcome variables for each group at each time point in the trial. An economic analysis was carried out to assess the programme costs from the viewpoint of the NHS provider.		
First author and year: Isaksson 2000 **Study Design:** UBA	**Aim of study:** To evaluate the clinical oral health outcome in residents after their caregivers had undergone an oral health education program.	**Method of allocation:** UBA **Intervention(s):** The oral health education program (OHEP), which focuses on knowledge	**Primary outcomes:** *Dental status:* no. of remaining teeth or denture status. *Oral mucosal status:*	**Primary:** Significant improvement in the residents' oral health status following the OHEP was found for all of the studied variables: Oral mucosa color changes (p <	**Limitations (author):** Short follow up period. **Limitations (review team):** UBA so potential for confounding.

Quality score: + **External validity score:** ++	**Setting:** Urban; 3 municipalities in southwestern Sweden; 6 LTC facilities. **Participants:** 240 at baseline; 84.6 years mean age; 70% women 236 at re-examination but an overlap of 170 residents only. **Inclusion:** Residents had to be available for examination both before and 3-4 months after intervention. **Exclusion:** The subjects rejected the offer or; Nursing personnel considered their health status to be too poor. **Water fluoridation?:** Not reported	of the oral cavity and was offered to all nursing personnel as a single, four-hour session. **Control:** N/A **Sample sizes:** **170** **Baseline comparisons:** Statistically significant improvements recorded for all oral health recordings, pre- and post-intervention. **Study power:** Not reported but 170 data measures at both time points. **Intervention delivery:** Specially trained dental hygienists.	presence or absence of color changes, wounds and/or blisters, hyperplasias, and suspected malignancies. *Oral hygiene status*: Modified plaque index (PI), Musosal Index (MI), Mucosal friction index (ME). *Treatment intention/goals:* Treatment intention index (TII), Treatment need index (TNI). **Secondary outcomes:** **Follow-up periods:** 3-4 months. **Method of analysis:** Descriptive statistics performed by means of cross-tabulation and frequency tables. Analytical statistics were calculated based on the Wilcoxon Signed-rank Test.	0.001, Z = -7.556) PI ($p < 0.001$, Z = -9.202) MI ($p < 0.001$, Z = -8.873). TII and TNI were of value in offering nursing personnel information on an estimated realistic need for oral treatment. **Secondary:** **Attrition:** 70.8% 170 individuals completed the pre and post examinations.	Direct measures at both time points only available for 70.8% participants. No information on refusals. **Evidence gaps:** Assess effect over a longer time period. **Funding sources:** Swedish National Board of Health and Welfare and the County Council of Halland, Sweden. **Conflicts of interest:** Not reported. **Applicable to UK?** Yes, UK applicable
First author and year: Kullberg 2010	**Aim of study:** To evaluate the effect of a repeated education programme for nursing staff in	**Method of allocation:** All residents at a single nursing home **Intervention(s):**	**Primary outcomes:** Knowledge, **plaque (Silness and Lőe), gingival bleeding (Lőe and Silness, GBI),** Use of	**Primary:** Significant pre-post improvements in plaque and gingivial bleeding were observed.	**Limitations (author):** Uncontrolled study. Urban home and may not be applicable to rural location.

Study Design : UBA **Quality score:** - **External validity score:** +	a home for older people **Setting:** Sweden, Nursing home. **Participants:** 43. Dementia care centre. 72% female, age range 69-99. **Inclusion:** Resident at nursing home **Exclusion:** **Water fluoridation?:** Not reported	Individual oral care instruction, training in tooth-brushing techniques and provision of electric toothbrush, chlorhexidine gluconate 1% gel for residents with own teeth twice a day for one week/month rather than tooth-brushing. Dental hygienist present 1d/week and by phone at other times. Time unstated (RC: 3 hours?) **Control:** N/A **Sample sizes:** 43 **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Dental hygienist	chlorhexidine gluconate 1% gel. **Secondary outcomes:** **Follow-up periods:** 3 weeks **Method of analysis:** Wilcoxon matched pairs and Kruskal-Wallis Anova by ranks test.	Median difference in plaque score (after vs before education) = -12.0 (95% CI -14.0 to -7.0; p<0.001). Median difference in GBI (after vs before education) = -6.0 (95% CI -7.0 to -1.0; p<0.001). Increase in use of chlorhexidine gluconate gel from 61% to 100% residents. **Secondary:** **Attrition:** 2/43 = 4.7%	**Limitations (review team):** UBA so potential for confounding. Very short follow up period. No information on who carried out the oral examinations. Single nursing home only so may not be generalizable. **Evidence gaps:** Evaluate long term effects **Funding sources:** Oral Care AB Stockholm, KArolinska Institute, Cancer and Allergy Foundation, Health Foundation, Broaun Oral-B provided electric toothbrushes (no role in study) **Conflicts of interest:** None **Applicable to UK?** Yes
First author and year: Lange 2000 **Study Design :** CBA	**Aim of study:** To determine if a change in policy followed by staff training and monitored by an interested third party would improve the oral hygiene of clients living on wards	**Method of allocation:** Drawing numbers from a hat **Intervention(s):** Training with accountability (T&A): Oral hygiene presentation and hands on staff training re tooth brushing	**Primary outcomes:** Plaque (Ramfjord's Periodontal Index) **Secondary outcomes:** **Follow-up periods:**	**Primary:** At 21 days plaque of residents whose carers were in the training *and* accountability group had significantly less plaque than those in the training only (p=0.004) or control groups (p=0.0001).	**Limitations (author):** **Short duration of study** **Limitations (review team):** Not randomised. Small sample size, very short

Quality score: - **External validity score:** -	**Setting:** USA. Single mid-western residential facility (disabilities) **Participants:** 34 T&A: 12 females aged 36-64 with profound mental retardation T: 10 males aged 36-41 with profound mental retardation C: 12 famales aged 32-51 with moderate to profound mental retardation Each group was a Unit with 12 assigned staff members **Inclusion:** Not described (34/800 residents selected) **Exclusion:** **Water fluoridation?:** Not reported	technique (no indication of time, est 1h [RC]). Random daily plaque checks by dental hygienist/assistant and feedback Training without accountability (T): Training only as above **Control:** Usual care (C) **Sample sizes:** T&A: 12 T: 10 C: 12 **Baseline comparisons:** No significant differences in oral health but otherwise very different **Study power:** Not reported **Intervention delivery:** Nurses trained by dental hygienist	7, 14 and 21 days **Method of analysis:** Anova. Fisher's Least Significant Different Test.	Plaque indices from baseline to 21 days were 2.13 (SE 0.14) and 0.23 (0.009) for the T&A group, 1.94 (0.17) and 2.12 (0.16) for the T group and 1.77 (0.12) and 1.78 (0.16) for the C group. **Secondary:** **Attrition:** 0%	follow up period. Unclear how the 34 participants were selected from the 800 residents. **Evidence gaps:** **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** Yes
First author and year: Le 2012 **Study Design :** CBA	**Aim of study:** To assess the efficacy of oral care education among nursing home staff members to improve the oral health of residents	**Method of allocation:** Convenience sample of nursing homes then randomised. **Intervention(s):** 'Mouth care of persons in residential care' (ELDERS) education programme	**Primary outcomes:** Plaque (Silness and Lőe), gingival index (Lőe and Silness), knowledge score **Secondary outcomes:**	**Primary:** There was no statistically significant difference in the plaque index between groups at 6 months (p=.76; no effect size data provided), although both study and control groups had a statistically significant	**Limitations (author):** Convenience sample of homes. Residents not keen to participate **Limitations (review team):** Close to ++ but no

Quality score: + **External validity score:** ++	**Setting:** Canada, Nursing homes in Toronto **Participants:** 75 Support Staff Members (SSMs) - I:89.4% & C:82.8% female), 80 residents - I: 66% & C: 59% female; I: Av. 18.9 teeth C: Av. 20 teeth Resident age: I: 80.98 (mean) C: 79.18 (mean) **Inclusion:** Dentate, able to understand and give informed consent **Exclusion:** **Water fluoridation?:** Not reported	(University of Columbia). A 60 minute in service video. **Control:** Usual care **Sample sizes:** I: 47 SSMs, 41 residents C: 29 SSMs, 39 residents **Baseline comparisons:** No major differences **Study power:** 80% power to detect a clinically relevant difference. **Intervention delivery:** Academic	**Follow-up periods:** Immediately post education & 6 months **Method of analysis:** T tests and factorial analysis of variance (Anova). McNemar's test of significance for pair-wise comparisons.	reduction in plaque from 0-6 months ($p<0.05$). There were no statistically significant differences in the Gingivial Index. There was no statistically significant difference in pre-post test knowledge score between groups ($p=0.65$) but knowledge in both groups increased pre- to post-test (even though no intervention for control group) ($p<0.05$). **Secondary:** **Attrition:** 0%	allocation concealment; No information on the number of nursing homes **Evidence gaps:** **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** Yes
First author and year: Lin 1999 **Study Design :** CBA **Quality score:** - **External validity score:**	**Aim of study:** To examine the effect of an education program on the ability of nursing staff to conduct an oral health assessment for a population of persons with Alzheimer's disease **Setting:** USA Texas. Single long-term care facility (dementia). Six	**Method of allocation:** Four pods selected with residents with the highest cognitive ability and paired to give residents with similar abilities; and 16 nursing staff (4 per pod) selected. (Selection process not described further). **Intervention(s):** 1h general in-service training on oral health plus 3h training on the oral assessement tool (Kayser-Jones	**Primary outcomes:** Results of the Brief Oral Health Status Examination (BOHSE, Kayser-Jones 1995) compared to 'gold standard' dentist assessment **Secondary outcomes:** **Follow-up periods:** Immediately post-training for two-week period	**Primary:** The CNAs with four hours training had the highest correlations with the dentists. Both 4h training groups had higher correlations than the 1h groups but they were not significantly different. Spearman Correlation Coefficients (two-tailed significance) were: Nurse 1 h 0.351 (0.053) Nurse 4 h 0.419 (0.037)	**Limitations (author):** **Limitations (review team):** No baseline comparison data. Not stated if assessments were blinded. Small numbers and short follow up time. Specialist population (dementia) & emphasis of study is on the ability of nurses to identify if dental treatment is

+	living areas ('pods') of 20 residents; placement determined by level of cognitive impairment. **Participants:** 68 patients (16 nurses) Patients: 76% female, 94% caucasian Licenced nurses, N (8): Mean age 50 (SD 3.7); mean years employed in LTC 9 (10.5); 75% caucasian Nursing assistants, CNA (8): Mean age 35 (5.5); Mean years employed 12 (8.7); 87.5% African American **Inclusion:** Residents with highest cognitive ability **Exclusion:** Staff who elected not to participate, 3 months or less employment, night shift work only. **Water fluoridation?:** Not reported	1995) **Control:** 1h training only **Sample sizes:** 68 residents I: 8 nurses (4 N, 4 CNA) C: 8 nurses (4 N, 4 CNA) **Baseline comparisons:** No information **Study power:** Not reported **Intervention delivery:** Education delivery not stated (Academic?). Assessments compared with Geriatric Dental Fellow 'gold standard'.	**Method of analysis:** Item level inter-rater agreement: %agreement and Kappa Score	CNA 1h 0.548 (0.001) CNA 4h 0.578 (0.001) **Secondary:** - **Attrition:** Not stated. 0% implied.	needed, rather than providing oral health care. **Evidence gaps:** Evaluate training for completion of a simplified assessment form, the oral/dental status section of the Minimum Data Set (MDS) **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** Yes

First author and year: Lopez 2012 **Study Design :** RCT **Quality score:** - **External validity score:** +	**Aim of study:** Compare the efficacy of amine fluoride toothpaste and gel with chlorhexidine spray in a long-term care institutionalised population. **Setting:** Urban; Barcelona; Spain; Nursing home. **Participants:** 26(21 completers); 85.7% female; mean age of 86.03 **Inclusion:** Being a permanent resident in the aforementioned nursing home and having at least four teeth. **Exclusion:** Those who had taken antibiotics 15 days prior to the start of the study and/or had been using an antiseptic 12 h before. **Water fluoridation?:** Not stated	**Method of allocation:** Purposive selection to deliberately alter the degree of cognitive impairment across. **Intervention(s):** Group A: applied 0.2ml chlorhexidine 0.12% in a spray once a day before bed. Group B: brushed their teeth, at least once a day, with Elmex anticaries toothpaste and once a week (Sundays at night), used Elmex Gel. **Control:** Group C: brushed their teeth without toothpaste and with a Vitis Access (medium) toothbrush. **Sample sizes:** *Group A*: 10 (5 completed) (patients with moderate to severe cognitive impairment) *Group B*: 10 without or with slight cognitive impairment) *Group C*: 6 (moderate cognitive impairment). **Baseline comparisons:** No statistical difference between groups for plaque index, gingival index of levels of S. mutans/Lactobacillus. Improvement in remineralisation in groups A and B compared to control	**Primary outcomes:** *Plaque index:* measures the quantity of plaque built up in the gingival area. *Gingival index:* measures the health of the gingival tissue (inflammation). *Remineralisation of the dental surfaces*: measures the dental tissue affected by carious lesions. *Colony-forming units (CFU) of S. mutans and Lactobacillus*. *General Oral Health Assessment Index*: measures the perception of the patient's oral health. **Secondary outcomes:** *McLeran index*: evaluate the capacity of a patient to perform correct oral hygiene techniques. *Pfeiffer index*: assess the cognitive capacity of a patient. **Follow-up periods:** 6 months **Method of analysis:**	**Primary:** Differences between groups, after 6 months were not statistically significant for plaque index nor for gingival index ($p > 0.05$ but trend in amine fluoride group: Values from baseline and six months were 2.0 to 1.2 for plaque index and 1.0 to 0.1 for gingival index. Group A and B remineralised the decayed dental surfaces, being statistically significant compared with the control group ($p = 0.0151$). No difference between the number of colonies of either S. mutans or lactobacillus. GOHAI index was maintained stable during the 6-month period. **Secondary:** The more dependency the patient had, the worse the plaque and gingival index were ($p = 0.0059$ and 0.0001, respectively). The more cognitive impairment of the patient, the worse the gingival index was ($p = 0.0072$).	**Limitations (author):** A lack of homogenisation of the techniques used to collect the data. Lack of application of treatments by caregivers. **Limitations (review team):** Deliberate bias introduced into treatment groups. No blinding of outcomes. Very small study. **Evidence gaps:** The effect of training being provided to the caregivers. **Funding sources:** Not reported. **Conflicts of interest:** Not reported. **Applicable to UK?** Yes

		(p = 0.0151). **Study power:** Not reported **Intervention delivery:** Principal investigator.	Inferential statistics; simple ANOVA for each of the primary outcomes.	**Attrition:** 80.8%; 21 of 26 completed.	
First author and year: López-Jornet 2012 **Study Design :** RCT **Quality score:** ++ **External validity score:** +	**Aim of study:** To determine the effects of 0.2% alcohol-free chlorhexidine mouthrinse applied twice a day during 30 days in patients over 65 years of age **Setting:** Spain. Single care home. **Participants:** 70. Mean age 75 (range 65-94). 57% female. **Inclusion:** Removable dentures, with no manifestation of oral candidiasis and at least six remaining teeth. No adhesive use, in good general health. >65 years old. **Exclusion:** Smokers, hypesensitivity or	**Method of allocation:** Randomisation **Intervention(s):** Instruction (to residents) on correct oral and denture hygiene, with the supply of a whitening rinse (alcohol-free 0.2% chlorhexidine mouthrinse) and toothbrush with 0.05% fluoridated toothpaste and instruction sheet. 10ml 30 sec rinse after breakfast and after dinner. No water rinse for 30 min after application. **Control:** As above but placebo rather than chlorhexidine mouthrinse. **Sample sizes:** I: 35 C: 35 **Baseline comparisons:**	**Primary outcomes:** **Plaque index (Silness and Löe), gingival index (Lőe and Silness),** possible adverse effects of chlorhexidine Also colony-forming units of Candida albicans **Secondary outcomes:** **Follow-up periods:** One week whitening phase, then 30 days follow up. **Method of analysis:** Kruskal-Wallis for continuous variables (baseline to final evaluation), Wilcoxon for paired samples, chi-squared for categorical variables.	**Primary:** Improvements in both groups to plaque index - I: 1.17±0.84 to 0.83±0.84 (p=0.0045); C: 1.21±0.96 to 1.06±0.85 (p=0.0366). Improvements in both groups to gingivial index- I: 1.51±0.98 to 1.15±0.85 (p=0.0086); C: 1.33±0.69 to 0.75±0.83 (p=0.0002). Authors noted that adverse effects included staining of teeth/dentures and tongue (p=0.000 for each at 30 days) but no resident showed mucosal desquamation or alterations in taste sensation. This was not backed up in Table 4 of the paper which suggested that, at 30 days, tongue staining was present in 31.4% of intervention and 22.9% of placebo patients and dental/denture staining was present in 5.7% of intervention and 8.6% of placebo patients.	**Limitations (author):** Short study duration. **Limitations (review team):** Short term and no power calculation but well conducted study. Single care home only and quite a few exclusion criteria. **Evidence gaps:** Larger studies required. **Funding sources:** Not reported **Conflicts of interest:** Not reported **Applicable to UK?** Yes

	allergy to study medication, oral mucosal disease or antibiotic treatment in the mouth in the month prior to study start. **Water fluoridation?:** Not reported	No significant differences **Study power:** **Intervention delivery:** Academic. Examinations by experienced dental examiner.		Also reductions in C.albicans. **Secondary:** **Attrition:** 0%	
First author and year: MacEntee 2007 **Study Design :** cRCT **Quality score:** ++ **External validity score:** ++	**Aim of study:** To assess the effect of pyramidal educational intervention on clinical and psychosocial outcomes of residents in intermediate care in LTC facilities **Setting:** Vancouver Canada, LTC facilities **Participants:** 14 facilities, 127 participants **Inclusion:** First 14 facilities that responded **Exclusion:** - **Water fluoridation:** Not reported	**Method of allocation:** Block randomisation conducted by an independent individual. **Intervention(s):** A Nurse from each facility received training on appearance and management of oral diseases in elderly using photographs and texts. Additional guidance offered to nurses if needed. Care aides received similar training and also training on mouth examination and cleaning. Care aides had access to nurses during the trial. Estimated training time (RC): 1 hour **Control:** Usual care**.** A 1-hour seminar delivered directly by a dental hygienist with no additional follow up. **Sample sizes:**	**Primary outcomes:** Geriatric simplified debris index (derived from the Simplified Debris Index and the Simplified Oral Hygiene Index) and Gingival bleeding index, **Secondary outcomes:** BMI, Malnutrition Indicator Score, Eichner Index, and the number of fractured teeth and roots of teeth visible on the surface of the residual ridge **Follow-up periods:** 3 months **Method of analysis:** Odds ratio, Mean difference, 95% CI, p-values	**Primary:** All outcomes were non-significant at 3 months. No clinically meaningful effect of the Intervention was seen on the oral health and nutritional status of the residents. Odds ratio (95% CI) was 0.8 (0.2, 3.8; p=0.41) for Simplified Debris Index and mean difference (95% CI) was -0.2 (-0.73, 7.0; p=0.48) for Gingival Bleeding Index Score. **Secondary:** No significant findings. **Attrition:** Care Aides attending seminars: I: 15% C: 22% Residents at three months I: 13.6% C: 8.8%	**Limitations (author):** Study did not meet the required number of participants from the power calculation. Hawthorne effect due to disruption of social environment of the facilities. There was a possibility of selection bias. Few care aides attended the seminar. **Limitations (review team):** Possibility of contamination as facilities where in the same region. Nurses and care aides did not make use of additional information, therefore difficult to see the difference between programs offered to the 2 groups. *Very low* attendance rate of care aides at seminar.

		I: 7 Facilities, 59 residents, 63 care aides C: 7 Facilities, 68 residents, 85 care aides **Baseline comparisons:** No significant differences at baseline between groups **Study power:** 80% power at 0.05 significance indicated 14 facilities were needed with 114 residents **Intervention delivery:** A nurse trained by a dental hygienist delivered intervention to care aides.			**Evidence gaps:** Exploration of organisational structures and labour relations between administrators, nurses and care aides before creating effective educational environments for oral health improvement **Funding sources:** BC Medical Services Foundation Grant no. BCM00-0106 **Conflicts of interest:** None reported **Applicable to UK?** Yes
First author and year: Mac Giolla Phadraig 2013, 2014 **Study Design :** cRCT **Quality score:** ++	**Aim of study:** To demonstrate the effect of oral health education on knowledge, Behaviour, Attitude and self-efficacy of care staff in residential units for intellectually disabled adults. **Setting:** Dublin Ireland, residential units	**Method of allocation:** Stratification into high (nursing led) and low (social led) dependency units, division of units into 2 groups using purposive selection to include staff from each stratum. Random allocation to I and C group but the method was not described. **Intervention(s):** Oral health education program	**Primary outcomes:** Knowledge (K), behaviour, attitude and self-efficacy (BAS) scores. [Paper submitted December 2014: *Modified Gingival Index, Plaque Index [possibly Lőe/Silness but unspecified]* **Secondary outcomes:**	**Primary:** Paired t-test showed a statistically significant increase in K index and BAS scale scores in the intervention group only. The independent t-test showed a significantly higher K index score for the intervention group than the control group, but no difference in BAS scale scores at post-test.	**Limitations (author):** The possibility of Hawthorne effect in the control group. Uncontrolled confounders could have affected the result. The attrition rate of 29.7% could affect generalizability of results. Almost a quarter of respondents did not receive training. There is a

External validity score: +	**Participants:** 50 residential units, 219 participants, Degree or higher 61%, Diploma/certificate or lower: 39% Data for 76 of 155 residents were also collected. **Inclusion:** Residential units from a large ID Service provider **Exclusion:** Those involved in pilot study **Water fluoridation?** Not reported	provided to service managers or their representative, with practical sessions. Training included sessions on description of oral disease and its prevention, toothbrushing techniques, management of residents during oral hygiene care and dietary advice. Estimated training time (RC): 9 hours **Control:** No training for care staff in control group. **Sample sizes:** I : 18 Units (101 participants) C : 21 Units (118 participants) **Baseline comparisons:** No significant differences at baseline **Study power:** 96.4% for knowledge index and 95.4% for BAS scale with a sample size of 154 **Intervention delivery:** Dental care professionals: a dentist, a dental hygienist and 3 oral health promoters. Trainees given a training pack, which was used to train their peers.	**Follow-up periods:** Ave. 9.5 months from the time 1st questionnaire was sent. **Method of analysis:** Independent and paired sample t-test and Pearson's goodness of fit	K values (SD) changed from 7.23 (1.34) to 7.86 (1.27) for intervention and 7.02 (1.38) to 7.21 (1.32) for control (independent samples t –test p=0.002). BAS values (SD) changed from 4.73 (1.32) to 5.42 (1.51) for intervention and 4.73 (1.36) ti 4,91 (1.55) for control (independent samples t-test p=0.040) Data from residents (paper submitted) identified reductions in Modified Gingival Index and Plaque Index of 10.5% and 8.5% respectively but this was not statistically significant when controlling for baseline covariates. **Secondary:** **Attrition:** 29.7% care givers 79/155 residents = 51%	possibility of social acceptability bias. **Limitations (review team):** Method of randomisation unclear, possibility of contamination amongst care staff, response rate was low, no ITT analysis. **Evidence gaps:** Further research needed to find out if training improves oral health **Funding sources:** ID service provider and public dental service split the cost of training tools **Conflicts of interest:** None reported **Applicable to UK?** Yes

First author and year: McKeown 2014 **Study Design :** UBA **Quality score:** + **External validity score:** +	**Aim of study:** Improvement of oral care knowledge and skills of staff using evidence-based practice guideline developed by Registered Nurses' Association of Ontario (RNAO) **Setting:** Ontario Canada, LTC home **Participants:** 42 residents from 2 units **Inclusion:** Residents who gave verbal consent **Exclusion:** - **Water fluoridation?:** Not reported	**Method of allocation:** NA **Intervention(s):** Viewing of RNAO's oral care video, photos of case examples, demonstration and practice of oral care techniques. Oral care pocket docket given to all participants. Estimated time: 45 minutes session offered 14 times **Control:** NA **Sample sizes:** 42 **Baseline comparisons:** NA **Study power:** Not reported **Intervention delivery:** Best practice coordinator and registered dental hygienist	**Primary outcomes:** RAI-MDS oral/dental assessment instrument (debris index included), Daily flow sheet documentation **Secondary outcomes:** **Follow-up periods:** 6 months and 1 year **Method of analysis:** Percentages	**Primary:** Oral assessment of debris prevalence *reduced* by 4% post intervention and 8% at 1-year follow up compared to baseline but significance of finding not stated. Prevalence of inflammation ***increased*** by 4% at post intervention and 8% at 1-year follow up, significance of result not stated. There were discrepancies in results from the RAI-MDS data and the Daily flow sheet documentation. **Secondary:** **Attrition:** 9.5% loss to follow-up [4/42]	**Limitations (author):** High staff turnover, only 49% of staff attended the education sessions. Daily flow sheet entries were used in the completion of RAI-MDS resulting in discrepancies in results and underreporting of conditions. **Limitations (review team):** method of selection of LTC home or residents not clearly stated, and single home selected **Evidence gaps:** A better oral health assessment tool is needed. Use of registered oral care professionals in assessment and documentation of residents' oral/dental status **Funding sources:** Government of Ontario **Conflicts of interest:** Not reported **Applicable to UK?**

					yes
First author and year: Mojon 1998 **Study Design :** CBA **Quality score:** + **External validity score:** +	**Aim of study:** To evaluate clinically and microbiologically the effects of a preventive oral health program in a long-term care facility **Setting:** Switzerland, Geneva. Long-term care facility (majority with disabilities) **Participants:** 116. I: 67% and C: 69% female. Mean age I: 83.5 (SD 7.2) and C: 84.6 (7.2). Complete functional dependence I: 62% and C: 53%. **Inclusion:** >65 years. At least two natural teeth at baseline. **Exclusion:** Unable to give consent. **Water fluoridation?:** Not reported	**Method of allocation:** Two groups of approximately equal size assigned to intervention or control by random selection. **Intervention(s):** 45 minute interactive lecture by dental hygienist, then prophylactic treatment of residents. Instruction to care staff. Provision of toothbrush and fluoridated toothpaste. **Control:** Usual care **Sample sizes:** I: 58 C: 58 **Baseline comparisons:** Similar. More complete functional dependence in the intervention group (62% vs 53%) **Study power:** Not reported **Intervention delivery:** Dental hygienist. Dentists carried out assessments.	**Primary outcomes:** Plaque index (Silness and Löe), caries (WHO) Also microbiological analysis **Secondary outcomes:** **Follow-up periods:** 18 months **Method of analysis:** Chi squared and t tests for means with normal distributions, Mann-Whitney otherwise. Wilcoxon signed rank for bacterial load over time.	**Primary:** No significant differences in plaque. Increase in median score of 0.25 in the control group vs 0.06 in the experimental group (p= 0.26 and 0.95 respectively). Authors reported that root caries prevalence reduced significantly in the experimental group (p=0.01). Also colony forming unit counts of mutans streptococci. **Secondary:** **Attrition:** 37/116 = 31.9%	**Limitations (author):** Chlorhexidine use was planned but nurses could not administer because of time constraints. **Limitations (review team):** Not truly randomised, blinding not possible. **Evidence gaps:** Find simpler means of administering antibacterial agents. Evaluate further the effects of reducing microbial counts and develop a more appropriate dental hygiene score for residents of LTC facilities. **Funding sources:** Swiss National Foundation for Research and suppliers of oral care products **Conflicts of interest:** Not reported **Applicable to UK?** Yes

First author and year: Munoz 2009 **Study Design :** UBA **Quality score:** - **External validity score:** -	**Aim of study:** To assess the impact of an oral health education on nurses' knowledge and residents' care practice in institutionalized elders **Setting:** New Jersey USA, skilled nursing facility (SNF) **Participants:** 9 nurses in 1 SNF, 176 participant records **Inclusion:** Patients older than 65years with nursing oral health assessment (NA), and Minimum Data Set assessment (MDS) assessment in their medical records. Licensed nurses responsible for completing the NA and the MDS assessments in **Exclusion:** Residents with multiple admissions, readmissions, and those whose records were unavailable for data abstraction.	**Method of allocation:** NA **Intervention(s):** Lectures, discussions, viewing of CD on adult's oral health assessment and practical sessions. Review of policies, regulations and components of the nursing and MDS assessments. Estimated time: Two 1-hour sessions **Control:** NA **Sample sizes:** 9 Nurses, 176 participant records **Baseline comparisons:** NA **Study power:** Not reported **Intervention delivery:** Dieticians	**Primary outcomes:** Knowledge change, completeness of the Nursing Assessment (NA), congruency between the NA and the Minimum Data Set (MDS), completion of Resident Assessment Protocol (RAP) summary and completion of all variables. **Secondary outcomes:** **Follow-up periods:** 2 months after intervention **Method of analysis:** Frequency distribution and paired t-test	**Primary:** Non-significant improvement in nurses' knowledge after the education. The mean scores out of 15 (SD) were 11.33 (1.5) pre-test and 11.78 (1.02) post-test. No significant difference in completion of RAP. Significant improvement in congruency between the NA and MDS. A higher percentage of NAs were completed. Variables completion also improved significantly. **Secondary:** **Attrition:** 54.5% of records were not checked after intervention	**Limitations (author):** Study was underpowered, use of only 1 SNF, NA and MDS assessment may have been completed by different nurses on the same patient. No previous validation of intervention. **Limitations (review team):** Not stated how single SNF was selected, short follow-up time, 54.5% of records checked pre-intervention not assessed post-intervention **Evidence gaps:** Larger cohort of nurses and SNFs needed in future research. Prospective study needed to determine accuracy of NA and nurses' skill level. **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** yes

	Water fluoridation?: Not reported				
First author and year: Nicol, 2005 **Study Design :** Pre- and post-intervention **Quality score:** - **External validity score:** +	**Aim of study:** Evaluate the effect of a staff training programme on mouth care on the oral health of elderly residents of long-term care institutions. **Setting:** Three nursing homes and two long-stay hospitals in Scotland. Both nursing homes and the long-stay wards were fully staffed with qualified nursing staff and untrained auxiliary staff. **Participants:** 78(81% female); 35 to 99 years; Residents in one of five elderly long-term care facilities; Scotland, UK **Inclusion:** Full time residents of the care facility; cooperative; able to give informed consent. **Exclusion:** Unwilling to participate; unable to give informed consent.	**Method of allocation:** Non-randomised study. **Intervention(s):** The educational intervention was based upon a resource pack entitled 'Making Sense of the Mouth', containing a videotape, CD-ROM and full colour pocket book. The resource pack was provided free to each of the establishments as part of the training programme. The training sessions were undertaken for groups of six and lasted approximately 90 min. An introductory 30-min lecture illustrating the mouth in health and disease was followed by discussion of seven protocols on basic mouth care procedures, including a sample admission sheet and care plan. Course participants were given practical demonstrations in tooth brushing and denture care and a variety of oral hygiene aids were discussed and demonstrated. **Control:** *Training* at 9-months post-baseline assessment.	**Primary outcomes:** The outcomes were measured by examining changes in the oral health of residents under their care, over a period of 18 months A dental examination recorded the number of teeth present, the debris index and the number of decayed teeth. **Secondary outcomes:** . **Follow-up periods:** Group I/II: 3-, 9- and 18-months post initial baseline assessment. Control group received education at 9 months **Method of analysis:** Data were double entered into a Microsoft Access-database and analysed using Minitab. Primary analysis of categorical data was carried	**Primary:** Oral mucosal disease and oral dryness were common at baseline. *Mucosal disease:* There were significant reductions in prevalence in both groups at 18-months post-intervention (C: P=0.131; I: P=0.012). *Clinical assessment of dry mouth:* There was little change in the prevalence of oral dryness throughout the study in either group (C: 39%, 30%, 29%; I: 27%, 21%, 23%, for 3-, 9- and 18-month assessments respectively). *Angular cheilitis:* There was a significant reduction in prevalence over the 18-month period (C: P=0.219; I: P= 0.039). *Denture hygiene:* A significantly greater proportion of intervention patients at both 3 and 18 months (i.e. post-training) had good denture hygiene compared with baseline, using McNemar's test (P=0.006 and P < 0.001 respectively). For C, a significantly greater	**Limitations (author):** There is a need to consider the longer-term format of training programmes for care staff and the value of regular refresher courses. Cost of such resources would need to be considered. **Limitations (review team):** Small sample sizes. Concern about lack of blinding (reassessments were blinded to earlier assessments but it looks as if study personnel were not blinded to allocation). No adjustments for baseline differences. Essentially no precision information (eg SD) for individual measures; p values for group differences are provided but not relevant since the precision of each set of measures is unknown. **Evidence gaps:** .

	Water fluoridation?: Not reported	**Sample sizes:** *I:* 39 patients in a long-stay hospital ward and one nursing home. *C:* 39 patients in a long-stay hospital ward and two nursing homes **Baseline comparisons:** Some differences and no adjustments made. In C: 87% of residents had evidence of mucosal disease at baseline compared with 79% in I. 36% of residents in C and 28% of residents in I had angular cheilitis at baseline. **Study power:** Not reported. **Intervention delivery:** The principal applicant (R.N.), who is a qualified dentist, conducted the training programme with the assistance of a dental hygienist. Care staff in group II received training immediately after the baseline oral assessment. Care staff in group I received the training immediately after the 9-month assessment.	out using descriptive statistics and cross tabulation. Significant associations between key factors were analysed using the Fisher's exact test and McNemar's test was used to determine whether there was a significant change across time with regard to the selected factors, for each group separately.	proportion of patients had good denture hygiene at 18 months compared with 9 months by McNemar's test (P =0.002). *Denture stomatitis:* A significantly smaller proportion of I patients had denture stomatitis present at both 3 and 18 months compared with baseline, P= 0.016 and P=0.039 respectively. **Secondary:** At baseline, 82% of the residents in group I undertook their own oral hygiene (18-months post-intervention = 32%), compared with 77% of group II (18-month post-intervention = 52%). Demonstrating an increased involvement of care staff in the provision of oral hygiene measures for the residents. At baseline, 20% of the residents in group I and 44% of residents in group II had no daily oral hygiene procedures performed. After staff training this dropped in group II to 10% (18 months) and in group I to 0% (18 months), compared with 18% at 9 months. **Attrition:** 86% at 3-months post-intervention	**Funding sources:** Not reported. **Conflicts of interest:** Not reported. **Applicable to UK?** Yes, UK setting

				and 79% at 9-months. Drop outs were mostly a consequence of mortality.	
First author and year: Paulsson 1998, **2001** **Study Design :** UBA **Quality score:** + **External validity score:** ++	**Aim of study:** To investigate the recall of oral health knowledge concerning attitudes to and knowledge about oral health among nursing personnel in special housing facilities for the elderly and confidence by nursing personnel in special housing facilities for the elderly, three years after an education programme **Setting:** South-western Sweden **Participants:** 'Nursing personnel' working in special housing facilities for the elderly. Participants included registered and enrolled nurses, nursing assistants and home care aides. 55% high level of education, 36% low level of education. **Inclusion:** All nursing personal working in	**Method of allocation:** n/a **Intervention(s):** Oral health education programme consisting of four one-hour lessons, delivered to groups not exceeding 30 persons. Programme designed to influence nursing personnel's attitudes towards oral hygiene. **Control:** n/a **Sample sizes:** 132 institutions 2901 individuals (nursing personnel) **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Dental hygienists provided instruction as part of the oral health education programme.	**Primary outcomes:** Participant attitudes - nurses-self rating of ability to perform oral hygiene procedures. **Secondary outcomes:** n/a **Follow-up periods:** Recall study taking place 3 years after intervention. **Method of analysis:** Frequency tables and cross tabulations (SPSS). Mann-Whitney U-test for statistical significance. P-value of <0.05 considered significant.	**Primary:** The nurses' *perceived* ability, opportunity and knowledge of oral health were significantly better than in the former group ($p<0.01$). **Secondary:** n/a **Attrition:** 33.5% (1,930 questionnaires returned)	**Limitations (author):** Possible confounders (transfer of knowledge between participants). Delivery of intervention to smaller groups impractical. **Limitations (review team):** **Evidence gaps:** Need for educational interventions for nurses and carers with low level of education. Comparison between oral health status of older people in special housing facilities and in own homes would be beneficial. **Funding sources:** County Council of Halland, Sweden and Faculty of Medicine, Lund University. **Conflicts of interest:** None reported.

	institutions. **Exclusion:** 9% of participants reported no occupational category and were excluded from analysis. **Water fluoridation?:** Not reported				**Applicable to UK?** Yes
First author and year: Peltola, 2007 **Study Design :** Cluster RCT **Quality score:** - **External validity score:** **+**	**Aim of study:** The effects of interventions on the oral cleanliness of the long-term hospitalised elderly. **Setting:** A large unit for the chronically-ill elderly, at the Laakso Hospital, Helsinki, Finland. **Participants:** Baseline oral examinations involved 260 subjects. 205 were enrolled. 130 completed; 76% Female; Mean age = 83.4. **Inclusion:** Only those with teeth or removable denture(s) or both. **Exclusion:** Not reported.	**Method of allocation:** Cluster randomisation; After baseline oral examinations, the 10 patient wards were divided into three groups (A, B and C) and the type of intervention for each group was randomly assigned. **Intervention(s):** ***Group A*** (three wards): A dental hygienist or two dental hygiene students provided oral hygiene measures for the subjects (tri-weekly). Teeth were brushed using a Braun Oral-B D15.511 electric toothbrush, with Braun Oral-B EB brush tips and Salutem toothpaste. The interdental spaces were cleaned with Oral-B Mini Interdenta brushes. Removable dentures were cleaned and brushed with a denture brush and Corsodyl1% gel. ***Group B*** (three wards): After the nurses had completed the	**Primary outcomes:** Dental hygiene was determined by means of a modified Visible Plaque Index (Silness and Loe) *Clinical Oral Examination:* Assessment of the number of functioning teeth, edentulousness, and the hygiene of dentures and teeth. Denture Hygiene: Examining the mucosal surface of the upper of lower denture scoring as: Good: surface against the mucosa was clean or almost clean Moderate: dental plaque, calculus or food remnants covered no more than one-	**Primary:** The best outcome concerning a subject's oral cleanliness occurred in those wards where the nursing staff maintained oral hygiene. *Denture Hygiene:* Those subjects with good denture hygiene increased in all groups (p =0.02), but the change was most prominent in group B (from 11% to 56%). By subjects denture hygiene improved in 35% of those in group A, 56% of those in group B and 27% of group C participants. *Dental Hygiene:* Improvement in overall dental hygiene only occurred in group B, where the proportion of subjects with poor overall dental hygiene decreased from 80% to 48% (p= 0.02). Little or no change occurred in wards where dental hygienists provided oral hygiene measures once every 3 weeks.	**Limitations (author):** Detailed cost-analyses could not be performed for comparisons among the groups. **Limitations (review team):** No power calculation, high dropout rate 63.4%. Very limited information on statistical methods. Baseline differences and unclear if these were adjusted for. **Evidence gaps:** . **Funding sources:** Finnish Dental Association Apollonia and Helsinki City Health Department.

		intervention training they proceeded to conduct the following protocol; tooth brushing every day with an electric toothbrush and toothpaste, and cleaning of interdental spaces twice per week, in a similar way as in group A. Dentures were rinsed after every meal, cleaned with soap and water every evening, and brushed with Corsodyl 1% gel once a week. Time unstated (est RC 1h). A dental hygienist visited each ward every 3 weeks during the 11-month intervention period to provide additional instructions on problems raised by the nursing staff. **Control:** ***Group C*** (four wards) served as a control; received neither intervention nor scheduled dental hygienist visits. **Sample sizes:** *Group A*: 72 (completed = 50); *Group B*: 67 (completed = 41); *Group C*: 66 (completed 39). **Baseline comparisons:** Significant differences (≤0.01) in mean age and need for continuous care **Study power:**	third of the surface Poor: dental plaque, calculus or food remnants covered more than one-third of the surface. *Dental Hygiene:* Dental hygiene was determined by means of a modified Visible Plaque Index16 and evaluated on buccal surfaces of the teeth in the upper molar (UM), upper premolar (UPM), upper or lower incisor (I), lower molar (LM) and lower premolar (LPM) regions. **Secondary outcomes:** - **Follow-up periods:** 11 months **Method of analysis:** Statistical evaluation included chi-squared test for differences in frequencies, t-test and ANOVA for the comparison of means in various subgroups.	**Secondary:** - **Attrition:** 130 of 205 completed; drop outs due to subject mortality. 51.2%	**Conflicts of interest:** Not reported. **Applicable to UK?** Undecided; Finland maybe comparable to the UK.

		Not reported. **Intervention delivery:** ***Group A***: A dental hygienist/ two dental hygiene students under supervision visited wards for 4hours at 3-week intervals during the 11-month intervention period. ***Group B***: An experienced dental hygienist trained the nursing staff. After training, the nursing staff assumed responsibility for subjects' oral hygiene. ***Group C:*** N/A.			
First author and year: Poisson 2014 **Study Design :** UBA **Quality score:** - **External validity score:** +	**Aim of study:** **Setting:** France Acquitaine, Nursing homes **Participants:** 138 homes **Inclusion:** Nursing home in the Acquitaine region of France **Exclusion:** **Water fluoridation?:** Not reported	**Method of allocation:** **Intervention(s):** Comprehensive nutrition programme for a range of staff - *Nutrition, Alimentation, et Hygiène BUCCO-Dentaire* (NABUCCOD). Two training days separated by 6-8 months [est RC 8 hours]. No information on oral health component. **Control:** N/A **Sample sizes:** 150 homes at baseline **Baseline comparisons:**	**Primary outcomes:** Assessment policies **Secondary outcomes:** **Follow-up periods:** 6 months after first training session but 0 months after second training session, asking about the previous 6 months activity. **Method of analysis:** Student's t-test, chi squared.	**Primary:** Following training there was an increase in assessment of newly admitted residents of any oral examination from 38.5% to 48.5% (p=0.01)and oral hygiene checking from 27.6% to 40.7% (p=0.0004) For residents present for more than six months outcomes for any oral examination increased from 39.8% to 46.2% (p=0.103) and oral hygiene checking from 32.3% to 42.7% (p=0.006) **Secondary:** **Attrition:** 12/150 homes declined to be	**Limitations (author):** Low participation. Not possible to blind. **Limitations (review team):** Self-reported outcomes. High attrition. Effectively no follow up after second training session. **Evidence gaps:** **Funding sources:** The Health Authority of Acquitaine, Agricultural Social Security (FNPEISA), SANOFI-AVENTIS, GABA Laboratories

		N/A **Study power:** Not reported **Intervention delivery:** Academic		involved at outset = 8% 42 NHs performed both assessments with regard to newly admitted patients = 72% attrition 34 NHs performed both assessments with regard to newly admitted patients = 77% attrition	**Conflicts of interest:** No conflicts of interest **Applicable to UK?** Yes
First author and year: Pronych 2010 **Study Design :** UBA **Quality score:** - **External validity score:** +	**Aim of study:** To test a curricular and systems approach to improving the oral health of nursing home residents. **Setting:** USA, New Hampshire. **Participants:** 3 nursing homes, one rural, two urban settings. 46 residents in all. **Inclusion:** Nursing homes that agreed to participate, sufficient facility size. **Exclusion:** n/a **Water fluoridation?:**	**Method of allocation:** Three different sized sites whose administrators were willing to be involved. **Intervention(s):** One hour training session (with pre-post testing) followed by job shadowing by trainer to offer advice and demonstrations. Nursing assistants trained in mouth care. Oral health coordinator (OHC) once trained became a trainer with responsibility for educating new staff. **Control:** N/A **Sample sizes:** 46 **Baseline comparisons:** N/A	**Primary outcomes:** Oral hygiene (Debris Index – Simplified DI-S) **Secondary outcomes:** **Follow-up periods:** 2,6,12 months **Method of analysis:** Paired t tests	**Primary:** Overall there was a statistically significant reduction in DI-S score across all sites at 12 months with a mean score change from 2.285 to 2.272 ($p<0.05$). Overall, scores varied across time at baseline, 2, 6 and 12 months. Mean scores were: Small site (n=4) 2.08, 2.12, 2.17, 1.68 Medium site (n=9) 2.46, 2.00, 2.10, 1.76 Large site (n=22) 2.26, 2.00, 2.10, 2.24 The authors concluded that strong accountability for the OHC needed to be in place. **Secondary:** **Attrition:** 179/225 = 79.6%	**Limitations (author):** Much smaller sample sizes than planned and complications from need for staged implementation of intervention resulted in changes along the way. The major changes applied to the larger site which resulted in the smallest effect. **Limitations (review team):** UBA so prone to confounding. Unclear if the three selected homes are representative and nearly 80% attrition by residents; sample may not be generalisable. There was no mean difference change at 12 months in the large site and small sample sizes in the other two sites.

	Not reported	**Study power:** Not reported **Intervention delivery:** Training by academics? Creation of Oral Health Coordinator (OHC), an existing staff member (registered nurse or nursing assistant) in each home. Oral health assessments by dentists.			**Evidence gaps:** **Funding sources:** Endowment for Health of Concord, New Hampshire. Northest Delta Dental, American Dental Hygiene Association Rosie Wall Community Spirit Award. **Conflicts of interest:** **Not reported** **Applicable to UK?** Yes
First author and year: Pyle 1998 **Study Design :** CBA **Quality score:** - **External validity score:** +	**Aim of study:** To determine if a program of training for nursing assistants in combination with adjunctive aids to oral care could improve resident oral health indicators **Setting:** USA Long-term care facility – two divisions. **Participants:** 24 residents, 68% female, 48% white. Average number of medical diagnoses 5.4, 73% with significant mental impairments, and 72.7%	**Method of allocation:** Not reported **Intervention(s):** Six weekly one-hour intensive training sessions for (12) nursing assistants on oral anatomy, diseases and hygiene techniques including hands-on demonstrations. Resident use of sensonic toothbrush. Assessment of nursing assistant attitudes to oral health care. **Control:** No participation in intensive training **Sample sizes:**	**Primary outcomes:** Plaque index (Silness and Löe), gingival index (Lőe and Silness) **Secondary outcomes:** **Follow-up periods:** 6, 12 weeks **Method of analysis:** No information provided	**Primary:** No effect size data were given but the authors reported a statistically significant reduction in plaque (p=0.039) and gingival index (p=0.17) in experimental versus control group residents at 3 months. **Secondary:** **Attrition:** 1/24 = 4.2%	**Limitations (author):** - **Limitations (review team):** No randomisation, no blinding, no analytical information or effect size data given other than p values **Evidence gaps:** To determine the relative contributions of training and use of adjunctive tools, such as sonic toothbrushes on oral health indices.

	dependent. Baseline slight-to-moderate plaque and mild-to-moderate gingival inflammation **Inclusion:** At least six teeth. **Exclusion:** Using oxygen or needing antibiotic therapy. Patients excluded if team unable to gain consent from legal guardians. **Water fluoridation?:** Not reported	I: 12 C: 12 (11 completed) **Baseline comparisons:** Not reported but dental hygiene levels were similar **Study power:** Not reported **Intervention delivery:** Academic delivery of training sessions			**Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** Yes
First author and year: Quagliarello 2009 **Study Design :** UBA **Quality score:** + **External validity score:** -	**Aim of study:** To identify a multicomponent intervention protocol that was feasible to administer, adhered to by staff, and effective in risk factor reduction **Setting:** New Haven Connecticut USA, Nursing home **Participants:** 2 nursing homes, 52 residents; Aged 86.0 ± 7.8; 90% women, 8% Hispanic and racial minorities.	**Method of allocation:** Residents were all randomised to different interventions **Intervention(s):** Educational session for nurses on purpose of study steps in performing individual protocols, questions and answers on practical implementation of protocol. Protocol included: oral hygiene interventions; Manual oral brushing plus chlorhexidine every morning, Manual oral brushing every morning plus chlorhexidine every morning and every evening, Manual oral brushing	**Primary outcomes:** Self-report of time spent on protocol, investigator determined adherence, dental consultant assessed oral hygiene **Secondary outcomes:** **Follow-up periods:** 3 month intervention **Method of analysis:** Means, medians, standard deviations, ranges, proportions, paired t-test and Fisher exact test	**Primary:** The mean reduction in plaque score was 1.45±0.52 ($p<0.001$) at the end of the 3 month intervention. Manual toothbrushing plus chlorhexidine twice per day was feasible. Protocol completed within 10 minutes was regarded as high feasibility and all OH intervention protocols had 100% feasibility. For the swallowing intervention only the manual oral brushing revealed 100% feasibility, upright feeding showed 95% feasibility. Staff demonstrated full adherence for more than 75% of assessments in	**Limitations (author):** Small sample size, 3 months duration of intervention was too short, CNAs not blinded when assessing cough during swallowing, specific bacteria within the plaque not determined. **Limitations (review team):** Not stated how the 2 homes were selected, 43.3% of eligible residents were selected and no reason given, no follow up; Small numbers in study.

	Inclusion: > 65 years, residents for swallowing difficulty should have cough during swallowing, those for impaired oral hygiene should have no documented dental examination for > 12 months or assessment by a nurse of poor oral hygiene **Exclusion:** < 4 weeks stay in home, on short-term rehabilitation, < 6 months estimated survival, tube fed or had tracheostomy, **Water fluoridation?:** Not reported	plus chlorhexidine every morning and every evening. Swallowing interventions: Upright feeding positioning with each meal Instruction in swallowing techniques with each meal Manual oral brushing every morning **Control:** No control **Sample sizes:** 52 **Baseline comparisons:** NA **Study power:** Not reported **Intervention delivery:** Geriatric nurse trained nursing staff and certified nursing assistants who then delivered intervention to residents		the OH and swallowing intervention, except for the swallowing technique that was 73%. **Secondary:** **Attrition:** 10% loss to follow up in participants assessed for oral hygiene	**Evidence gaps:** Testing of the intervention in vulnerable populations to determine effect on pneumonia **Funding sources:** National Institute on Aging (NIA) Grant R21-AG023020 and Claude D. Pepper Older Americans Independence Center Grant P30-AG21342; Dr. Juthani-Mehta was supported by NIA Grant T32-AG019134. **Conflicts of interest:** None **Applicable to UK?** Yes
First author and year: Samson 2009 **Study Design :** UBA	**Aim of study:** To assess the long-term effect of an oral healthcare programme aimed at improving and maintaining the oral hygiene of elderly residents in a nursing home	**Method of allocation:** **Intervention(s):** Motivation and oral care training of staff (4h training); picture-based oral-care procedure cards; distribution of oral-care equipment (electric	**Primary outcomes:** Mucosal-plaque score (MPS) index of cross sectional samples of patients at each time point **Secondary outcomes:**	**Primary:** The measure of acceptable MPS score changed from 36% at baseline to 70% after 6 years. The mean MPS scores for cross sectional samples were 5.4 (SD 1.4)	**Limitations (author):** No control group **Limitations (review team):** UBA so prone to confounding - measures may have improved over

Quality score: + **External validity score:** +	**Setting:** Norway, single nursing home **Participants:** 88; 84% female; **Inclusion:** Nursing home resident **Exclusion:** Edentate and without dentures **Water fluoridation?:** Not reported	toothbrush, toothpaste, flouride tablets; denture brush, soap, storage vessel; practical implementation of new routines on wards (oral health contact person with oversight and training role); regular dental hygienist monitoring every 6-18 months reported to ward administration. **Control:** N/A **Sample sizes:** 88 **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Academic assessment of outcomes but nursing home wide.	**Follow-up periods:** 3 months, 6 years **Method of analysis:** Two sample t-test, Pearson's rank correlation to compare plaque and mucosal scores. Interrater reliability tested with kappa.	at baseline, 3.9 (1.3) at 3 months and 4.0 (1.3) at 6 years. At 6 years, there were no statistically significant differences between men and women. MPS scores were slightly lower in residents with manifest versus uncertain dementia 3.8 (1.2) vs 4.3 (1.5) p=0.049. Dentate residents (n=67) had a higher mean MPS (4.3 [1.2]) than 21 edentate residents (3.0 [1.0]) p<0.001. There was a positive correlation between mucosal and plaque scores ($p < 0.001$). **Secondary:** **Attrition:** 12% at baseline (refusal or edentate/no dentures) 8% at 6 year follow up	the time period though authors claimed that results were better than the norm. Single site only. Sponsored by dental appliance company. **Evidence gaps:** **Funding sources:** Norwegian Foundation for Health and Rehabilitation **Conflicts of interest:** Braun and Jordan supplied dental appliances at reduced cost **Applicable to UK?** Yes
First author and year: Simons 2000 **Study Design :** CBA **Quality score:**	**Aim of study:** To evaluate carers' knowledge of oral health; to provide a high quality, consistent, oral health training programme for carers in residential homes; to evaluate the quality of this programme by examining both	**Method of allocation:** 10 homes offered training and 10 oral examination only; 7 homes accepted training and 11 accepted oral examination only. **Intervention(s):** 90 minute training session including	**Primary outcomes:** Plaque index (Silness and Lőe), gingival index (Lőe and Silness), Root caries index (RCI), Knowledge **Secondary outcomes:**	**Primary:** No significant differences between groups in any of the outcomes measured (no data provided for mean differences). There was a significant increase in coronal filled surfaces in both groups ($p<0.05$) but no changes in other	**Limitations (author):** Managers refused staff time for the more intensive training planned – thus only 90 mins training provided. High staff turnover – 46.2% had moved on at 12 months.

+ **External validity score:** +	carer's changes in knowledge, as reported by residents, and any changes in their oral health after one year. **Setting:** UK, West Hertfordshire. Residential/nursing homes. **Participants:** 20 homes. 213 residents. 39 carers in intervention group % Female. I: 70% C: 72% Mean age I: 82.9 ± 6.8 C: 83.8 ± 6.6 Years in home I:21.2 ± 19.6 C: 19.9 ± 21.1 Funded by social services I: 79% C: 73% **Inclusion:** Able and willing to consent to an oral evaluation and to respond to a structured questionnaire **Exclusion:** **Water fluoridation?:** Not reported	advice, practical demonstrations, hands on practice, video and introduction of basic oral health assessment and individual oral care plans for all residents. Training manual, box of samples & oral health aides, information leaflets and advice on where to buy at end of session. **Control:** Usual care **Sample sizes:** I: 7 homes (87 residents) C: 11 homes (126 residents) **Baseline comparisons:** No significant differences **Study power:** Not reported **Intervention delivery:** Dental therapists and hygienists delivered training. Senior dental officer conducted examinations.	**Follow-up periods:** 12 months **Method of analysis:** Chi squared for categorical data. Not clear for numeric: *'Appropriate parametric or non-parametric test'*	indices. Significant increases in knowledge gained pre-post training for 39 carers. Correct answers to seven questions at baseline ranged from 0-23% and post-training was 44-100%. This improved knowledge was not reflected in behaviour one week or 12 months post-training according to resident questionnaire responses. **Secondary:** **Attrition:** 0% implied	**Limitations (review team):** Allocation not truly randomised. Unclear if there was any attrition from baseline to follow up. **Evidence gaps:** To find a comprehensive programme that will change attitudes as well as providing skills and resources **Funding sources:** Not stated **Conflicts of interest:** Not stated **Applicable to UK?** Yes
First author and year: Simons 2001	**Aim of study:** To determine the effects of a medicated chewing gum on the	**Method of allocation:** Random number tables for homes, then all residents who met inclusion	**Primary outcomes:** Plaque index (Silness and Lőe), gingival index	**Primary:** Significant reductions in plaque index, gingival index, angular chelitis,	**Limitations (author):** **Limitations (review team):**

Also Simons 1999, 2002 **Study Design :** RCT **Quality score:** + **External validity score:** ++	oral health of frail older people **Setting:** UK 16 residential homes **Participants:** 111. 82% female; Aged 81.2±7.4 (male) and 84.6±7.8 (female); Time in residential home 21.2±22.7 months (male) 31.6±32.9 months (female) **Inclusion:** Dentate (with/without dentures). Aged 60+. Willing to take part and give formal consent. No antibiotic treatment in four weeks running up to trial. **Exclusion:** **Water fluoridation?:** Not reported	criteria **Intervention(s):** Chlorhexidine acetate/xylitol gum (ACHX) Two pellets for 15 mins twice daily for 12 months. Compliance closely monitored. **Control:** Xylitol gum (X) as above No gum (N) **Sample sizes:** I ACHX: 43 C X: 37 C N: 31 **Baseline comparisons:** Similar other than lactobacillus levels which were adjusted for **Study power:** 90% at 5% significance to detect a 50% increase in salivary flow **Intervention delivery:** Academic	(Lőe and Silness), denture stomatitis, angular cheilitis, denture debris Also salivary flow **Secondary outcomes:** Caries- associated microorganisms **Follow-up periods:** 3,6,9,12 months **Method of analysis:** Appropriate non parametric test. Mann-Whitney U test for unrelated variables, Wilcoxon's Signed Rank test for two related variables, and Friedman test for several related variables.	denture debris score and denture stomatitis were noted in both ACHX and X groups compared to the N group, and results for ACHX were significantly better than X. At 12 months Plaque index: ACHX 0.8±0.8 X 1.6±1.0, N 2.6±0.6 ($p<0.01$ for each pairing) Gingival index: ACHX 0.5±0.7, X 1.2±1.0, N 2.2±1.0 ($p<0.01$ for each pairing) Angular cheilitis: ACHX 7%, X 14%, N 32% ($p<0.01$ for each pairing) Upper fitting denture debris: ACHX mean 0.3 (95% CI 0.1-0.4), X 0.8 (0.4-1.1), N 2.2 (1.7-3.5) ($p<0.01$ for each pairing) Lower fitting denture debris: ACHX mean 0.2 (0.1-0.4), X 0.4 (0.2-0.6), N 1.5 (1.3-2.0) ($p<0.01$ for each pairing) Denture stomatitis: ACHX 4%, X 16%, N 39% ($p<0.01$ for each pairing) **Secondary:** Also data for caries- associated microorganisms **Attrition:** 53/164=32.3%	Lot of exclusions. Only 164 of 1,041 residents met inclusion criteria. Funding from gum manufacturer. No ITT analysis. **Evidence gaps:** These positive results for gum use do not appear to have been confirmed by further research. **Funding sources:** West Hertfordshire Community NHS Trust; Shirley Glasstone Hughes Prize Fund (British Dental Association); Fertin A/S **Conflicts of interest:** None stated **Applicable to UK?** Yes

First author and year: Sloane 2013 **Study Design :** UBA **Quality score:** + **External validity score:** ++	**Aim of study:** To develop and test a person-centered evidence-based mouth care program in nursing homes **Setting:** USA, North Carolina. Three nursing homes (dementia/disabilities) **Participants:** 97 (6 certified nursing assistants, CNAs) The average age of participating residents was 79; 75% were female, 33% had mild dementia, 52% had moderate to severe dementia, and 60% were totally dependent in mouth care at baseline. **Inclusion:** Residents of for-profit institutions which had significant proportions of residents receiving Medicaid and having dementia. **Exclusion:** Participants with oral health that needed urgent dental	**Method of allocation:** n/a **Intervention(s):** Training included seminars on oral pathology, dementia care, and individualized care planning plus skills training. Provided daily for 2 weeks then decreased in frequency to a few hours a week. For persons with some natural teeth, teeth were brushed with 0.12% chlorhexidine, gingival tissues were cleaned using chlorhexidine, cleaning between the teeth was performed using interdental brush dipped in chlorhexidine rinse; a small amount of 1.1% sodium fluoride paste was applied to tooth surfaces. For persons with partial or full dentures, food and denture paste were removed by brushing, gingival tissues were cleaned using chlorhexidine. **Control:** n/a **Sample sizes:** 97 residents in 3 homes **Baseline comparisons:**	**Primary outcomes:** Plaque Index for Long-Term Care (PI-LTC), Gingival Index for Long-Term Care (GI-LTC), Denture Plaque Index (DPI) **Secondary outcomes:** **Follow-up periods:** 8 week intervention; Follow up to 6 months at single site **Method of analysis:** Descriptive statistics, frequencies, means, and standard deviations were calculated. Adjusted for random effects on individual basis and for intervention dose.	**Primary:** Outcome scores across all sites at 8 weeks improved significantly for PI-LTC (2.5±0.5 to 1.7±0.8; $p < 0.001$) and GI-LTC (1.8±0.5 to 1.4±0.5; $p < 0.001$) and DPI (2.9±0.9 to 2.1±0.7; $p=0.04$). Scores for inflamed or bleeding gums did not change. For the single home with six months follow up (n=21 residents) the scores from baseline to six months were: LTC (2.4±0.5 to 1.5±0.7; $p < 0.001$) and GI-LTC (1.7±0.4 to 1.4±0.4; $p < 0.001$) and DPI (2.9±0.8 to 1.6±1.0; $p < 0.001$). The measure for inflamed or bleeding gums also changed significantly from 11±52 to 15±79; $p=0.007$). Coding of videotaped care episodes indicated that care was more thorough but took more time after training. Consistency of care appeared to be more important for natural teeth than dentures. **Secondary:** **Attrition:** 14.6%	**Limitations (author):** **Limitations (review team):** UBA so prone to confounding. **Evidence gaps:** **Funding sources:** Alzheimer's Association, FutureCare of North Carolina. **Conflicts of interest:** Authors declared no financial or personal conflicts of interest related to the content of this manuscript. **Applicable to UK?** Yes

	attention; history of an artificial heart valve, endocarditis, cardiac transplant, total joint replacement, or cardiac problem requiring prophylactic antibiotics. **Water fluoridation?:** Not reported	n/a **Study power:** Not reported **Intervention delivery:** Dental hygienists and geriatric psychologists provided training.			
First author and year: Stiefel 1995 **Study Design :** Randomized cross over trial **Quality score:** ++ **External validity score:** ++	**Aim of study:** To determine the effectiveness of chlorhexidine swabbing in special populations **Setting:** USA, Rehabilitation settings-Independent living, long-term care facilities, and supported employment **Participants :** 5 rehabilitation sites, 50 participants **Inclusion:** Participants ability to cope with study, presence of 10 or more teeth and no requirement for prophylactic antibiotics **Exclusion:** -	**Method of allocation:** Random assignment to groups but method not stated **Intervention(s):** Swabbing of chlorhexidine under various conditions: Trial I: CHX 5 times/week with(Group A) or without(Group B) prior dental prophylaxis; Trial II: CHX 5 times/week with(Group B) or without(Group A) prior dental prophylaxis Trial III: All had prophylaxis with CHX 2 times/week **Control:** Cross over trial **Sample sizes:** 25 in each group A and B **Baseline comparisons:** Some differences – no significance	**Primary outcomes:** Standard indices for plaque, calculus, gingivitis, pocket depth, DMFS (decayed, missing or filled teeth), and stain **Secondary outcomes:** **Follow-up periods:** 42-weeks from start of intervention and 6-weeks from the end of trial III **Method of analysis:** Mean, Wilcoxon signed-rank test, Wilcoxon rank sum test	**Primary:** End of trial results across all groups but completers only, showed a significant reduction in plaque score (from 1.83 to 1.28, p<0.001), calculus score (1.18 to 0.35, p<0.001), gingivitis score (2.07 to 1.10; p<0.001) and pocket depth (2.78 to 2.26 (p<0.001). There was no significant difference in DMFS. *Side effects*: Staining was a major problem for one subject (3%), a minor problem for 19% and no problem for 78%. Taste was a major problem for 11%, a minor problem for 22% and no problem for 67%. Gagging was a major problem for 11%, a minor problem for 3% and no problem for 86%. The overall rate of compliance was 94% and 77.8% of responding subjects/caregivers indicated a	**Limitations (author):** - **Limitations (review team):** Sample size was small, method of randomisation not mentioned **Evidence gaps:** - **Funding sources:** National Institute of Dental Research, grant #RR05346/DE09743. **Conflicts of interest:** Not reported **Applicable to UK?** Yes

	Water fluoridation?: Not reported	values – but cross over design. **Study power:** Not reported **Intervention delivery:** By participant or caretakers		willingness to continue the protocol beyond the end of the study. **Secondary:** **Attrition:** 16%	
First author and year: Stone 2013 **Study Design :** UBA **Quality score:** - **External validity score:** -	**Aim of study:** The effectiveness of xylitol chewing gum and Recaldent in improving oral health of residents by decreasing biofilm as well as caregivers' relationship with oral care in a LTC facility **Setting:** Rock County, Wisconsin USA, LTC facility **Participants:** 6 residents, 22 Certified Nursing Assistants CNAs. Mean age: 68-years, 33% female **Inclusion:** Residents' ability to execute intervention **Exclusion:** -	**Method of allocation:** NA **Intervention(s):** Training sessions for CNAs-where they were only encouraged to deliver oral care to the residents and told how to perform intervention. Participants: Use of Xylitol chewing gum in the morning and evening. Recaldent cream after midday meal and at night before sleeping **Control:** NA **Sample sizes:** 6 residents, 22 CNAs **Baseline comparisons:** NA **Study power:** Not reported	**Primary outcomes:** Change in participant biofilm (plaque) levels assessed using dye and photographs. CNAs attitude towards oral care **Secondary outcomes:** **Follow-up periods:** 6 and 12 weeks **Method of analysis:** Photographic illustration and frequency distribution	**Primary:** Decrease in biofilm (plaque) level on residents' teeth and positive change in attitudes of CNAs noted but no data provided. **Secondary:** **Attrition:** 68% of CNAs	**Limitations (author):** Limited resources, use of photographic evidence of biofilm reduction, **Limitations (review team):** No mention of questionnaire validity, more outcomes could have been included, measurement of outcome subjective. 1 LTC facility, no mention of how it was selected, small sample size, 68% of CNAs lost to follow up. **Evidence gaps:** Further study using laboratory assessment of biofilm levels, larger sample size in multiple sites. **Funding sources:**

	Water fluoridation?: Not reported	**Intervention delivery:** Researchers delivered training. CNAs and Residents			Xylitol products from Xiear Inc. Orem, UT, USA. MI Paste Plus was from GC America, Alsip, IL, USA. The 2Tone disclosing solution was donated by Young Dental, Earth City, MO, USA. **Conflicts of interest:** Not reported **Applicable to UK?** Yes
First author and year: Van der Putten 2013 Also van der Putten 2010 **Study Design :** cRCT **Quality score:** + **External validity score:** ++	**Aim of study:** To assess the effectiveness of a supervised implementation of the "Oral health care guideline for older people in long-term care institutions" (OGOLI) in the Netherlands [guideline unpublished] **Setting:** Netherlands. 12 care homes **Participants:** 343 **Inclusion:** Teeth and/or (removable) partial or complete dentures; physically suitable for examination; expected to be	**Method of allocation:** Stratified cluster sampling of homes within a 100-km radius in the centre of the Netherlands. Stratified random sample within wards. **Intervention(s):** Implementation of the OGOLI guideline, supervised by a dental hygienist. A study supervisor was appointed for each care home and each ward had a 'ward oral health care organizer (WOO)' Implementation included a 1.5h presentation, a 2h lecture and 3h practical education for the WOOs, a 1.5h practical session at ward level. Est time = 8h. **Control:**	**Primary outcomes:** Plaque on natural teeth (Silness and Löe Index) Oral hygiene of dentures (Augsbuger and Elahi) **Secondary outcomes:** **Follow-up periods:** 6 months **Method of analysis:** Chi squared for categorical, student's t test for continuous. Spearman's rank correlation for independent variables and plaque scores. Multilevel mixed model analysis (for clustered data). All adjusted for baseline	**Primary:** Dental plaque: Adjusted difference (95% CI) -0.43 (-0.09 to -0.77; p=0.013) Denture plaque: Adjusted difference (95% CI) -0.38 (-0.13 to -0.66; p=0.004) However, for the multilevel mixed-model analysis the intervention was statistically significant for denture plaque (p=0.007) but not dental plaque (p=0.38) **Secondary:** **Attrition:** I: 35% C: 30%	**Limitations (author):** Reliance on WOO to educate other staff so may not have been full implementation; Short time frame; High drop outs (though estimated that these were not significantly different from those remaining) **Limitations (review team):** No allocation concealment, may not have been adequately powered, no ITT. Mean **Evidence gaps:** Include costs and feasibility; Further RCTs

	resident in care home throughout 6 month period **Exclusion:** Day care attendees or short-term residency; in coma; terminally ill; verbally or physically resistant to the oral examination **Water fluoridation?:** Not stated	Usual care **Sample sizes:** I: 177 C: 166 **Baseline comparisons:** **Study power:** 80% power to detect a 25% reduction in plaque scores **Intervention delivery:** All care home staff with guideline implementation supervised by dental hygienist and managed by study superviser and WOOs.	values.		with sufficient follow up, frequent observation and intensive control of execution **Funding sources:** Numerous organisations in the Netherlands including the Open Ankh Foundation, the Opbouw Foundation, Birkhoven Care Estate. **Conflicts of interest:** None **Applicable to UK?** Yes, applicable country
First author and year: Wardh 2002 **Study Design :** CBA **Quality score:** - **External validity score:** +	**Aim of study:** To evaluate differences between the intervention and control group after an oral health care intervention **Setting:** Sweden, Nursing home **Participants:** 5 nursing home unit in the same district with the same ward director. I: Unit 1 -24 residents with mostly demented elderly; Unit 2 - 24 mostly stroke patients. 58.3 % agreed (N=28)	**Method of allocation:** I and C units were chosen to be as similar as possible in terms of demographic characteristics of residents and type of facility **Intervention(s):** Basic oral health care training (3 h) plus support from a specially trained oral care aide (4 days training) **Control:** Basic oral health care training (3 h) **Sample sizes:** I: 28 at baseline, 30 at follow up C:38 at baseline, 35 at follow up	**Primary outcomes:** Mucosal-Plaque Score (MPS) Also questionnaire data (see barriers & enablers review) **Secondary outcomes:** **Follow-up periods:** 18 months **Method of analysis:** Student's t-test and chi squared or Fisher's exact test.	**Primary:** The results indicated that no significant differences in the oral hygiene of residents were visible at follow-up compared to baseline. MPS values decreased for both intervention and control groups at 18 month follow up. MPS at baseline (±SD) = I: 3.4 (1.3); C:3.4 (1.6) MPS at 18 months (±SD) = I: 2.6 (0.7); C:2.8 (0.7) Authors reported that there was no difference in the results if replaced	**Limitations (author):** Management of intervention wards changed (to interim living arrangements) during intervention and lots of participant movement. Small study material (sic) and high dropout rate. **Limitations (review team):** Not randomised. Baseline differences. No blinding, no adjustment for potential confounders (eg degree of dependency). Some residents were added

	C: Unit 1 -12 demented elderly; Unit 2 – 12 demented elderly; Unit 3 – 24 residents with other diagnoses 79.2% agreed (N=38) I: mean age 79.9, 63% female C: mean age 79.7, 61% female No other SE information provided. Nursing personnel in intervention group received training (no details on numbers) **Inclusion:** Selected nursing units in the same district. No other detail. **Exclusion:** **Water fluoridation?:** Not reported	**Baseline comparisons:** Some differences in major issues, eg need for oral hygiene help (Table 2) **Study power:** Not reported **Intervention delivery:** Unclear. Possibly academic. MPS outcome assessment by dental hygienist		individuals were excluded. Also questionnaire data on coping beliefs **Secondary:** **Attrition:** Residents who dropped out during the intervention were replaced by other residents.	during the trial to both groups as participants dropped out (I:14 and C:21) **Evidence gaps:** **Funding sources:** Swedish Dental Association and Department of Health and Disease (Västmanland). **Conflicts of interest:** None reported **Applicable to UK?** Yes
First author and year: Wyatt, 2004 **Study Design :** RCT **Quality score:**	**Aim of study:** To assess, over 2 years, the clinical effectiveness of a daily mouthrinse with 15 ml of either 0.2% neutral NaF or 0.12% chlorhexidine gluconate (CHX) compared with a placebo (Pl) for reducing the net incidence	**Method of allocation:** Participants were assigned by a double-blind randomized block design. **Intervention(s):** Prescription of a daily mouthwash. A pharmacy delivered a supply of	**Primary outcomes:** The net incidence of caries in each group, calculated by measuring the surface-by-surface incremental change in the number of new coronal and root surface lesions over the three examination	**Primary:** The prevalence of caries increased in the CHX (73% to 85%) and Pl (75% to 81%) groups but decreased in the NaF group (85% to 61%). The incidence of caries on one or more coronal or root surface during the trial was significantly less in the	**Limitations (author):** 69% loss to follow-up. **Limitations (review team):** Some baseline differences, no allocation concealment, high drop out. No specific demographics

+ **External validity score:** **+**	of dental caries among institutionalized elders. **Setting:** Developed; 39 Long-term Care facilities in Vancouver, Canada. **Participants:** 369; mean age=83 years; 69% female. **Inclusion:** (i) natural teeth; (ii) at least a 3-year life expectancy; (iii) a tolerance for dental examinations, (iv) an ability to use a mouth rinse; (v) competence to give consent. **Exclusion:** Not reported. **Water fluoridation?:** Not reported	mouth rinse to each facility every month during the trial, and the nursing staff monitored and recorded the use of the mouth rinses. -**15 ml of a 0.12% CHX solution** [chlorhexidine gluconate 20% BP, 4% isopropyl alcohol, 0.04% peppermint essence, and distilled water] **-15 ml of a 0.2% NaF solution** (Fluorinse) **Control:** **- 15 ml of a Pl** (4% isopropyl alcohol, 0.04% peppermint essence, and distilled water). A random selection of 10 subjects was re-examined after 1 week to determine the examiner's repeatability of the tooth surface scores for coronal and root caries. **Sample sizes:** 116 Completers; 38 (33%) using NaF; 41 (35%) using CHX; and 37 (32%) using the Pl. **Baseline comparisons:** Some differences which were not adjusted for **Study power:** 80% but dropout rate high.	recordings. The Root Caries Index (RCI) Caries management for institutionalized elders indicated the distribution of caries relative to the number of root surfaces at risk to caries **Secondary outcomes:** - **Follow-up periods:** 12-months and 24-months. **Method of analysis:** Contingency table chi-square tests were used to compare groups with respect to categorical and dichotomous outcomes. T-tests were used to compare groups with respect to mean values or changes in mean values.	NaF group (15%) than in the CHX (50%) or Pl (35%) groups (x^2 = 15.44; d.f. =2; P < 0.001). The effect of the fluoride rinse was most pronounced in reversing and preventing caries on root surfaces. **Secondary:** - **Attrition:** 116; (31%) of the recruits completed the trial do to subject mortality and non-compliance (1:5).	provided. **Evidence gaps:** Further information is needed to determine the optimal concentration and frequency of NaF for a maximal dose effect. **Funding sources:** British Columbia Health Research Foundation Institutional Program Grant no. 212. **Conflicts of interest:** Not reported. **Applicable to UK?** Yes; Canada

		Intervention delivery: Research team with nursing staff monitored and recorded the use of the mouth rinses.			
First author and year: Zenthőfer 2013 **Study Design :** RCT **Quality score:** + **External validity score:** ++	**Aim of study:** To compare different interventions used to improve oral hygiene of elderly patients in long-term care facilities within a twelve-week follow-up period. **Setting:** Urban; 8 institutions for elderly in South-West Germany. **Participants:** 106; 80.8 years (SD 7.45), range 49-95; 78.4% Female; 32.4% edentulous; 87.3% some kind of denture **Inclusion:** Care level 1 criteria eligibility: A person must have a need for care for a minimum of 90 min per day, of which 45 min must be basic-care, for example, personal hygiene and nutrition. Or;	**Method of allocation:** Single blinded RCT. PI assigned group membership by lot and gave the information to the second study clinician. **Intervention(s):** Professional cleaning of teeth and dentures was performed for all intervention groups. Participants received a tooth brush and a denture brush, toothpaste, mouth rinse, and an information brochure on oral and denture hygiene. Caregiver staff had to complete a 2-h lesson, including a PowerPoint presentation, an oral hygiene film, and dental demonstration models. *Intervention group 1* (no re-motivation group); *Intervention group 2* (dentist Re-motivation group 4- and 8-weeks post baseline); Intervention group 3 (staff re-motivation group	**Primary outcomes:** Main target clinical data were mean plaque, gingival bleeding, and denture hygiene indices. **Secondary outcomes:** Long-term effect on primary outcomes at 36 months **Follow-up periods:** Follow-up on main target variables: 2-, 6- and 12-weeks post baseline. Plus final 36-month assessment. **Method of analysis:** For assessment of the difference between being in an intervention group and in a control group, mixed-model analysis for repeated measurements was performed for each main target variable. In addition, target clinical data were evaluated in long-term	**Primary:** *12-weeks:* The denture hygiene index was significantly lower ($p < 0.0001$) over time for all three therapy groups than for control when controlled for the other variables, by at least 12.7% (lower bound 95% CI of estimate in staff remotivation group). For plaque and gingival Bleeding, the hygiene index improved significantly for intervention groups over time compared with the control group ($p< 0.023$) but there were no significant between intervention group results. Detailed outcomes (vs control) were: *Denture hygiene* No remotivation -27.5 (95% CI -38.5, -16.5, $p<0.0001$) Dentist remotiv -23.2 (-33.7, -12.8, $p<0.0001$) Staff remotiv -23.3 (-33.9, -12.7, $p<0.0001$) *Plaque index*	**Limitations (author):** Restriction of the study population to participants needing moderate or no care. Only one aspect of oral health was investigated. The recall period of 12 weeks only. **Limitations (review team):** Lacking detailed randomisation information, small study (with no power calculations) and follow-up to 12 weeks only. **Evidence gaps:** No conclusions can be drawn for elderly people needing more intensive care. **Funding sources:** Alexander-Stift GmbH **Conflicts of interest:** Not reported

	Participants with no official care level that live in assisted accommodation in homes, with help from staff with everyday tasks. **Exclusion:** Dementia patients. Patients suffering severe infectious diseases. Care level 2 and 3. **Water fluoridation?:** Not reported	twice/week). Staff signed a sheet certifying that help had been given. **Control:** Control group; oral hygiene performed without intervention. **Sample sizes:** Group 1: 26 Group 2: 27 Group 3: 26 Control: 23 **Baseline comparisons:** Authors reported no significant differences (data not provided) **Study power:** Authors stated 'low study power' but specifics not reported. **Intervention delivery:** Academic and clinical research staff. Daily support from care giver staff.	follow-up after 3 years using a paired t-test.	None -23.3 (-35.0, -11.6, p=0.0001) Dentist -24.9 (-37.1, -12.6, p<0.0001) Staff -18.1 (-29.6, -6.7, p=0.002) *Gingival bleeding* None -10.8 (-20.1, -1.5, p=0.023) Dentist -12.7 (-22.3, -3.2, p=0.009) Staff -11.7 (-20.9, -2.5, p=0.013) **Secondary:** 36-months (38 participants evaluated). Across all intervention groups, the values were worse *Mean denture hygiene index* increased by 42.9% (95% CI 31.5%/54.3%, P <0.001, n = 34); *Mean gingival bleeding index* by 17.5% (95% CI 4.8%/ 30.5%, P =0.010, n = 23); *Mean plaque index* by 38.0% (95% CI 29.1%/50.0%, P < 0.001, n = 24). **Attrition:** 19.7% from 127 eligible 3.8% from 106 enrolled (data for 102/106)	**Applicable to UK?** Yes

Appendix B – Quality summary

Key to headings (brief summary from Appendix F, NICE 2009): 1.1 Source population described; 1.2 Eligible population representative of source ; 1.3 Selected population representative of eligible; 2.1 Population described; 2.2 Intervention/comparison described; 2.3 Allocation concealed; 2.4 Blinded; 2.5 Exposure adequate; 2.6 Contamination low; 2.7 Other interventions similar in groups; 2.8 All participants accounted for; 2.9 Setting reflects UK practice; 2.10 Intervention reflects UK practice; 3.1 Reliable outcomes; 3.2 Complete outcomes; 3.3 Important outcomes assessed; 3.4 Relevant outcomes; 3.5 Similar follow up times; 3.6 Meaningful follow up; 4.1 Groups similar at baseline; 4.2 ITT used; 4.3 Sufficient power; 4.4 Estimates of effect size given; 4.5 Appropriate analysis; 4.6 Precision; 5.1 Internally valid; 5.2 Externally valid; ++ Minimal bias; +Bias unclear; - Risk of bias; nr Not reported; na Not applicable

Author and Year	Study design	Population			Method of allocation to intervention (or comparison)											Outcomes						Analyses						Summary	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2
Altabet 2003	RCT	++	+	+	+	++	-	++	++	+	++	+	-	++	++	+	+	+	++	++	++	+	na	nr	+	++	-	+	+
Amerine 2013	CBA	+	-	-	+	++	-	+	nr	++	++	-	nr	+	+	++	-	++	++	++	-	+	-	nr	++	++	-	-	-
Arvidson-Bufano 1996	UBA	++	++	++	na	++	na	na	na	na	na	++	na	++	++	++	++	++	++	na	+	na	na	-	++	++	++	+	+
Avenali 2011	CBA	++	++	++	-	++	-	-	++	-	++	++	-	++	nr	++	++	++	++	+	++	-	-	-	++	++	+	+	+
Beck 2008	RCT	++	+	+	+	++	-	++	-	++	++	-	-	++	+	+	-	-	+	++	+	++	++	na	-	-	-	-	++
Bellomo 2005	RCT	++	nr	Nr	+	++	-	nr	++	+	++	++	+	++	+	++	++	+	++	++	+	+	-	-	++	++	+	+	-
Binkley 2014	UBA	++	++	++	na	++	na	-	++	na	na	+	-	++	++	++	++	++	++	++	-	na	++	-	++	++	++	+	++
Bockzo 2009	UBA	+	++	++	na	++	na	na	++	++	na	++	-	+	+	++	++	+	+	na	-	na	na	+	++	++	++	+	+
Budtz-Jorgensen 2000	nRCT	++	++	++	+	++	-	-	+	++	++	+	-	++	++	++	++	+	++	++	++	++	-	+	++	++	+	+	++
Carr 1997	RCT	++	+	++	++	++	nr	++	++	++	++	++	++	+	+	++	++	++	++	++	++	nr	++	-	++	++	+	+	+
Chalmers 2009	UBA	++	++	++	na	++	na	na	++	na	na	++	+	++	++	++	++	+	++	na	+	na	na	nr	++	++	+	+	++
Day 1998	RCT	++	nr	++	++	++	nr	++	++	++	++	++	++	++	++	++	++	+	++	++	-	++	+	-	++	++	+	+	++
De Visschere 2011	cRCT	++	++	+	+	++	-	++	-	+	+	+	++	++	++	++	-	+	++	-	+	++	-	+	++	+	+	-	++
De Visschere	cRCT	++	++	++	++	++	-	++	+	++	++	++	++	++	++	++	++	+	++	++	+	+	++	++	++	++	++	++	++

2012																												
Fickert 2012	UBA	++	++	+	na	++	na	na	++	na	na	-	-	++	++	++	?	+	++	na	+	na	-	nr	++	++	+	-	+
Fjeld 2014	RCT	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	-	++	++	+	++	++	+	++	+
Frenkel 2001	cRCT	++	++	++	++	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++	+	++	++	++	++	++	+
Isaksson 2000	UBA	++	++	+	na	++	na	-	+	na	na	+	-	++	++	++	+	++	++	na	+	na	na	+	++	++	+	+	++
Kullberg 2010	UBA	+	++	++	na	++	na	na	++	na	na	++	-	++	++	nr	++	++	++	na	-	na	na	-	++	++	++	-	+
Lange 2000	CBA	++	+	-	-	+	-	++	++	++	++	++	-	++	++	++	++	+	++	++	-	-	na	-	++	++	++	-	-
Le 2012	cRCT	+	+	+	++	++	-	++	++	++	++	++	-	++	++	++	++	++	++	++	+	++	nr	++	++	++	++	+	++
Lin 1999	CBA	++	+	+	+	+	-	nr	++	++	++	++	-	++	++	++	+	+	++	++	-	+	+	-	++	++	++	-	+
Lopez 2012	CBA	+	+	+	-	++	-	-	+	++	++	++	-	++	++	-	++	++	++	++	+	-	-	-	++	++	+	-	+
Lopez-Jornet 2012	RCT	++	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++	++	++	-	++	++	-	++	++	++	++	+
MacEntee 2007	cRCT	++	++	++	++	++	++	++	++	+	++	++	+	++	++	++	++	++	++	++	+	++	++	+	++	+	++	++	++
MacGiolla 2013	cRCT	++	++	+	++	++	-	+	++	+	++	-	-	++	++	+	++	+	++	++	++	++	-	++	++	++	+	+	+
McKeown 2014	UBA	++	-	+	na	++	na	na	++	na	na	++	na	++	++	++	++	++	++	++	++	na	na	nr	++	+	-	+	+
Mojon 1998	CBA	++	++	+	+	++	-	-	+	++	++	+	-	++	++	++	++	++	++	++	++	+	-	+	++	++	+	+	+
Munoz 2009	UBA	++	-	++	na	++	na	na	++	na	na	-	na	++	++	++	++	++	++	na	-	na	na	+	++	++	+	-	-
Nicol 2005	CBA	+	-	-	-	++	-	-	+	++	+	++	-	++	++	+	++	++	++	++	++	-	-	-	++	-	-	-	+
Paulsson 2001	UBA	++	++	++	na	++	na	na	na	na	na	+	-	++	++	+	+	+	+	na	++	na	na	nr	++	++	++	+	++
Peltola 2007	RCT	+	+	++	-	++	nr	-	++	+	++	+	-	+	++	+	++	+	++	+	++	-	-	nr	-	-	-	-	+
Poisson 2014	UBA	+	++	++	na	+	na	-	na	na	na	-	-	++	++	+	-	-	+	na	+	na	na	nr	++	++	+	-	+
Pronych 2010	UBA	++	-	-	na	++	na	na	na	na	na	-	na	++	++	+	-	+	++	na	++	na	na	-	++	++	+	-	+
Pyle 1998	CBA	++	+	+	-	++	-	-	++	nr	++	++	-	++	++	++	++	+	++	++	+	-	+	-	-	-	-	-	+
Quagliarello 2009	RCT	++	nr	+	na	++	na	na	na	na	na	++	na	++	++	+	++	++	++	na	-	na	na	nr	++	++	++	+	-
Samson 2009	UBA	+	++	++	na	++	na	na	+	na	na	na	-	++	++	++	++	+	++	na	++	na	-	+	++	++	++	+	+

Simons 2000	CBA	++	++	+	+	++	-	-	++	++	++	++	-	++	++	++	++	++	++	++	++	++	-	+	++	+	++	+	++
Simons 2001	RCT	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	+	+	++	++	++	++	-	+	++	++	+	+	++
Sloane 2013	UBA	++	+	++	na	++	na	-	+	na	na	++	++	++	++	+	+	++	++	na	+	na	na	nr	++	++	++	+	++
Stiefel 1995	RCT	++	++	++	++	++	nr	++	++	++	++	++	+	++	++	++	++	++	++	++	+	+	+	-	++	++	+	++	++
Stone 2013	UBA	++	+	-	na	++	na	na	na	na	na	+	na	++	++	+	+	-	+	na	+	na	na	-	+	-	-	-	-
Van der Putten 2013	RCT	++	++	++	++	++	-	+	+	++	++	-	++	++	+	++	+	+	++	++	+	+	-	+	++	++	++	+	++
Wardh 2002	CBA	++	++	+	-	++	-	-	++	+	+	-	-	++	++	++	++	+	++	++	++	+	-	+	+	++	-	-	+
Wyatt 2004	RCT	++	+	-	++	++	-	-	+	++	++	-	-	++	++	++	+	+	++	++	++	-	-	+	++	++	++	+	+
Zenthofer 2013	RCT	++	++	++	+	++	+	++	++	+	++	++	+	++	++	++	++	++	++	++	+	+	na	-	++	++	++	+	++

Appendix C – Review Team

Project Director	Dr Alison Weightman
Systematic Reviewers	Weyinmi Agnes Demeyin Mala Mann Fiona Morgan Dr Alison Weightman
Information Specialist	Mala Mann
Topic expertise	Professor Ivor Chestnutt Dr Damian Farnell Dr Ilona Johnson Fiona Morgan
Statistical analysis	Dr Damian Farnell
Presentation	Dr Alison Weightman Professor Ivor Chestnutt Fiona Morgan Dr Ilona Johnson

Appendix D – Search Strategy (Medline)

The search comprises two groups of terms with a mix of indexed terms and keywords. The first group of terms is designed to identify care home residents. This includes a failsafe component (lines 17 to 22) to ensure that studies in adults with disabilities are identified. The second group of terms relates to oral health. The strategy was designed to enhance specificity, but testing against a core set of 50 potentially relevant papers indicates that the strategy is well balanced for sensitivity (all papers included in Medline were identified by the search).

	Searches	Results
1	exp nursing homes/	32415
2	Residential Facilities/	4748
3	Homes for the Aged/	11296
4	Assisted Living Facilities/	943
5	Long-Term Care/	22022
6	nursing home*1.tw.	21267
7	care home*1.tw.	1771
8	((elderly or old age) adj2 home*1).tw.	1614
9	assisted living facilit*.tw.	452
10	((nursing or residential) adj (home*1 or facilit*)).tw.	24158
11	(home*1 for the aged or home*1 for the elderly or home*1 for older adult*).tw.	2247
12	residential aged care.tw.	362
13	("frail elderly" adj2 (facilit* or home or homes)).tw.	52
14	(residential adj (care or facilit* or setting*)).tw.	3107
15	or/1-14	69174
16	Disabled Persons/	32526
17	Vulnerable Populations/	6120
18	Intellectual Disability/	47834
19	Learning Disorders/	12832
20	Mentally Disabled Persons/	2344
21	((physical* or learning or mental* or intellectual*) adj (disorder* or disab* or impair*)).tw.	45798
22	or/16-21	130980
23	(residential or home*1 or facilit*).tw.	543808
24	22 and 23	8763
25	15 or 24	75868
26	Preventive dentistry/	3096
27	Oral Hygiene/	10553

28	Dental Care/	15591
29	Toothbrushing/	6206
30	Mouthwashes/	4447
31	Health Education, Dental/	5816
32	Oral health/	10546
33	Dental Care for Chronically Ill/	2708
34	Dental Care for Aged/	1734
35	Geriatric Dentistry/	982
36	Dental Care for Disabled/	3986
37	((access* or availab*) adj2 dentist*).tw.	185
38	((dental health or oral health) adj3 (care or promotion or training)).tw.	3590
39	((oral or dental or mouth or teeth or tooth or gum or periodontal) adj (care or hygiene or health)).tw.	35651
40	(mouthwash* or mouth-wash* or mouth-rins* or mouthrins* or oral rins* or oralrins* or toothpaste* or tooth paste* or dentifrice* or toothbrush* or tooth brush* or fissure sealant* or floss*).tw.	13228
41	exp Dentifrices/	5699
42	(fluorid* adj2 (varnish* or topical or milk)).tw.	1441
43	Fluorides, Topical/	3947
44	Mouth Diseases/pc	899
45	Periodontal diseases/pc	2561
46	Mouth neoplasms/pc	1145
47	Xerostomia/pc	358
48	(dental adj (crown* or implant* or bridge* or denture* or inlay*)).tw.	8345
49	or/26-48	87974
50	(oral disease* or oral neoplasm* or oral cancer* or dental disease* or mouth disease* or dental decay or mouth neoplasm* or mouth cancer* or gum disease* or DMF or caries or gingivitis or periodontal disease* or periodontitis or dental plaque or oral plaque or dry mouth or xerostomia).tw.	84386
51	((tooth or teeth) adj2 (decay* or loss)).tw.	4675
52	(prevent* or control* or reduc*).tw.	4582217
53	50 or 51	86866
54	52 and 53	32141
55	49 or 54	108782
56	25 and 55	1264
57	limit 56 to (english language and humans and yr="1995 - 2014")	742

Appendix E – Included papers

1. Altabet, S., Rogers, K., Imes, E., Boatman, I.M., & Moncier, J. 2003. Comprehensive approach toward improving oral hygiene at a state residential facility for people with mental retardation. *Mental Retardation*, 41, (6) 440-445
2. Amerine, C., Boyd, L.D., Bowen, D.M., Neill, K., Johnson, T., Peterson, T. 2013. Oral health champions in long-term care facilities – a pilot study. Special Care in Dentistry, 34 (4), 164-170
3. Arvidson-Bufano, U.B., Blank, L.W., & Yellowitz, J.A. 1996. Nurses' oral health assessments of nursing home residents pre- and post-training: a pilot study. *Special care in dentistry*, 16, (2) 58-64
4. Avenali, L., Guerra, F., Cipriano, L., Corridore, D., & Ottolenghi, L. 2011. Disabled patients and oral health in Rome, Italy: long-term evaluation of educational initiatives. *Annali di Stomatologia*, 2, (3-4) 25-30
5. Beck, A.M., Damkjaer, K., & Beyer, N. 2008. Multifaceted nutritional intervention among nursing-home residents has a positive influence on nutrition and function. *Nutrition*, 24, (11-12) 1073-1080
6. Beck, A.M., Damkjaer, K., & Tetens, I. 2009. Lack of compliance of staff in an intervention study with focus on nutrition, exercise and oral care among old (65+ yrs) Danish nursing home residents. *Aging-Clinical & Experimental Research*, 21, (2) 143-149
7. Beck, A.M., Damkjaer, K., & Sorbye, L.W. 2010. Physical and social functional abilities seem to be maintained by a multifaceted randomized controlled nutritional intervention among old (>65 years) Danish nursing home residents. *Archives of Gerontology and Geriatrics*, 50, (3) 351-355
8. Bellomo, F., de Preux, F., Chung, J.P., Julien, N., Budtz-Jorgensen, E., & Muller, F. 2005. The advantages of occupational therapy in oral hygiene measures for institutionalised elderly adults. *Gerodontology*, 22, (1) 24-31
9. Binkley, C.J., Johnson, K.W., Abadi, M., Thompson, K., Shamblen, S.R., Young, L., & Zaksek, B. 2014. Improving the oral health of residents with intellectual and developmental disabilities: An oral health strategy and pilot study. *Evaluation and Program Planning*, 47, 54-63
10. Blank, L.W., Arvidson-Bufano, U.B., & Yellowitz, J.A. 1996. The effect of nurses' background on performance of nursing home resident oral health assessments pre- and post-training. *Special care in dentistry*, 16, (2) 65-70
11. Boczko, F., McKeon, S., & Sturkie, D. 2009. Long-term care and oral health knowledge. *Journal of the American Medical Directors Association*, 10, (3) 204-206
12. Budtz-Jorgensen, E., Mojon, P., Rentsch, A., & Deslauriers, N. 2000. Effects of an oral health program on the occurrence of oral candidosis in a long-term care facility. *Community Dentistry and Oral Epidemiology*, 28, (2) 141-149
13. Carr, M.P., Sterling, E.S., & Bauchmoyer, S.M. 1997. Comparison of the Interplak and manual toothbrushes in a population with mental retardation/developmental disabilities (MR/DD). *Special care in dentistry*, 17, (4) 133-136

14. Chalmers JM, Spencer AJ, Carter KD, King PL & Wright C 2009. Caring for oral health in Australian residential care. Dental statistics and research series no. 48. Cat. no. DEN 193. Canberra: AIHW.

15. Day, J., Martin, M.D., & Chin, M. 1998. Efficacy of a sonic toothbrush for plaque removal by caregivers in a special needs population. *Special care in dentistry*, 18, (5) 202-206

16. De Visschere, L., Schols, J., van der Putten, G.-J., de Baat, C., & Vanobbergen, J. 2012. Effect evaluation of a supervised versus non-supervised implementation of an oral health care guideline in nursing homes: a cluster randomised controlled clinical trial. *Gerodontology*, 29, (2) e96-106

17. De Visschere, L., De, B.C., Schols, J.M.G.A., Deschepper, E., & Vanobbergen, J. 2011. Evaluation of the implementation of an 'oral hygiene protocol' in nursing homes: A 5-year longitudinal study. *Community Dentistry and Oral Epidemiology*, 39, (5) 416-425

18. Fickert, N.A. & Ross, D. 2012. Effectiveness of a caregiver education program on providing oral care to individuals with intellectual and developmental disabilities. *Intellectual & Developmental Disabilities*, 50, (3) 219-232

19. Fjeld, K.G., Mowe, M., Eide, H., & Willumsen, T. 2014. Effect of electric toothbrush on residents' oral hygiene: a randomized clinical trial in nursing homes. *European Journal of Oral Sciences*, 122, (2) 142-148

20. Frenkel, H.F. 2001. Improving oral health in institutionalised elderly people by educating caregivers: a randomised controlled trial. *Community Dentistry and Oral Epidemiology, Copenhagen,* 29, (4) 289-297

21. Frenkel, H., Harvey, I., & Needs, K. 2002. Oral health care education and its effect on caregivers' knowledge and attitudes: a randomised controlled trial. *Community Dentistry & Oral Epidemiology*, 30, (2) 91-100

22. Isaksson, R., Paulsson, G., Fridlund, B., & Nederfors, T. 2000. Evaluation of an oral health education program for nursing personnel in special housing facilities for the elderly. Part II: Clinical aspects. *Special Care in Dentistry*, 20, (3) 109-113

23. Kullberg, E., Forsell, M., Wedel, P., Sjogren, P., Johansson, O., Herbst, B., & Hoogstraate, J. 2009. Dental hygiene education for nursing staff. *Geriatric Nursing*, 30, (5) 329-333

24. Kullberg, E., Sjogren, P., Forsell, M., Hoogstraate, J., Herbst, B., & Johansson, O. 2010. Dental hygiene education for nursing staff in a nursing home for older people. *Journal of Advanced Nursing*, 66, (6) 1273-1279

25. Lange, B., Cook, C., Dunning, D., Froeschle, M.L., & Kent, D. 2000. Improving the oral hygiene of institutionalized mentally retarded clients. *Journal of Dental Hygiene*, 74, (3) 205-209

26. Le, P., Dempster, L., Limeback, H., & Locker, D. 2012. Improving residents' oral health through staff education in nursing homes. *Special Care in Dentistry*, 32, (6) 242-250

27. Lin, C.Y., Jones, D.B., Godwin, K., Godwin, R.K., Knebl, J.A., & Niessen, L. 1999. Oral health assessment by nursing staff of Alzheimer's patients in a long-term-care facility. *Special care in dentistry*, 19, (2) 64-71

28. Lopez, R.M., Uribe, M.R., Rodriguez, B.O., & Casasempere, I.V. 2013. Comparison between amine fluoride and chlorhexidine with institutionalized elders: a pilot study. *Gerodontology*, 30, (2) 112-118

29. Lopez-Jornet, P., Plana-Ramon, E., Leston, J.S., & Pons-Fuster, A. 2012. Short-term side effects of 0.2% alcohol-free chlorhexidine mouthrinse in geriatric patients: a randomized, double-blind, placebo-controlled study. *Gerodontology*, 29, (4) 292-298

30. MacEntee, M.I., Wyatt, C.C.L., Beattie, B.L., Paterson, B., Levy-Milne, R., McCandless, L., & Kazanjian, A. 2007. Provision of mouth-care in long-term care facilities: an educational trial. *Community Dentistry & Oral Epidemiology*, 35, (1) 25-34

31. Mac Giolla Phadraig, C., Guerin, S., & Nunn, J. 2013. Train the trainer? A randomized controlled trial of a multi-tiered oral health education programme in community-based residential services for adults with intellectual disability. *Community Dentistry & Oral Epidemiology*, 41, (2) 182-192

32. Mac Giolla Phadraig C 2014 [submitted for publication] No title.

33. McKeown, L., Woodbeck, H., & Lloyd, M. 2014. A journey to improve oral care with best practices in long-term care. *Canadian Journal of Dental Hygiene*, 48, (2) 57-62

34. Mojon, P., Rentsch, A., Budtz-Jorgensen, E., & Baehni, P.C. 1998. Effects of an oral health program on selected clinical parameters and salivary bacteria in a long-term care facility. *European Journal of Oral Sciences*, 106, (4) 827-834

35. Munoz, N., Touger-Decker, R., Byham-Gray, L., & Maillet, J.O. 2009. Effect of an oral health assessment education program on nurses' knowledge and patient care practices in skilled nursing facilities. *Special Care in Dentistry*, 29, (4) 179-185

36. Nicol, R., Petrina Sweeney, M., McHugh, S., & Bagg, J. 2005. Effectiveness of health care worker training on the oral health of elderly residents of nursing homes. *Community Dentistry & Oral Epidemiology*, 33, (2) 115-124

37. Paulsson, G., Fridlund, B., Holmen, A., & Nederfors, T. 1998. Evaluation of an oral health education program for nursing personnel in special housing facilities for the elderly. *Special care in dentistry*, 18, (6) 234-242

38. Paulsson, G., Soderfeldt, B., Fridlund, B., & Nederfors, T. 2001. Recall of an oral health education programme by nursing personnel in special housing facilities for the elderly. *Gerodontology*, 18, (1) 7-14

39. Peltola, P., Vehkalahti, M.M., & Simoila, R. 2007. Effects of 11-month interventions on oral cleanliness among the long-term hospitalised elderly. *Gerodontology*, 24, (1) 14-21

40. Poisson, P., Barberger-Gateau, P., Tulon, A., Campos, S., Dupuis, V., & Bourdel-Marchasson, I. 2014. Efficiency at the resident's level of the NABUCCOD nutrition and oral health care training program in nursing homes. *Journal of the American Medical Directors Association*, 15, (4) 290-295

41. Pronych, G.J., Brown, E.J., Horsch, K., & Mercer, K. 2010. Oral health coordinators in long-term care--a pilot study. *Special Care in Dentistry*, 30, (2) 59-65

42. Pyle, M.A., Massie, M., & Nelson, S. 1998. A pilot study on improving oral care in long-term care settings. Part II: Procedures and outcomes. *Journal of Gerontological Nursing*, 24, (10) 35-38

43. Quagliarello, V., Juthani-Mehta, M., Ginter, S., Towle, V., Allore, H., & Tinetti, M. 2009. Pilot testing of intervention protocols to prevent pneumonia in nursing home residents. *Journal of the American Geriatrics Society*, 57, (7) 1226-1231

44. Samson, H., Berven, L., & Strand, G.V. 2009. Long-term effect of an oral healthcare programme on oral hygiene in a nursing home. *European Journal of Oral Sciences*, 117, (5) 575-579

45. Simons, D., Baker, P., Knott, D., Rush, S., Briggs, T., Kidd, E.A., & Beighton, D. 1999. Attitudes of carers and the elderly occupants of residential homes to antimicrobial chewing gum as an aid to oral health. *British Dental Journal*, 187, (11) 612-615

46. Simons, D., Baker, P., Jones, B., Kidd, E.A., & Beighton, D. 2000. An evaluation of an oral health training programme for carers of the elderly in residential homes. *British Dental Journal*, 188, (4) 206-210

47. Simons, D., Brailsford, S., Kidd, E.A., & Beighton, D. 2001. The effect of chlorhexidine acetate/xylitol chewing gum on the plaque and gingival indices of elderly occupants in residential homes. *Journal of Clinical Periodontology*, 28, (11) 1010-1015

48. Simons, D., Brailsford, S.R., Kidd, E.A.M., & Beighton, D. 2002. The effect of medicated chewing gums on oral health in frail older people: a 1-year clinical trial. *Journal of the American Geriatrics Society*, 50, (8) 1348-1353

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50. Stiefel, D.J., Truelove, E.L., Chin, M.M., Zhu, X.C., Leroux, B.G. 1995. Chlorhexidine swabbing applications under various conditions of use in preventive oral care for persons with disabilities. *Special Care in Dentistry*, 15 (4) 159-165

51. Stone, A. & Gutkowski, S. 2013. Novel Approach to Oral Care for Dependent Adults. *Integrative Medicine: A Clinician's Journal*, 12, (5) 28-36

52. van der Putten, G.-J., De Visschere, L., Schols, J., de Baat, C., & Vanobbergen, J. 2010. Supervised versus non-supervised implementation of an oral health care guideline in (residential) care homes: a cluster randomized controlled clinical trial. *BMC Oral Health*, 10, 17

53. van der Putten, G.-J., Mulder, J., de Baat, C., De Visschere, L.M.J., Vanobbergen, J.N.O., & Schols, J.M.G.A. 2013. Effectiveness of supervised implementation of an oral health care guideline in care homes; a single-blinded cluster randomized controlled trial. *Clinical Oral Investigations*, 17, (4) 1143-1153

54. Wardh, I., Berggren, U., Andersson, L., & Sorensen, S. 2002. Assessments of oral health care in dependent older persons in nursing facilities. *Acta Odontologica Scandinavica*, 60, (6) 330-336

55. Wardh, I., Berggren, U., Hallberg, L.R.M., Andersson, L., & Sorensen, S. 2002. Dental auscultation for nursing personnel as a model of oral health care education: development, baseline, and 6-month follow-up assessments. *Acta Odontologica Scandinavica*, 60, (1) 13-19

56. Wardh, I.M. & Wikstrom, M.B. 2014. Long-term effects of using oral care aides at a nursing home for elderly dependent residents--a pilot study. *Special Care in Dentistry*, 34, (2) 64-69

57. Wyatt, C.C.L. & MacEntee, M.I. 2004. Caries management for institutionalized elders using fluoride and chlorhexidine mouthrinses. *Community Dentistry & Oral Epidemiology*, 32, (5) 322-328

58. Zenthofer, A., Dieke, R., Dieke, A., Wege, K.C., Rammelsberg, P., & Hassel, A.J. 2013. Improving oral hygiene in the long-term care of the elderly--a RCT. *Community Dentistry & Oral Epidemiology*, 41, (3) 261-268

Appendix F – Systematic reviews discussed

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. Research in Gerontological Nursing 2014 Mar;7(2):87-100.

Appendix G – Unpicked systematic reviews

Brady, M.C., Furlanetto, D., Hunter, R., Lewis, S.C., & Milne, V. 2006. Staff-led interventions for improving oral hygiene in patients following stroke. Cochrane Database of Systematic Reviews (4)

Cobban, S. 2012. Improving Oral Health for Elderly Residents of Long-Term Care Facilities. Ph.D. University of Alberta (Canada).

Coker, E., Ploeg, J., & Kaasalainen, S. 2014. The effect of programs to improve oral hygiene outcomes for older residents in long-term care: a systematic review. Research in Gerontological Nursing, 7, (2) 87-100 [Summarised in Section 5: Results]

Lugt-Lustig, K., Vanobbergen, J., Putten, G.J., Visschere, L., Schols, J., & Baat, C. 2014. Effect of oral healthcare education on knowledge, attitude and skills of care home nurses: a systematic literature review. Community Dentistry & Oral Epidemiology, 42, (1) 88-96

Raghoonandan, P., Cobban, S., & Compton, S. 2011. A scoping review of the use of fluoride varnish in elderly people living in long term care facilities. Canadian Journal of Dental Hygiene, 45, (4) 217-222

Sjogren, P., Nilsson, E., Forsell, M., Johansson, O., & Hoogstraate, J. 2008. A systematic review of the preventive effect of oral hygiene on pneumonia and respiratory tract infection in elderly people in hospitals and nursing homes: effect estimates and methodological quality of randomized controlled trials. [34 refs]. *Journal of the American Geriatrics Society*, 56, (11) 2124-2130

Appendix H – Studies in progress

Lavigne SE 2012 http://www.clinicaltrials.gov/ct2/show/NCT01639183?term=%28%22nursing+home%22+OR+%22care+home%22%29+AND+%28%22oral+hygiene%22+OR+%22dental+care%22%29&rank=2 Lavigne SE 2013 http://apps.who.int/trialsearch/Trial2.aspx?TrialID=NCT01639183	RCT Oscillating power toothbrush versus usual care. 6 week trial. Gingivitis, plaque.	Canada, Manitoba N=58 nursing home residents

Appendix J – Papers excluded from the review at full text

ADA Division of Science 2003. The importance of oral health in patients receiving long-term care. *Journal of the American Dental Association*, 134, (1) 109	Product information
Anon 2006. Best practice: evidence based practice information sheets for health professionals. Oral hygiene care for adults with dementia in residential aged care facilities. *Geriaction*, 24, (3) 23-28	News report
Anon 2010. Oral health of disadvantaged groups. British Dental Journal, 208, (4) 151	News report
Allukian, M.J. 2008. Who is helping seniors improve their oral health? What is our responsibility? *Journal of the Massachusetts Dental Society*, 57, (3) 68-69	Opinion/Commentary
Alty, C.T. & Olson, K. 1996. Serving kindness through in-service. *RDH*, 16, (11) 26-28	Opinion/Commentary
Arpin, S. 2009. Oral hygiene in elderly people in hospitals and nursing homes. *Evidence-Based Dentistry*, 10, (2) 46	Opinion/Commentary
Bailit, H. & D'Adamo, J. 2012. State case studies: improving access to dental care for the underserved. *Journal of Public Health Dentistry*, 72, (3) 221-234	Not specific to care homes
Baker, R. 2009. Deplorable care. *British Dental Journal*, 206, (10) 509	Letter
Banting, D.W., Greenhorn, P.A., & McMinn, J.G. 203. Effectiveness of a topical antifungal regimen for the treatment of oral candidiasis in older, chronically ill, institutionalized, adults. *Journal (Canadian Dental Association)*, 61, (3) 199-200	Specific clinical intervention
Banting, D.W. & Hill, S.A. 2001. Microwave disinfection of dentures for the treatment of oral candidiasis. *Special care in dentistry*, 21, (1) 4-8	Microbial outcomes
Barnes, C.M. 2014. Dental hygiene intervention to prevent nosocomial pneumonias. *The Journal of Evidence based Dental Practice*, 14 Suppl, 103-114	Non-systematic review
Bartold, P.M. 2011. Nursing home care - we only have ourselves to blame. *Australian Dental Journal*, 56, (1) 1	Editorial
Beck, A.M., Gogsig Christensen, A., Stenbaek Hansen, B., et al. 2014. Study protocol: cost-effectiveness of multidisciplinary nutritional support for under-nutrition in older adults in nursing home and home-care: cluster randomized controlled trial. *Nutrition Journal*, 13,	No oral health component to intervention

(1) 86	
Borreani, E., Jones, K., Wright, D., Scambler, S., & Gallagher, J.E. 2010. Improving access to dental care for older people. *Dental Update*, 37, (5) 297-298	Non-systematic review
Brody, R., Touger-Decker, R., Radler, D., Parrott, J., Rachman, S., & Trostler, N. 2014. A Novel Approach to Oral Health Assessment Training for Dietitians in Long-Term Care Settings in Israel. *Topics in Clinical Nutrition*, 29, (1) 57-68	Non applicable country (Israel) and training for dieticians (n=30) rather than care home staff. UBA. Education (1.5 days). For 18/30 responses at 12 months mean difference in knowledge = 9.5±4.6 (p=0.0001)
Brady, M.C., Furlanetto, D.L.C., Hunter, R.V., Lewis, S.C., & Milne, V. 2011. Oral health care for patients after stroke. *Stroke*, 42, (12) e636-e637	Paper based on previously identified Cochrane Review
Buchholtz, K.J. & King, R.S. 2012. Policy and proposals that will help improve access to oral care services for individuals with special health care needs. *North Carolina Medical Journal*, 73, (2) 124-127	Opinion/Commentary
Budtz-Jorgensen, E., Chung, J.P., & Mojon, P. 2000. Successful aging--the case for prosthetic therapy. *Journal of Public Health Dentistry*, 60, (4) 308-312	Non-systematic review
Budtz-Jorgensen, E., Chung, J.P., & Rapin, C.H. 2001. Nutrition and oral health. *Best Practice & Research in Clinical Gastroenterology*, 15, (6) 885-896	Non-systematic review
Carmody,S.; Forster,S. 2003. *Nursing older people: a guide to practice in care homes* Oxford, Radcliffe	Textbook
Burtner AP, Smith RG, Tiefenbach S, Walker C. 1996. Administration of chlorhexidine to persons with mental retardation residing in an institution: Patient acceptance and staff compliance. *Special Care Dentistry* 16(2), 53-7	Clinical intervention
Carson, S.J. & Edwards, M. 2014. Barriers to providing dental care for older people. *Evidence-Based Dentistry*, 15, (1) 14-15	Commentary on systematic review (Bots-Vantspijker et al 2013)
Chalmers, J.M. 2000. Behavior management and communication strategies for dental professionals when caring for patients with dementia. *Special Care in Dentistry*, 20, (4) 147-154	Non-systematic review
Chalmers, J.M., Carter, K.D., & Spencer, A.J. 2004. Oral health of Adelaide nursing home residents: longitudinal study. *Australasian*	Study design: epidemiology

Journal on Ageing, 23, (2) 63-70	
Chalmers, J. & Pearson, A. 2005. Oral Hygiene Care for Residents with Dementia: A Literature Review. *Journal of Advanced Nursing*, 52, (4) 410-419	Paper based on previously identified Joanna Briggs Institute systematic review
Chavez, E.M., LaBarre, E., Fredekind, R., & Isakson, P. 2010. Comprehensive dental services for an underserved and medically compromised population provided through a community partnership and service learning. *Special Care in Dentistry*, 30, (3) 95-98	Report of a dental school programme
Christensen, L.B., Hede, B., & Nielsen, E. 2012. A cross-sectional study of oral health and oral health-related quality of life among frail elderly persons on admission to a special oral health care programme in Copenhagen City, Denmark. *Gerodontology*, 29, (2) e392-e400	Mixed population of community-dwelling and residential-care participants. Not possible to disaggregate data for residential care population
Clavero J, Baca P, Junco P, Gonzílez MP. Effects of 0.2% chlorhexidine spray applied once or twice daily on plaque accumulation and gingival inflammation in a geriatric population. Journal of Clinical Periodontology 2003 Sep 1;30(9):773-7.	Clinical intervention
Coker, E., Ploeg, J., Kaasalainen, S., & Fisher, A. 2013. A concept analysis of oral hygiene care in dependent older adults. *Journal of Advanced Nursing*, 69, (10) 2360-2371	2104 systematic review by the same authors identified
Coleman, P. 2005. Opportunities for nursing-dental collaboration: Addressing oral health needs among the elderly. *Nursing Outlook*, 53, (1) 33-39	Non-systematic review
Coleman, P.R. 2004. Promoting oral health in elder care--challenges and opportunities. *Journal of Gerontological Nursing*, 30, (4) 3	Editorial
Connell, B.R., McConnell, E.S., & Francis, T.G. 2002. Tailoring the environment of oral health care to the needs and abilities of nursing home residents with dementia. *Alzheimer's Care Quarterly*, 3, (1) 19-25	Study design: case study
Connick, C.M. & Barsley, R.E. 1999. Dental neglect: definition and prevention in the Louisiana Developmental Centers for patients with MRDD. *Special Care in Dentistry*, 19, (3) 123-127	Study design: epidemiology
Crogan NL. Managing xerostomia in nursing homes: pilot testing of the Sorbet Increases Salivation intervention. Journal of the American Medical Directors Association 2011 Mar;12(3):212-6.	Special population. Drug induced xerostomia
de Mello, A.L.F. & Erdmann, A.L. 2007. Investigating oral healthcare in the elderly using Grounded Theory. *Revista Latino-Americana de*	Non-systematic review

Enfermagem, 15, (5) 922-928	
De Visschere, L.M. & Vanobbergen, J.N. 2006. Oral health care for frail elderly people: actual state and opinions of dentists towards a well-organised community approach. *Gerodontology*, 23, (3) 170-176	Not specific to care homes
DeBiase, C.B. & Austin, S.L. 2003. Oral health and older adults. [75 refs]. *Journal of Dental Hygiene*, 77, (2) 125-145	Not specific to care homes
Delambo, D.A. 1997. *Assessment of dental care training needs of direct service staff in intermediate care facilities for individuals with mental retardation.* PH.D. Southern Illinois University at Carbondale.	Thesis unavailable
Durgude, Y. & Cocks, N. 2011. Nurses' knowledge of the provision of oral care for patients with dysphagia. *British Journal of Community Nursing*, 16, (12) 604-610	Specific clinical population – patients with dysphagia
Dye, B.A., Fisher, M.A., Yellowitz, J.A., Fryar, C.D., & Vargas, C.M. 2007. Receipt of dental care, dental status and workforce in U.S. nursing homes: 1997 National Nursing Home Survey. *Special Care in Dentistry*, 27, (5) 177-186	Study design: epidemiology
Dyke D, Bertone M, Knutson K, Campbell A. 2012. Improving oral care practice in long-term care. *Canadian Nurse*, 108, (9) 20-24	Special population group (dysphagia); Guidance but small un-replicated UBA in single location. Not relevant to good practice review.
Edwards, M. 2008. Staff training improved oral hygiene in patients following stroke. *Evidence-Based Dentistry*, 9, (3) 73	Summary of Brady et al 2006 Cochrane Review
Ekstrand, K.R., Poulsen, J.E., Hede, B., et al. 2013. A randomized clinical trial of the anti-caries efficacy of 5,000 compared to 1,450 ppm fluoridated toothpaste on root caries lesions in elderly disabled nursing home residents. *Caries Research*, 47, (5) 391-398	Fluoride concentration levels in toothpaste
El-Solh, A.A. 2011. Association between pneumonia and oral care in nursing home residents. *Lung*, 189, (3) 173-180	Non-systematic review
Ellis, A.G. 1999. Geriatric dentistry in long-term-care facilities: current status and future implications. *Special care in dentistry*, 19, (3) 139-142	Non-systematic review of epidemiology studies
Ettinger, R.L. 2012. Dental implants in frail elderly adults: a benefit or a liability? *Special Care in Dentistry*, 32, (2) 39-41	Editorial
Fitzpatrick, J. 2000. Oral health care needs of dependent older people: responsibilities of nurses and care staff. [64 refs]. *Journal of Advanced*	Non-systematic review

Nursing, 32, (6) 1325-1332	
Foltyn, P. 2011. Nursing home care. *Australian Dental Journal*, 56, (2) 239	Letter
Franchignoni, M., Giordano, A., Levrini, L., Ferriero, G., & Franchignoni, F. 2010. Rasch analysis of the Geriatric Oral Health Assessment Index. *European Journal of Oral Sciences*, 118, (3) 278-283	Analysis amendments to GOHAI assessment tool
Garrido Urrutia, C., Romo Ormazabal, F., Espinoza Santander, I., & Medics Salvo, D. 2012. Oral health practices and beliefs among caregivers of the dependent elderly. *Gerodontology*, 29, (2) e742-e747	Comparison between community- and residential-based carers
Gaskill, D., Isenring, E.A., Black, L.J., Hassall, S., & Bauer, J.D. 2009. Maintaining nutrition in aged care residents with a train-the-trainer intervention and Nutrition Coordinator. *Journal of Nutrition, Health & Aging*, 13, (10) 913-917	No oral health interventions or outcomes
Ghezzi, E.M., Smith, B.J., Manz, M.C., & Markova, C.P. 2007. Comparing perceptions of oral health care resources and barriers among LTC facilities. *Long-Term Care Interface*, 8, (6) 20-25	Paper unavailable. Other papers reporting this study identified.
Glassman, P. & Subar, P. 2010. Creating and maintaining oral health for dependent people in institutional settings. *Journal of Public Health Dentistry*, 70 Suppl 1, S40-S48	Non-systematic review
Glassman, P., Helgeson, M., & Fitzler, S.L. 2010. Protecting the elderly. *Journal of the American Dental Association*, 141, (11) 1298-1299	Letter
Gonzalez, E.E., Nathe, C.N., Logothetis, D.D., Pizanis, V.G., & Sanchez-Dils, E. 2013. Training caregivers: disabilities and dental hygiene. *International Journal of Dental Hygiene*, 11, (4) 293-297	Not residential care - community-based carers
Gornitsky, M., ParadisI, I., Landaverde, G., Malo, A.M., & Velly, A.M. 2002. A clinical and microbiological evaluation of denture cleansers for geriatric patients in long-term care institutions. *Journal (Canadian Dental Association)*, 68, (1) 39-45	Microbial outcomes
Grant, E., Carlson, G., & Cullen-Erickson, M. 2004. Oral health for people with intellectual disability and high support needs: positive outcomes. *Special Care in Dentistry*, 24, (2) 70-79	Not residential care
Guay, A.H. 2005. The oral health status of nursing home residents: what do we need to know? *Journal of Dental Education*, 69, (9) 1015-1017	Opinion/Commentary
Gutkowski, S. 2013. Using xylitol products and MI paste to reduce oral biofilm in long-term care residents. *Annals of Long-Term Care*, 21, (12)	Microbial outcomes

26-28	
Habegger, L., Sloane, P.D., Chen, X. et al. 2012. Mouth care without a battle: Designing a training video to individualize mouth care for persons with cognitive and physical impairments. *Journal of the American Geriatrics Society*, Suppl S4	Conference abstract. Main study paper identified.
Hasegawa, T.K.J., Matthews, M.J., & Reed, M. 2004. Ethical dilemma #48. "Who cares for the incompetent patient". *Texas Dental Journal*, 121, (7) 616-619	Opinion/Commentary
Heyes, G. & Robinson, P.G. 2008. Pilot study to assess the validity of the single assessment process as a screening tool for dental treatment needs in older people. *Gerodontology*, 25, (3) 142-146	Mixed population of community-dwelling and residential-care participants. Not possible to disaggregate data for residential care population
Hopcraft, M.S., Morgan, M.V., Satur, J.G., & Wright, F.A.C. 2011. Utilizing dental hygienists to undertake dental examination and referral in residential aged care facilities. *Community Dentistry & Oral Epidemiology*, 39, (4) 378-384	Compares screening by dentists with screening by dental hygienists
Howard, R. 2010. *Survey of oral hygiene knowledge and practice among Mississippi nursing home staff.* Ph.D. University of Mississippi Medical Center	Thesis unavailable
Innes, N. & Evans, D. 2009. Caries prevention for older people in residential care homes. *Evidence-Based Dentistry*, 10, (3) 83-8	Non-systematic review
Ishikawa, A., Yoneyama, T., Hirota, K., Miyake, Y., & Miyatake, K. 2008. Professional oral health care reduces the number of oropharyngeal bacteria. *Journal of Dental Research*, 87, (6) 594-598	Microbial outcomes
Ito, K., Tsuboya, T., Aida, J., & Osaka, K. 2013. Policy impact on employment of dental hygienists in nursing homes in japan. *American Journal of Epidemiology*, 15. 650S	Epidemiology study
Kaiser, C.M., Williams, K.B., Mayberry, W., Braun, J., & Pozek, K.D. 2000. Effect of an oral health training program on knowledge and behavior of state agency long-term-care surveyors. *Special Care in Dentistry*, 20, (2) 66-71	Training of those undertaking surveys in care homes for state agencies
Kasche, I., Schuez, B., Heiden, A., Mallach, N., & Jahn, K. 2006. Evaluation of an oral health program for carers in institutions for adults with disabilities. O2B:I. *Journal of Disability and Oral Health*, 7, (2) 86	Abstract only and not enough data to include as evidence. Caregiver oral health education in 56 German institutions for adults with

	disabilities. UBA. Increased carer self efficacy (perceived knowledge) and toothbrushing duration (both p<0.05); Use of chlorhexidine mouthwash from 7.5% to 14.6%
Kayser-Jones, J., Bird, W.F., Redford, M., Schell, E.S., & Einhorn, S.H. 1996. Strategies for conducting dental examinations among cognitively impaired nursing home residents. *Special care in dentistry*, 16, (2) 46-52	Intervention to manage resistance to care
Kikutani, T., Enomoto, R., Tamura, F., Oyaizu, K., Suzuki, A., & Inaba, S. 2006. Effects of oral functional training for nutritional improvement in Japanese older people requiring long-term care. *Gerodontology*, 23, (2) 93-98	No oral health outcomes
Kokubu, K., Senpuku, H., Tada, A., Saotome, Y., & Uematsu, H. 2008. Impact of routine oral care on opportunistic pathogens in the institutionalized elderly. *Journal of Medical & Dental Sciences*, 55, (1) 7-13	Microbial outcomes
Lawton, L. 2002. Providing dental care for special patients: tips for the general dentist. *Journal of the American Dental Association*, 133, (12) 1666-1670	Opinion/Commentary
Lemaster, M. 2013. Pilot program provides oral health services to long term care facility residents through service learning and community partnership. *Journal of the American Medical Directors Association*, 14, (5) 363-366	Full text unavailable
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Lim, Y.M. 2003. Nursing intervention for grooming of elders with mild cognitive impairments in Korea. *Geriatric Nursing*, 24, (1) 11-15	Very small study in non-applicable country (Korea). Morning training for residents (N=8) UBA. No significant effect of toothbrushing ability: Mean (SE) from 0.78 (0.21) to 0.71 (0.24)
Lin, M.K. & Kramer, A.M. 2013. The Quality Indicator Survey: background, implementation, and widespread change. *Journal of Aging & Social Policy*, 25, (1) 10-29	Epidemiology survey
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MacEntee, M.I. 2005. Caring for elderly long-term care patients: oral health-related concerns and issues. [97 refs]. *Dental Clinics of North America*, 49, (2) 429-443	Non-systematic review
MacEntee, M.I. 2006. Missing links in oral health care for frail elderly people. *Journal (Canadian Dental Association)*, 72, (5) 421-425	Opinion/Commentary
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Mello, A.L.S.F.d., Erdmann, A.L., & Brondani, M. 2010. Oral health care in long-term care facilities for elderly people in southern Brazil: a conceptual framework. *Gerodontology*, 27, (1) 41-46	Does not consider barriers/ facilitators
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Naughton, D.K. 2009. The business of dental hygiene--a practice experience in nursing homes. *Journal of Dental Hygiene*, 83, (4) 193-194	Opinion/Commentary
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Ohno T, Uematsu H, Nozaki S, Sugimoto K. Improvement of taste	No oral health outcomes.

sensitivity of the nursed elderly by oral care. Journal of Medical & Dental Sciences 2003 Mar;50(1):101-7.	Just taste sensitivity
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Pino, A., Moser, M., & Nathe, C. 2003. Status of oral healthcare in long-term care facilities. *International Journal of Dental Hygiene*, 1, (3) 169-173	Non-systematic review
Rogers, C. 2009. Dental care in aged care facilities. *Australian Dental Journal*, 54, (2) 178	Letter
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Simons, D., Kidd, E.A., & Beighton, D. 1999. Oral health of elderly occupants in residential homes. *Lancet*, 353, (9166) 1761	Letter
Simons, D., Brailsford, S., Kidd, E.A., & Beighton, D. 2001. Relationship between oral hygiene practices and oral status in dentate elderly people living in residential homes. *Community Dentistry and Oral*	Epidemiology study

Epidemiology, 29, (6) 464-470	
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Soini, H., Muurinen, S., Routasalo, P., Sandelin, E., Savikko, N., Suominen, M., Ainamo, A., & Pitkala, K.H. 2006. Oral and nutritional status - Is the MNA a useful tool for dental clinics. *Journal of Nutrition, Health and Aging*, 10, (6) 495-499	No oral health outcomes
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Sumi, Y., Miura, H., Nagaya, M., Nagaosa, S., & Umemura, O. 2009. Relationship between oral function and general condition among Japanese nursing home residents. *Archives of Gerontology and Geriatrics*, 48, (1) 100-105	No oral health outcomes
Sumi, Y., Ozawa, N., Miura, H., Michiwaki, Y., & Umemura, O. 2010. Oral care help to maintain nutritional status in frail older people. *Archives of Gerontology & Geriatrics*, 51, (2) 125-128	No oral health outcomes
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Tramini, P., Montal, S., & Valcarcel, J. 2007. Tooth loss and associated factors in long-term institutionalised elderly patients. *Gerodontology*, 24, (4) 196-203	Epidemiology study
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Watando, A., Ebihara, S., Ebihara, T., Okazaki, T., Takahashi, H., Asada, M., & Sasaki, H. 2004. Daily oral care and cough reflex sensitivity in elderly nursing home patients. *Chest*, 126, (4) 1066-1070	No oral health outcomes
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Wyatt, C.C.L. 2009. A 5-year follow-up of older adults residing in long-term care facilities: utilisation of a comprehensive dental programme.	Dental clinical treatment

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Zimmerman, S., Sloane, P.D., Cohen, L.W., & Barrick, A.L. 2014. Changing the culture of mouth care: mouth care without a battle. *Gerontologist*, 54 Suppl 1, S25-S34	Intervention to manage resistance to care
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