Q4 Evidence Profile

Recommendation Question 4: What specific strategies or techniques should be recommended for the provision of oral care to improve outcomes for persons who are behaviourally complex and health providers?

Population: Adults 18 years of age and older who are behaviorally complex (i.e. responsive and challenging)
Intervention: Care strategies or techniques (i.e., skills) for oral care
Comparison: No care strategies or techniques (i.e., skills) for oral care or usual care
Outcomes: Person's oral health status, person's responsive behaviours, frequency of oral care, knowledge and ability of health providers to provide oral care
Setting: Health setting and academic environments

Bibliography: 111, 347, 830, 1179, 1241, 1263, 1312, 1389, Samson et al. (2009), Jablonski et al. (2011), Connell et al. (2002)

Quality assessment							Study details		No. of participants		Summary of Findings	Certainty	References
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Country	Strategies or techniques for oral care	Strategies or technique for oral care	Comparator	Reported effects/ Outcomes		
Frequency of oral care (assessed with: Oral Hygiene Practice Index (disclosing solution, brushed, flossed, rinsed), manual count of resident's completion of oral care/task success) (Follow up: 1 month to 15 months)													
2	Quasi-experimental	Serious [a]	Not serious	Serious [b]	Serious [c]	None	830: United States 1241: Canada	830: This multimodal intervention involved creating an action plan specific for oral health, health provider education, adapting the environment, and reinforcing practices via coaching sessions. Specifically, the educational component included using a video to train health providers on how to provide oral hygiene for persons who are behaviourally complex, interpersonal strategies, use of rewards, meal supervision, and monitoring goals of oral health care. Health providers were also offered additional dental devices (i.e. special toothbrushes and pastes, mouth props) and taught how to create a calming environment during oral care. The action plan was reinforced and modified with the support of the dental hygienist for	830: N=25 **Oral Hygiene Practice Index (mean (SD))** *Pre-test:* 1.71 (0.77) *Post-test* (1 mth later): 2.64 (0.82) 1179: **Outside Mouth (N=69):** *Upper Right:* 96% to 100%; *Middle:* 95% to 93%; *Left:* 96% to 97%. *Lower Right:* 93% to 98%; 94% to 100%; 100% to 100%. **Inside Mouth (N=69):** *Upper Right:* 54% to 100%; *Middle:* 33% to 88%; *Left:* 46% to 97%. *Lower Right:* 69% to 95%; 48% to 89%; 73% to 97%.	830: No comparators 1241: No comparators	One study (830) found a statistically significant improvement in the overall oral hygiene practice index (d = 2.30). In particular, significant increases were seen in the use of a disclosing solution, flossing, and mouth rinse. After training, brushing in the inside surfaces of teeth significantly improved (p <0.001 to p = 0.03), as did brushing of the interdental spaces or flossing (p < 0.001). 1241 found that in patients with moderate dementia, there was a positive correlation between oral care task success rates and health providers use of encouraging comments (r(5) = .837, p = .038) or demonstration of an action (r(5)=0.816, p=0.048). In patient with severe dementia, there was a significantly positive correlation between oral health task success rate and the use of re-direction (r(6) = 0.839, p=0.018). In addition, task success rate and the use of full assistance had a significantly negative correlation (r(6) = 0.865, p=0.012).	⊕◯◯◯ Very Low	830: Binkley (2014) 1179: Sloane et al., 2013 1241: Wilson (2013)

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								continuous quality improvement of the oral health action plan. 1179: A multi-component intervention was utilized to educate health providers about oral pathology, dementia care, and using an individualized care plan. Furthermore, strategies were taught such as how to build a therapeutic relationship, adapt the physical environment, and use of verbal communication. 1241: The research team observed utterances that health providers use when providing oral care. These were transcribed and coded into type of communication strategy used, and differences across disease severity.	**Interdental brushing or flossing:** *Upper* (N=51): 0 to 88% Lower (N=65): 0 to 91% 1241: N=13 Overall, residents invited to participate in 49% of steps of tooth brushing, 45% of steps completed: 67% entirely successful (all steps completed), 23% marginally successful (at least half completed), 10% unsuccessful (less than half of tasks completed).				
Person's oral health status (assessed with: Plaque Control Record (PCR), Gingival Bleeding Index (GBI), Denture Hygiene Index (DHI), Plaque Index for Long-Term Care (PI-LTC), Gingival Index for Long-Term Care (GI-LTC), Denture Plaque Index (DPI),Minimum Data Set (presence/absence of inflamed or bleeding gums); Oral Health Assessment Tool (OHAT); Silness-Loe Index; O'Leary Plaque Control Index, Oral Assessment Guide (OAG), Debris Index, Mucosal Plaque Index,) (follow-up: 1 week to 6 years)													
2	RCT	Very serious [d]	Not serious	Not serious [e]	Not serious	None	111 and 1389: Germany	111: Educational program for health providers in a variety of nursing homes using PowerPoint and video. Topics included: age-related oral health changes	111: N= 144 (baseline); N = 130 (longitudinal) **Denture hygiene Index (mean (SD))**:	111: N= 75 (baseline); N=57 (longitudinal) **Denture hygiene Index**	Oral health education and training for health providers in nursing homes was found to improve the oral hygiene status of care-dependent residents and those with dementia. Overall, residents had significant improvements in PCR (p = 0.002) (111) and	⊕⊕◯◯ Low	111: Zenthofer et al., 2016a 1389: Schwindling,

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								and pathology, teeth brushing techniques, use of interdental space brushes and mouth rinses. Health providers were also trained in handling of different removable dentures using demonstration and how to use ultrasound baths to clean dentures, They were also taught how to use the revised Oral Assessment Guide (OAG). A practical component was also used, whereby health providers recommended seniors who they had problems in care routines with. The health providers had to estimate the seniors' oral health using the OAG, and than take out and clean the dentures and natural residual teeth while being supervised by a dentist. Feedback and advice was provided. 1389: Intervention same as above (111).	*Baseline*:86.3 (15.6) *6 mth follow-up*: 52.6 (30.3) [-20.1, 95%CI: -29.5, -10.6] **Plaque Control Record (mean (SD))** *Baseline*: 89.8 (11.9) *6-mth follow-up*: 77.0 (24.6) [-13.7, 95%CI: -22.1, -5.2] **Gingival Bleeding Index (mean (SD)):** *Baseline:* 51.2 (25.5) *6-mth follow-up:* 44.6 (30.1) [-8.2, 95%CI: -19.8, 3.5] 1389: N= 178 (baseline); N = 116 (longitudinal) **Plaque Control Record (Group difference (mean (SD))** *Baseline to 6-months* (N=140): -14.9 (26.3) *Baseline to 12 mths* (N=99): -15.5 (27.8) [-16.2 (95% CI:-27.7; -4.7] **Denture Hygiene**	**(mean (SD))** *Baseline:* 84.3 (13.6) *6 mth follow-up:* 79.2 (21.9) **Plaque Control Record (mean (SD))** *Baseline*: 84.1 (23.7) *6-mth follow-up*: 89.1 (14.7) **Gingival Bleeding Index (mean (SD)):** *Baseline:*57 (30) *6-mth follow-up:* 51.5 (28.1) 1389: N=91 (baseline); N=40 (longitudinal) **Plaque Control Record (Group difference (mean (SD))** *Baseline 6-months* (N=140): -0.5 (19.0) *Baseline to 12-months* (N=99): 3.5 (18.5) **Denture Hygiene Index (mean (SD))** *Baseline to 6-months* (165): -6.0 (18.7) *Baseline to 12-*	(p=0.006)] (1389) and DHI (p =0.001) (111) (p=0.024)] (1389) over a 12 mth period. Moreover, the more care-dependent residents had greater improvements in DHI [-0.3, p = 0.001; 95%Ci: -0.4, 0.1] (111) compared to those who needed less help from caregivers.		Krisam, Hassel, Rammelsberg & Zenthofer, 2017

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									Index (mean (SD)) *Baseline to 6-months* (N=165)*:* -26.0 (28.3) *Baseline to 12-months* (N=114)*:* -27.4 (29.3) [-13.3 (95% CI: -24.9; -1.8] **Gingival Bleeding Index (mean (SD))** *Baseline to 6-months* (N=140)*:* -6.8 (34.8) *Baseline to 12-months* (N=94)*:* -11.7 (33.9) [-6.9, 95%CI: -21.7, 7.9]	*months* (N=114)*:* -8.3 (24.7) **Gingival Bleeding Index (mean (SD)** *Baseline to 6-months* (N=140)*:* -4.0 (31.4) *Baseline to 12-months* (N=94)*:* --4.0 (36.1)			
6	Quasi-experimental	Very serious [f]	Serious [g]	Not serious [h]	Not serious	None	347: Germany 830 United States of America 1179: United States of America Jablonski et al. (2011):	347: All health providers working in 4 long-term care homes received an education intervention that included: lecture on age-related changes in oral health and the oral cavity; demonstration and practical training with supervision and feedback on brushing, handling of tooth and interdental brushes, tooth paste, mouth rinses, removable dentures and the use of ultrasonic bathes. They were also taught how to assess oral health using the revised oral assessment	347: N(*baseline*, dementia) = 33; N (*6 mths*, dementia) = 30. **Gingival bleeding (GBI) (mean (SD))** *Baseline:* 52.1 (29.2) *6-mth follow-up*: 37.7 (24.5) **Plaque control record (PCR) (mean (SD))** *Baseline*: 89.3 (12.6) *6-mth follow-up*: 80.4 (21.0)	347: No comparator 830: No comparator 1179: No comparator Jablonski et al. (2011): No comparator Connell et al. (2002): No comparator	Denture hygiene and GBI improved significantly over 6 mths for persons with dementia (p <0.001 and p < 0.05, respectively) (347). In patients with intellectual disabilities, significant improvements were seen in plaque scores (d = -3.66) and in the overall oral assessment guide (d = 1.57) (830). Eight weeks after the training, residents with mild to severe dementia had improved plaque index (p < 0.001) denture plaque index (p = 0.04) and gingival index (p < 0.001) scores (1179). Jablonski et al. (2011) found a statistically significant improvement in mean OHAT scores at both 7-days (p < 0.001) and 14 days (p<0.001) after baseline.	⊕◯◯◯ Very Low	347: Zenthofer, Cabrera, Rammelsberg & Hassel, 2016b 830: Binkley, Johnson, Abadi, Thompson, 1179: Sloane, Zimmerman, Barrick, Poole, Reed, Mitchell, & Cohen, 2013.

Quality assessment							Study details		No. of participants		Summary of Findings	Certainty	References
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							United States Connell et al. (2002): United States Samson et al. (2009): Norway	guide (OAG). 830: This multimodal intervention involved creating an action plan specific for oral health, health provider education, adapting the environment, and reinforcing practices via coaching sessions. Specifically, the educational component included using a video to train health providers on how to provide oral hygiene practice for persons who are behaviourally complex, interpersonal strategies, use of rewards, meal supervision, and monitoring goal of oral health care. Furthermore, health-care providers were also offered additional dental devices (i.e. special toothbrushes and pastes, mouth props) and taught how to create a calming environment during oral care. The action plan was reinforced and modified with the support of the dental hygienist for continuous quality improvement of the oral health action plan. 1179: A multi-component intervention was utilized to educate health providers about oral pathology,	**Denture Hygiene Index (mean (SD))** *Baseline*: 86.1 (20.1) 55.3 *6-mth follow up:* 55.3 (35.1) 830: N=25 **O'Leary Plaque Index (mean (SD))** *Pre-test*: 100 (2) *Post-test*: 49 (29) **Oral Assessment Guide (mean (SD))** *Pre-test*: 1.60 (0.26) *Post-test:* 1.78 (0.22) 1179: N=97 (baseline); N= 93 (8-wk follow-up) **Plaque Index for LTC (mean(SD))** *Baseline*: 2.5 (0.5) *8-wk follow-up*: 1.7 (0.8) **Denture Plaque Index (mean (SD))** *Baseline*: 2.9 (0.9) *8-wk follow-up*: 2.1 (0.7) **Gingival Index for LTC (mean (SD))**		Connell et al. (2002) found a reduction in oral plaque for all participants, with plaque index scores ranging from 17% to 83% improvment. Samson et al. (2009) found a significant decrease in the mean mucosal plaque scores (plaque score + mucosal score) 3 months after baseline ($p < 0.001$) and 6 years after baseline ($p < 0.001$).		Jablonski et al. (2011) Connell et al. (2002) Samson et al. (2009)

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								dementia care, and using an individualized care plan. Furthermore, strategies were taught such as how to build a therapeutic relationship, adapt the physical environment, and use of verbal communication. Jablonski et al. (2011): The MOUTh intervention was implemented in a nursing home which involves using best mouth care practices for older adults and threat-reduction strategies during mouth care. Mouth care was provided for a minimum of twice daily. Connell et al. (2002): A research nurse observed patients while they received oral care, conducted a chart review, assessed the cognitive abilities, and worked with other health providers to revise each patient's oral care plan. This included tailored changes to the physical environment and specified cuing strategies to overcome cognitive and non-cognitive deficits. Samson et al. (2009): Oral healthcare program that included: (1)	*Baseline*: 1.8 (0.5) *8-wk follow-up*: 1.4 (0.5) **MDS (bleeding inflamed gums):** *Baseline:* 64 (85) *8 wk follow-up:* 60 (85) Jablonski et al. (2011): N= 7 **Oral Health Assessment Tool (mean (SD))** *Baseline*: 7.29 (1.25) *7-day follow-up*: 2.14 (0.90) *14-day follow-up:* 1.00 (1.26) Connell et al. (2002): N=6 **Silness-Loe Index** Mean change: 47% improvement (SD 27%) Samson et al. (2009): **Mean MPS (SD):** *baseline*, N=88: 5.4 (1.4) **MPS (SD):** *3 mth follow-up*, N = 87: 3.9 (1.3)				

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								teaching/motivation of nursing staff; (2) picture-based procedure cards that depict simple and practical procedures and relevant appliances; (3) Distribution of appliances (e.g., electric toothbrush, interdental brush, toothpaste, fluoride tablets); (4) implementation of new routine on wards; (5) regular measuring routines and feedback on the residents' oral hygiene, including follow-up screening from public dental services.	**MPS (SD):** *6-yr follow-up*, N=88: 4.0 (1.3)				
Person's responsive behaviours (assessed with: modified Resistiveness to Care (RTC) Scale) (Follow up: 2 weeks)													
1	Quasi-Experimental	Very Serious [i]	Not serious	Serious [j]	Serious [k]	None	United States	The MOUTh intervention was implemented in a nursing home which involved using best-practice oral care techniques and threat-reduction strategies.	N=7 **Resistiveness to Care (RTC) Scale** *3-day baseline*: 2.43 behaviors/minute (SD 4.26) *14-day Follow-up*: 1.09 behaviors/minute (SD 1.56)	No comparator	Jablonski et al. (2011) found a non-statistically significant reduction (p=0.06) in the rate of responsive behaviours per minute when the 14-day intervention period was compared to the 3-day baseline measurement. It was noted that there was a downward trend in the number of responsive behaviours; however, there was a lot of variability among patients which could have been due to changes in co-morbid health and medication prescription (confounding variables).	⊕◯◯◯ Very Low	Jablonski et al. (2011)
Knowledge and ability of health providers to provide oral care (assessed with: Caregiver self-efficacy scale, Knowledge (K) Index, Behavior, Attitude, and Self-efficacy (BAS) index, investigator-designed questionnaire) (Follow up: 8 weeks-11 months)													
1	Quasi-Experimental	Serious [l]	Not serious	Serious [e]	Serious [m]	None	United States	This multimodal intervention involved creating an action plan specific for oral health, health provider education, adapting the environment, and reinforcing practices via	N = 21 **Caregiver self-efficacy (mean (SD))** Pre-test: 2.75 (0.30)	No comparator	There was no significant change in caregiver self-efficacy from a pre-test to post-test mean (d=0.51).	⊕⊕◯◯ Low	830: Binkley (2014)

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								coaching sessions. Specifically, the educational component included using a video to train health providers on how to provide oral care for persons who were behaviourally complex, interpersonal strategies, use of rewards, meal supervision, and monitoring goal of oral health care. Furthermore, health providers were also offered additional dental equipment (i.e. special toothbrushes and pastes, mouth props) and taught how to create a calming environment during oral care. The action plan was reinforced and modified with the support of the dental hygienist for continuous quality improvement of the oral health action plan.	Post-test: 2.84 (0.23)				
2	RCT	Very Serious [n]	Not serious	Not serious [o]	Serious [p]	None	1263: United States 1312: Ireland	1263: Health-care providers received oral health education which included a 90-min lecture and practical seminar which covered topics such as: tooth brushing techniques, periodontal disease pathology, and strategies on providing oral care to persons with responsive behaviour.	1263: N=14 **Pre-test vs. Post-test Scoring** Estimated score difference: 0.061 (P-value = 0.01), t = 2.645, d.f. = 13. 1312: **Knowledge Index (mean (SD))**	1263: N=10 **Pre-test vs. Post-test Scoring** Estimated score difference: 0.035 (P-value = 0.14), t = 1.172, d.f. = 9 1312: **Knowledge**	Both studies demonstrated that there was a significant improvement in health-care provider knowledge score after education/training in comparison to the control groups. Specifically, the intervention group had almost a two-fold increase in post-test questionnaire in comparison to the control group (1263). In study 1312, the intervention group had an increase in the Knowledge (K) index (p<0.0001) and Behavior, Attitude, and Self-efficacy (BAS) index (p<0.0001).	⊕◯◯◯ Very Low	1263: Gonzalez, 2013 1312:Mac Giolla Phadraig (2013)

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									Pre-test: 7.23 (1.34) Post-test: 7.86 (1.27) **Behaviour, attitude and self-efficacy (BAS) Index (mean (SD))** Pre-test: 4.73 (1.32) Post-test: 5.42 (1.51)	**Index (mean (SD))** Pre-test: 7.02 (1.38) Post-test: 7.21 (1.32) **Behaviour, attitude and self-efficacy (BAS) Index (mean (SD))** Pre-test: 4.73 (1.36) Post-test: 4.91 (1.55)			

CI: Confidence interval

Explanations

a. There was no control of the confound variables (e.g. level of disability, baseline variables, and use of assistive devices). One study also did not control for confounding variables related to re-organization of group home and changes in intervention implementation. Outcomes assessors in both studies were aware of group assignment and assessment method could have been biased. Downgraded by 1 for risk of bias.

b. Both studies had different populations, outcome measures, and interventions. Downgraded by 1 for indirectness.

c. The total number of patients across both studies was 36 residents at baseline which is well below the optimal sample size of 300. Confidence intervals or estimates of effect could not be compared because different outcomes were evaluated. Downgraded by 1 for imprecision.

d. Although there were some concerns with risk of bias for one study (111), there were high concerns with risk of bias for the other study (1389) because there was no mention of randomization or allocation concealment. Moreover, there were baseline differences between the intervention and control groups in both studies, and there were some concerns with regards to deviations from the intended interventions. Thus, the body of evidence was determined to have a very serious risk of bias, and was downgraded by 2.

e. Participants, interventions, and outcomes provide direct evidence to the clinical question of interest. However, the population of included patients is very specific (e.g., dementia) and therefore may not be generalizable to other populations with cognitive impairments. Downgraded by 0.5 for lack of generalizability.

f. Half of the studies had a critical risk of bias due to confounding variables. Two other studies had serious risks of bias mainly due to some participants not receiving the intended intervention. Thus, there are serious concerns with risk of bias. Downgraded by 1.0.

g. Although all studies demonstrated positive effects in the oral hygiene of residents after the implementation of an oral health care intervention, direct comparison is not possible because the outcomes assessed differ. Thus, the body of evidence was downgraded by 1.

h. Participants, interventions, and outcomes across the four studies provide direct evidence to the clinical question of interest. However, the population of included patients is very specific (e.g., dementia and intellectual and/or developmental disability) and therefore may not be generalizable to other populations. Downgraded by 0.5 for lack of generalizability.

i. There were very serious concerns regarding confounding variables, and some moderate concerns regarding measurement of outcome. Downgraded by 1

j. Differences in the intervention and outcomes measured between the studies precluded the ability to compare the effectiveness of the intervention on the outcomes of interest. Downgraded by 0.5 for heterogeneity.

k. Only 7 residents in sample and no confidence interval provided. Downgraded by 1 for imprecision.

l. There was no control of the confound variables (e.g. level of disability). Also did not control for confounding variables related to re-organization of group home and changes in intervention implementation. Caregivers were aware of intervention. A self-assessment tool was used to measure outcomes of interest and therefore prone to response bias. Downgraded by 1 for risk of bias.

m. Only 25 participants in 11 group homes with no confidence interval reported. Downgraded by 1 for imprecision

n. Both studies had some concerns regarding risk of bias which included an unknown use of a random allocation sequence, lack of blinding of carers, trial personnel, and outcome assessors. Study 1312 which had a larger weight due to bigger sample size, received a high risk of bias in certain domains related to participants being transferred to control group due to lack of attendance in intervention training and no appropriate analysis method was used. Downgraded by 2 for risk of bias.

o. Intervention and population of included studies was very specific and therefore not generalizable. Downgraded by 0.5 for indirectness.

p. There were only 165 participants across both studies, which is well below the optimal sample size of 400. Downgrade by 1 for imprecision.