

**Supplementary Table S1.** Search strategy.

Databases searched: EBM Reviews - Cochrane Database of Systematic Reviews 2005 to February 15, 2023, EBM Reviews - ACP Journal Club 1991 to January 2023, EBM Reviews - Cochrane Clinical Answers January 2023, EBM Reviews - Cochrane Central Register of Controlled Trials January 2023, EBM Reviews - Cochrane Methodology Register 3<sup>rd</sup>Quarter 2012, EBM Reviews - Health Technology Assessment 4<sup>th</sup>Quarter 2016, Embase 1996 to 2023 February 14, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations without Revisions (for alerts only) 1996 to present

#	Search terms	Hits
1	dental health/ or mouth hygiene/	27391
2	((oral adj2 care) or (mouth adj2 care) or (dental adj2 care) or (teeth adj2 care)).mp.	81953
3	((oral adj2 hygiene) or (mouth adj2 hygiene) or (dental adj2 hygiene) or (teeth adj2 hygiene)).mp.	55615
4	((oral adj2 health) or (dental adj2 health) or (teeth adj2 health) or (mouth adj2 health)).mp.	86870
5	1 or 2 or 3 or 4	173702
6	(educat* or program* or train* or practic* or modul*).ab,ti.	8525173
7	nurse midwifery/ or neonatal nurse practitioner/ or nurse midwife/ or pediatric nurse practitioner/ or nurse practitioner/ or pediatric nurse/ or nurse/ or nursing students.mp. or nurse students.mp. or nurse undergraduates.mp. or nurse educators.mp. or nursing staff/ or nursing/ or community health nursing/ or nursing education/ or perinatal nursing/ or newborn nursing/ or nursing practice/ or obstetrical nursing/ or pediatric nursing/ or education, nursing/ or public health nursing/ or neonatal nursing/ or maternal-child nursing/ or community health nursing/ or primary care nursing/ or obstetric nursing/ [mp=ti, ot, ab, tx, kw, ct, sh, fx, hw, tn, dm, mf, dv, kf, dq, bt, nm, ox, px, rx, an, ui, sy]	566409
8	6 and 7	259925
9	5 and 8	1834
10	limit 9 to human [Limit not valid in ACP Journal Club,CDSR,CCTR,CCA,CLCMR; records were retained]	1748

11	limit 10 to humans [Limit not valid in ACP Journal Club,CDSR,CCTR,CCA,CLCMR; records were retained]	1748
12	limit 11 to english language [Limit not valid in ACP Journal Club,CDSR,CCA,CLCMR; records were retained]	1689
13	remove duplicates from 12	1409

**Supplementary Table S2.** Characteristics and key findings of the included studies (n=70).

Reference	Country	Objective	Participants	Research Design	Main findings
<b>Asia (n=21)</b>					
Haresaku et al. 2021 [44]	Japan	To investigate the effects of a study course in oral health care on the perceptions of nursing students	119 Nursing students	Survey questionnaire	<p>Multi-professional education:</p> <ul style="list-style-type: none"> <li>Oral health course that comprised 45h of training in 4 years. These were designed and taught by oral health professionals, a certified speech-hearing therapist, and nurses</li> </ul> <p>Attitude towards oral care</p> <ul style="list-style-type: none"> <li>Almost all expressed interest in oral health care after attending the courses (98%)</li> <li>Those who expressed a positive attitude toward practicing oral health care and collaborating with other professionals' post qualification (96.1%)</li> </ul> <p>Perception regarding oral health care</p>

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- Almost all the participants perceived the effectiveness of oral health care on the prevention of dental caries, periodontal diseases, and aspiration pneumonia after the courses
  - The percentage of students expressing awareness of the effectiveness of oral health care on the prevention of diseases except for dental caries and periodontal disease was significantly increased from 31.4%–44.1% at the baseline to 85.3%–98.0% after the courses
  - More than 96.1% of the students perceived that oral health care should be provided for patients and older adults, and the percentage was significantly increased after the courses ( $p < 0.001$ )
  - More than 90.2% perceived that oral health care should be provided at long-term care facilities, in hospital wards, and hospices
  - The percentage of those expressing this view increased significantly from 6.9%–79.4% at the baseline to 90.2%–97.1% after the courses
  - After the courses, more than 91.2% of the
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students perceived the need for knowledge of general dentistry and nursing, and about three quarters for that of geriatrics and general medicine

- The percentage of those perceiving the need for knowledge of nursing, geriatrics, and general medicine was significantly increased from less than half at the baseline to more than 72.5% after the courses

Perception regarding oral health care practice:

- The percentage of those expressing a need to learn techniques except for swabbing oral soft issue and using interdental cleaning were significantly increased from 21.6%–76.5% at the baseline to 65.7%–95.1% after the courses, both in theory or practice ( $p < 0.05$ )
- The percentage of participants expressing the need to learn how to use interdental cleaning tools significantly decreased before the oral health care course. However, this increased significantly after the course, both in theory and practice

After completing the courses, more than 95% of

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					<p>the participants were interested in the oral health care practice and expected to collaborate with oral health professionals after getting qualified</p> <p>They understood the effectiveness of oral health care for the prevention of aspiration pneumonia and perceived that oral health care should be provided to hospitalized patients and community-dwelling older adults. Their awareness of the need to learn techniques for tooth brushing support, salivary gland massage, oral management, swallowing training, removing tongue coating, and gargling, both in theory and practice, was significantly improved</p>
Haresaku et al. 2020 [24]	Japan	To investigate the effect of interprofessional educational programmes on the improvement of nursing students' oral assessment performances by comparing their attitudes, confidence,	112 first year nursing students	Survey questionnaire	<p>Interprofessional education:</p> <p>Attitudes of nurses: Score 1=strongly disagree, Score 2=disagree, Score 3=neither, Score 4=agree, and Score 5=strongly agree; Mean (SD)</p> <ul style="list-style-type: none"> <li>Assess the status of oral hygiene in their patients: Baseline: 3.57 (0.95); After the programme: 4.12 (0.91)</li> <li>Assess the presence of dental caries in their patients: Baseline: 3 (1); After the programme: 4.04 (0.85)</li> <li>Assess the presence of periodontal</li> </ul>

<p>abilities, and self-performance before and after the education</p>		<p>disease in their patients: Baseline: 3.19 (1); After the programme: 4.09 (0.85)</p> <ul style="list-style-type: none"> <li>Assess the presence of oral cancer in their patients: Baseline: 3.05 (1.1); After the programme: 3.98 (0.95)</li> <li>Perform oral assessment to perform appropriate oral health care for their patients: Baseline: 4.25 (0.77); After the programme: 4.44 (0.77)</li> <li>Perform oral assessment to their patients and encourage their patients with dental problems to see a dentist: Baseline: 4.10 (0.85); After the programme: 4.44 (0.70)</li> <li>If I have a nurse qualification in the future, I hope I perform oral assessment for my patients: Baseline: 3.84 (0.95); After the programme: 4.00 (1.04)</li> <li>If I have a nurse qualification in the future, I hope I perform oral assessment for my patients and encourage those with dental problems to see a dentist: Baseline: 4.05 (0.94); After the programme: 4.37 (0.86)</li> <li>Total of the attitude scores (Average (SD)): Baseline: 32.50 (5.54); After the programme: 37.17 (5.70)</li> </ul> <p>Confidence of nurses: Score 1=no confidence and</p>
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Score 5=strong confidence; Mean (SD)

- Lip: Baseline: 2.75 (0.98); After the programme: 3.93 (0.98)
- Tongue and tongue coating: Baseline: 2.43 (0.96); After the programme: 3.77 (1.03)
- Gingiva and oral mucosa: Baseline: 2.40 (0.92); After the programme: 3.80 (1.01)
- Saliva: Baseline: 2.23 (1.01); After the programme: 3.56 (1.13)
- Present teeth: Baseline: 2.50 (1.02); After the programme: 3.68 (1.05)
- Removable dentures: Baseline: 2.70 (1.45); After the programme: 4.10 (0.96)
- Oral cleanliness: Baseline: 2.53 (0.97); After the programme: 3.81 (0.94)
- Oral pain: Baseline: 2.68 (1.25); After the programme: 3.84 (1.08)
- Assessment of the needs of dental referral after the oral assessment performance: Baseline: 2.18 (0.96); After the programme: 3.75 (1.08)
- Total confidence: Baseline: 22.09 (7.32); After the programme: 34.25 (7.21)

Their attitudes and confidence regarding oral assessment were significantly improved after the

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programmes					
Gu et al. 2023 [46]	China	To investigate nurses' self-efficacy and attitudes of providing oral care in geriatric care facilities (GCFs) and compare differences between individuals, facilities and countries	852 Nurses	Cross-sectional survey	<ul style="list-style-type: none"> <li>SE-PMC and A-PMC of nurses in public GCFs were higher than those of nurses in private GCFs (2.93 [SD: 0.37] vs 2.92 [SD: 0.38])</li> <li>Scores of SE-PMC and A-PMC of nurses in GCFs with less than 100 beds were higher than those of nurses in GCFs with more than 100 beds (2.94 [SD: 0.36] vs 2.87 [SD: 0.39])</li> <li>SE-PMC of nurses in GCFs established in 10 years higher than those in GCFs established over 10 years (2.93 [SD: 0.37] vs 2.87 [SD: 0.39])</li> <li>No differences between SE-PMC and A-PMC were found about the age of nurses</li> <li>Nurses with 1–2 years and 3–4 years of work experience had higher SE-PMC scores than those with 5–8 years and ≥9 years of work experience (3.25 [SD: 0.47] vs 3.22 [SD: 0.43]) vs 3.14 [SD: 0.46] vs 3.21 [SD: 0.5])</li> <li>Overall, American nurses (n = 434) had higher scores than Chinese nurses (n=852) in Shanghai for SE-PMC &amp; A-PMC (3.03 [SD: 0.38] vs 2.89 [SD: 0.38]) &amp; ((3.19 [SD: 0.38] vs 2.98 [SD: 0.38])</li> </ul>



Fernandes et al. 2022 [47]	India	To assess the knowledge and attitude of paramedical students about the emergency management of avulsed tooth	71 physiotherapy, 106 nursing, and 83 pharmacy students	Cross-sectional survey	<p>Knowledge of nurses:</p> <ul style="list-style-type: none"> <li>• Definition of tooth avulsion: “Fracture of tooth”: 29; “Complete displacement of tooth from its socket denoted”: 29.61%</li> <li>• Tooth re-implantation: 28.85% of nurses denoted it can be done</li> <li>• Handling avulsed tooth: 15% by crown, 14.62% by root</li> <li>• Transport of avulsed tooth to dentists: By paper tissue or handkerchief (12.69%), any liquid (11.54%)</li> <li>• Most suitable storage medium: Milk: 13.07%, allow the tooth to dry and cover in sterile gauze 10.77%</li> <li>• Have you heard of mouth guards: 27.69%</li> </ul> <p>Attitude of nurses:</p> <ul style="list-style-type: none"> <li>• Emergency management of dental trauma: Very important/important 15.38%</li> </ul>
An et al. 2022 [42]	China	To investigate oral health literacy (OHL) and oral health behaviors of nurses, and explore the	317 hospital nurses	Cross-sectional survey	<p>Oral health literacy scores (OHL):</p> <ul style="list-style-type: none"> <li>• OHL scores: 7–56 <ul style="list-style-type: none"> <li>- 44.2% showed low level scores (0–35)</li> <li>- 34.1% showed medium level scores (36–46)</li> </ul> </li> </ul>

<p>association between oral health literacy with demographic variables and oral health behaviors</p>	<div><div>- 21.8% showed high level scores (&gt;46)</div><div>Association of OHL with demographics: Mean (SD)</div><div><ul style="list-style-type: none"><li>• There was no statistically significant (<math>p&gt;0.05</math>) comparison of scores by gender, education level, job title, and place of residence</li><li>• Oral health literacy scores tended to increase with age (18~25: 34.33 (9.35) vs 26~35: 36.12 (10.99) vs <math>\geq 36</math>: 39.03 (10.02) and years of working experience (1 ~ 5: 35.29 (10.20) vs 6~10 (35.23 (10.916) vs <math>\geq 11</math>: 38.62 (10.21)</li><li>• The higher the monthly household income (RMB), the higher the oral health literacy score (<math>\leq 2000</math>: 34.44 (11.67) vs 2000-5000: 33.39 (10.11) vs 5000-10000: 36.17 (9.69) vs <math>\geq 10,000</math>: 42.62 (10.64)</li><li>• Those nurses who had seen a dentist in the last year had higher oral health literacy scores</li></ul></div><div>Associations between different OHB and OHL</div><div><ul style="list-style-type: none"><li>• There were no statistical differences in total OHL scores in terms of the number</li></ul></div></div>
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of daily brushing, whether to use toothpicks, frequency of toothbrush replacement, and whether or not there were caries

- Statistically significant difference between subjects with OHL scores in relation to:

Mean (SD)

- Brushing method: horizontally (35.42 [11.28] vs vertically (38.34 [10.35]) vs circle (37.52 [10.78] vs no fixed method (33.53 [9.84])
  - Brushing time: ≤1 (33.22 [9.70] vs 1–2 (35.78 [9.91] vs >2 (40.18 [11.02])
  - Whether to use dental floss (Never or occasionally (34.30 [10.47] vs 1~2 times per week (38.71 [8.47] vs ≥3 times per week (42.91 [10.48] vs once a day (44.7 [9.22] vs more than 2 times a day (41.44 [8.54])
  - Rinsing after daily meals (Never or occasionally (34.41 [9.19] vs 1 time (35.42 [11.38] vs 2 times (39.83 [12.11] vs >2 times (41.37 [9.50])
  - Using mouthwash: No (36.06
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[10.30] vs Yes (44.12 [10.34])

- Using fluoride toothpaste: Yes (39.55 [11.03]) vs No (37.67 [9.29])
  - Regular oral examination: No (32.88 [8.93]) vs Yes (40.84 [10.57])
  - Regular scaling: No (34.51 [9.62]) vs Yes (40.25 [10.98])
  - Gum bleeding when brushing: Never (37.95 [11.94]) vs Sometimes (1 time/week) (37.23 [10.00]) vs Often ( $\geq 3$  times/week) (32.71 [9.66]) vs Don't know or didn't care (32.71 [8.79])
  - Treatment measures when brushing bleeding or gum swelling: Don't need to treat (34.72 [9.99]) vs Go back to the dentist when you have time (38.1 [10.40]) vs Seek medical attention immediately (42.75 [12.66]) vs Take your own medicine or other (34.16 [7.98])
  - Reasons for visiting dentist: See a dentist when tooth decay is found (40.63 [9.59]) vs Regular
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					<p>checkup even without discomfort 43.00 [13.31])</p> <p>- Whether to take the initiative to learn about oral health knowledge: Never (32.06 [9.20] vs occasionally (35.2 [9.75] vs Often (45.51 [9.60]))</p>
Haresaku et al. 2022 [71]	Japan	To investigate the performance of oral assessment and health care education at nursing schools across Japan to identify problems and the need for oral health professional support	Heads of the nursing fields	Cross-sectional survey	<p>Oral health training:</p> <ul style="list-style-type: none"> <li>• Majority (71%) of them spent less than 2 hours in teaching</li> <li>• 24.5% taught the usage of oral assessment tools</li> <li>• More than 90% spent less than 2 hours in lecture-based and practical oral health care education, respectively</li> <li>• Less than half taught the association of periodontal diseases with diabetes and cardiovascular diseases and use of fluoride for caries prevention in the lectures</li> <li>• Approximately 30% taught the usage of an interspace brush or dental floss</li> <li>• Less than 10% of oral health professionals taught oral health care in lectures or practical oral health care</li> </ul>

Wei et al. 2022 [61]	China	To assess the practicing situation of nurses in the intensive care unit (ICU) for postoperative patients with oral cancer and their need for training	Nurses and head nurses of ICU	Cross-sectional survey	<p>Duration of oral care of patients:</p> <ul style="list-style-type: none"> <li>55.5% spent approximately 5–10 min conducting oral care for patients.</li> </ul> <p>Frequency of oral care:</p> <ul style="list-style-type: none"> <li>2.3% once a day, 20.2% twice a day, 25.4% three time a day, 22% four times a day</li> </ul> <p>Method of oral care:</p> <ul style="list-style-type: none"> <li>Swabbing (91.9%), rinsing (37.6%), combination (48.6%)</li> </ul> <p>Oral care mouthwash method, and tool</p> <ul style="list-style-type: none"> <li>Physiological saline solution (82.7%), Special mouthwash for oral care (e.g., chlorhexidine) (57.2%), Hydrogen peroxide solution (31.8%), Sodium bicarbonate solution (20.8%), Distilled water (17.9%)</li> </ul> <p>Tools for oral care:</p> <ul style="list-style-type: none"> <li>Oral care package with cotton ball (86.1%), Large cotton swab or gauze (69.9%), Toothbrush with flushing and suction (43.9%)</li> </ul> <p>Barriers for nurses to implement oral care</p> <ul style="list-style-type: none"> <li>Lack of knowledge and skills surrounding</li> </ul>
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oral care (76.9%), insufficient perception of the importance of oral care (74%), surgical incision hinders the evaluation and operation (67.1%), uncooperative patients due to pain and discomfort (62.4%), shortage of nurse human resources (57.8%), lack of appropriate tools of oral care (57.8%), lack of standardized regulation of oral care (57.2%), concerns about conditions caused by oral care (e.g., wound bleeding (45.1%)

Oral health training:

- 69.4% had never received continuing education or training in oral care for postoperative patients with oral cancer
  - Indications and contraindications (84.4%), tools (81.5%), and mouthwash (80.9%) of oral care, evaluation of oral care (79.2%), first timing of first oral care (75.7%), procedure of oral care (74%), matters needing attention of oral care (69.9%), methods of oral care (67.6%), frequency of oral care (65.3%), purpose of oral care (59.5%) are the oral content that nurses most eager to learn about for
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					<p>postoperative patients with cancer</p> <ul style="list-style-type: none"> <li>• Scenario simulation analysis (75.1%), education online (69.9%), series of lectures (55.5%), communication and discussion with others (38.2%), self-study (12.1%) training methods</li> </ul>
Zagade et al. 2022 [48]	India	To evaluate the attitudes and practices among nurses concerning the oral health care of debilitated patients	180 hospital nurses	Cross sectional questionnaire study	<p>Practice of nurses regarding periodontal disease and oral health care of debilitated patients</p> <ul style="list-style-type: none"> <li>• Oral health management a part of your education: Yes (100%)</li> <li>• Training on oral health for debilitated patients: Yes (88.3%)</li> <li>• Do you use mouthwash in oral health care of the patients: Yes (86.1%)</li> <li>• Is cleaning the oral cavity of patient is a difficult task: Strongly Agree (13.3%), Agree (42.2%)</li> <li>• Is there a need for specialized training for oral care in debilitated patients: Strongly Agree (55.6%), Agree (41.7%)</li> <li>• Need to involve dental hygienists for oral care in debilitated patients: Strongly Agree (51.1%), Agree (47.8%)</li> </ul> <p>Knowledge of nurses about periodontal disease</p>



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and oral health care of debilitated patients

- Does the Health of teeth and gums affect the general health of the patients?  
Strongly Agree (68.9%), Agree (30.6%)
- Does poor oral health can lead to the loosening of teeth: Strongly Agree (68.9%), Agree (30.6%)
- Should Oral care be given to the patients twice a day: Strongly Agree (62.2%), Agree (34.4%)
- Does poor oral care can cause hospital acquired infections: Strongly Agree (44.4%), Agree (47.8%)
- Good oral hygiene showed decreased chances of hospital-acquired infection: Strongly Agree (43.3%), Agree (49.4%)
- Aware of how to use a powered toothbrush for debilitated patients: Yes (58.3%)

Awareness of nurses about periodontal disease and oral health care of debilitated patients

- As a nursing graduate, do you think you need to know more about oral cavity and oral diseases: Strongly Agree (59.4%), Agree (40%)
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					<ul style="list-style-type: none"> <li>• According to you, is there any need for a clinical posting in dental college: Yes (71.1%)</li> <li>• Have you ever taken part in a dental camp conducted by a college: Yes (61.1%)</li> </ul>
Lakshmi et al. 2022 [43]	India	To determine and compare the oral health knowledge, attitude and practice with oral health status among nursing students	261 nursing students	Cross-sectional survey	<p>Knowledge, attitude, practice of nurses: Mean (SD)</p> <ul style="list-style-type: none"> <li>• Females reported better knowledge (24.08 (4.3) vs 24.06 (3.3)) , attitude (5.43 (1.3) vs 5.14 (1.2)) and practice (10.82 (1.5) vs 10.46 (1.6)) than males</li> <li>• Third year students reported better knowledge (24.42 (4.3) vs 24.02 (4.2) vs 23.76 (3.8)) and practice (10.89 (1.7) vs 10.56 (1.5) vs 10.74 (1.4) than second year and fourth year students</li> <li>• Higher mean attitude scores in second year (5.61 (1.2) vs 5.56 (1.3) vs 4.89 (1.1) than third year and fourth year students</li> </ul>
Paulsamym et al. 2022 [49]	India	To evaluate the empowerment of primary healthcare providers on the	112 nurses, 71 pharmacists, 35 lab technicians	Cross sectional questionnaire study	<p>Knowledge:</p> <ul style="list-style-type: none"> <li>• Overall level of knowledge on dental or oral health was better among nurses (64.56%), followed by pharmacists</li> </ul>

		prevention and management of dental or oral health issues among post chemotherapy (PC) patients during pandemic			<p>(54.5%); lab technicians scored less (30.03%) comparatively</p> <p>Attitude:</p> <ul style="list-style-type: none"> <li>Nurses and pharmacists with less years of experience (OR=1.31, 95% CI: 1.43–3.11) and those who had higher degrees (OR=1.4, 95% CI: 1.47–2.27) also had a more positive attitude toward the prevention and management of dental and oral health problems of PC patients than did those with a lower qualification</li> </ul>
Bashir et al. 2021 [50]	Pakistan	To assess and correlate the knowledge, attitude and practice of nursing students towards oral health care	183 Nursing students	Cross-sectional study	<p>Knowledge and attitude</p> <ul style="list-style-type: none"> <li>How many times should a person brush his teeth? <ul style="list-style-type: none"> <li>Morning (10.9%)</li> <li>Evening (73.2%)</li> <li>More than 2 times (7.7%)</li> <li>After every meal (8.2%)</li> </ul> </li> <li>What is the proper brushing method? <ul style="list-style-type: none"> <li>Horizontal (8.7%)</li> <li>Circular (57.9%)</li> <li>Vertical (2.7%)</li> <li>Horizontal and circular (30.6%)</li> </ul> </li> <li>What kind of brush is ideal to use? <ul style="list-style-type: none"> <li>Soft (78.1%)</li> </ul> </li> </ul>

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- Medium (21.3%)

- Hard (0.5%)

- How often a person should change his tooth brush?

- Once a month (13.1%)

- Every 3 months (64.5%)

- Every 6 months (18.6%)

- When it is spoilt (3.8%)

- Would you advice flossing and use of interdental brushes?

- Yes (75.4%)

- No (13.7%)

- Should oral ailments be treated equally as other diseases/problems of the day?

- Yes (96.7%)

- No (1.6%)

- Do you think collaboration between regular health care and dental care is needed?

- Yes (90.7%)

- No (4.4%)

#### Oral health practices

- At what time do you brush your teeth?

- Morning (12.6%)

- Evening (7.7%)

- After meals (62.3%)

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- More than two times (17.5%)
  - For how many minutes do you brush your teeth?
    - Less than one minute (59%)
    - More than one minute (36.1%)
  - What method of tooth-brushing do you use?
    - Horizontal (10.9%)
    - Circular (39.3%)
    - Vertical (2.2%)
    - Both horizontal and circular (47.5%)
  - What type of tooth brush do you use?
    - Hard bristle (6%)
    - Medium bristle (27.9%)
    - Soft bristle (66.1%)
  - When do you change your toothbrush?
    - After 1-3 months (30.6%)
    - After 4-6 months (64.5%)
    - After 7-12 months (3.3%)
    - After a year or more (1.6%)
  - Do you use any other aid for cleaning your teeth?
    - Floss (7.1%)
    - Mouthwash (81.4%)
    - Combination of both (11.5%)
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					<p>There is good basic knowledge, and attitude regarding oral health care among our nursing students. With provision of advance knowledge about oral diseases and oral hygiene protocols, nurses can be efficiently utilized in spread oral health promotion among our general population</p>
Ahmad et al. 2021 [51]	Malaysia, Australia	To determine nursing students' perceptions of OH education and practice in Malaysian and Australian nursing schools	122 Malaysian nursing students, 299 Australian nursing students	Cross-sectional survey	<p>Students' experience of encountering patients with oral health issues</p> <ul style="list-style-type: none"> <li>• More Malaysian nursing students reported having encountered patients with oral health issues compared with students in Australia (98.4% vs. 82.9%, <math>p \leq 0.01</math>)</li> <li>• Majority of students in Malaysia and Australia were exposed to patients presenting with halitosis (87.7% vs. 62.2%, <math>p \leq 0.01</math>) and edentulism (69.7% vs. 57.5%)</li> <li>• Malaysian students also reported significantly higher encounters than Australian students with patients who had <ul style="list-style-type: none"> <li>- Oral ulceration (63.1% vs. 41.1%, <math>p \leq 0.01</math>)</li> <li>- Oral and/or dental trauma (36.9% vs. 21.1%, <math>p = 0.001</math>)</li> </ul> </li> </ul>

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- Children with caries (28.7 vs. 7.7%,  $p \leq 0.01$ )

Students' comfort level in undertaking oral health activities

- The majority of Malaysian and Australian students felt comfortable in
  - Oral hygiene instruction (77.5% vs. 68.9%)
  - Conducting oral examinations (52.4% vs. 51.6%)
  - But not in deciding whether dental referral was required (42.5% vs. 43.0%;  $p = 0.004$ )

Students' beliefs about the role of nurses in oral health care

- Educating patients about the effects of diet on oral health (94.3% Malaysian vs. 74.7% Australian,  $p \leq 0.01$ )
  - Advising patients to obtain regular dental check-ups (89.3% Malaysian vs. 71.6% Australian,  $p \leq 0.01$ )
  - Undertaking routine oral screening (86.9% Malaysian vs. 67.4% Australian,  $p \leq 0.01$ )
  - Providing advice on oral hygiene
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procedures (86.1% Malaysian vs. 72.1% Australian,  $p=0.002$ )

- They should be trained to apply fluoride varnish on teeth of patients with a high-risk of developing caries (55.4% Malaysian vs. 51.4 Australian;  $\chi^2 = 14.241$ ,  $p=0.001$ )

Student's attitude regarding oral health provision:

- Oral hygiene care was a high priority (79.5% Malaysian vs. 74.7% Australian)
- Oral hygiene had a significant impact on patients' clinical outcomes (86.9% Malaysian vs. 82.2% Australian)
- Half of the students felt that cleaning the oral cavity was difficult (44.3% Malaysia vs 50% Australia)
- Small percentage thought it was an unpleasant task to clean oral cavity (15.6% Malaysian vs. 34.3% Australian;  $\chi^2 = 19.238$ ,  $p\leq 0.01$ )

Students' perceptions of current training in oral health

- Less than half of the students in both countries felt that they received adequate training in oral health (48.4% Malaysian
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vs. 36.6% Australian,  $p \leq 0.01$ )

- A significantly higher proportion of students in Malaysia reported that they received good training in performing oral hygiene procedures on patients (91.0% vs. 68.7%,  $p \leq 0.01$ )
- Giving oral hygiene instruction (84.4% vs. 64.9%,  $p \leq 0.01$ )
- Undertaking basic oral examination (68.9% vs. 51.9%,  $p = 0.001$ )
- Providing smoking cessation advice (57.0% vs. 46.2%,  $p = 0.008$ )
- Less than half the students in both countries felt that their training in advising patients about diet and oral disease prevention (46.7% Malaysian vs. 41.7% Australian,  $p = 0.009$ )
- Detecting oral cancerous lesions (18.0% Malaysian vs. 22.6% Australian,  $p \leq 0.01$ )
- Students also felt that they needed more information regarding evidence-based oral care standards (75.4% Malaysian vs. 67.0% Australian)

Students' perceptions of future training in oral health

- Almost all nursing students in Malaysia
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					<p>(99.2%) and Australia (91.2%) agreed that oral health should be taught to nursing students (<math>p=0.002</math>)</p> <ul style="list-style-type: none"> <li>Over 80% of nursing students from both countries indicated the importance of instruction in the oral care of patients as components of the intensive or critical care unit as well as smoking and its impact on oral health, the effects of poor oral health on systemic health and conducting basic oral examinations in adults</li> </ul>
Yavagal et al. 2020 [41]	India	To assess knowledge, attitude and practices related to oral health among nursing (BSc) students	365 BSc nursing students	Cross-sectional survey	<p>Oral health knowledge</p> <ul style="list-style-type: none"> <li>Mean knowledge scores of final year (14.06) and third year nursing students (11.54) were higher than first year (9.08) and second year students (9.84) (<math>p=0.01</math>)</li> <li>Oral health is related to general health (88.5%)</li> <li>Proper maintenance for milk teeth is important as permanent teeth (45.2%)</li> <li>Dental decay and gum disease are caused by plaque (42.7%)</li> <li>By proper tooth brushing and flossing dental decay and gum disease can be prevented (81.9%)</li> </ul>

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- Fluoride prevents tooth decay (46.8%)
  - Germs that cause tooth decay are transmitted from mother to her child (33.4%)
  - Frequent consumption of sticky sweets causes tooth decay (80.3%)
  - Alignment of teeth is done for aesthetic and functional purpose (50.7%)
  - Para-functional habits like mouth breathing, thumb sucking and nail-biting among children can have effects on jaw and facial growth (66.6%)
  - Mouth guards prevent sports related injuries to oral structures (67.9%)
  - A tooth avulsed due to trauma can be replaced in the socket (41.6%)
  - Loss of teeth in old age can be prevented by proper maintenance of oral health (67.7%)
  - Soft drinks cause weakening of teeth (67.7%)
  - Following causes oral cancer: Tobacco (60.8%), pan-chewing (14.8%), Ill-fitting prosthesis (0.8%), Sharp teeth (1.4%), All of the above (19.2%)
  - Gum disease is linked with: diabetes
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(29.9%), pregnancy (7.4%), preterm birth weight (8.2%), cardiac diseases (6.8%), all of the above (14%)

Attitude of nurses:

- Do you feel regular visit to dentist for oral health check-up is necessary (72.6%)
- Oral health can be important part of nursing care (91.2%)
- Oral care is given less emphasis in your curriculum (33.2%)
- Oral health should be updated and expanded in nursing education (82.2%)
- Need to collaborate with dentists in order to provide oral healthcare for patients (78.1%)

Oral health practices:

- How often do you visit your dentist: Once in 6 months (40.5%), once in a year (9%), Whenever there is problem (44.1%)
  - Do you refer patients to the dentists when necessary (61.4%)
  - How many times you brush your teeth in a day: Once (22.5%), twice (74.2%), more than twice (3.3%)
  - What do you use to clean your teeth:
-

					<p>Toothbrush and tooth paste (94.2%), Toothbrush and toothpowder (3.8%), Any other (1.9%)</p> <ul style="list-style-type: none"> <li>Do you have a habit of mouth rinsing: Yes (67.4%)</li> </ul> <p>Knowledge related to oral health was good among the study subjects</p> <p>Majority of the students felt the need for regular visits to dentists and felt that oral health care was an important part of nursing care</p> <p>Most brushed their teeth twice daily and had the habit of mouth rinsing and referred their patients to dentists. They also felt the need to collaborate with dentists for providing optimum oral care for the patients</p>
Haresaku et al. 2019 [77]	Japan	To investigate nursing faculty members' perceptions of oral care and to identify the effects of an educational environment on their perceptions	156 Nursing faculty members	Cross sectional questionnaire study	<p>Oral health practices:</p> <ul style="list-style-type: none"> <li>To whom should oral care provided: Older adults who need nursing care (98.1%); Patients on the hospital ward (94.2%); Patients with cancer (92.3%); Healthy older adults (86.5%); Healthy persons except for older adults (74.4%)</li> <li>Where oral care should be provided: Nursing home (98.7%); At home (96.2%), Acute care hospital (95.5%), Cancer</li> </ul>

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hospital (94.9%), Hospice (94.9%), Rehabilitation center (89.1%), Pediatric ward (89.1%), Psychiatric ward (83.3%), Maternity ward (70.5)

- What should be included in oral care as treatments or instructions: Toothbrushing by caregiver (96.8%), Swabbing oral soft tissues (95.5%), Removing tongue coatings (94.2%), Cleaning dentures (94.2%), Cleaning interdental surfaces (89.7%), Gargling (87.8%), Oral management (78.8%), Perioperative oral management (78.8%), Home dental care (74.4%), Salivary gland massage (72.4%), Indirect swallowing training (53.2%), Direct swallowing training (52.6%), Speech therapy (43.6%)
- What kind of knowledge is particularly important in practicing oral care? General dentistry (90.4%), General medicine (84%), Geriatrics (70.5%), Psychology of aging (48.7%)

It is suggested that oral care education should be standardized and nursing faculty members should standardize the curriculum regarding oral care for nursing students

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Philip et al. 2019 [39]	India	To determine the knowledge, attitude and practices of nurses regarding oral care for hospitalized patients	244 tertiary care hospital nurses	Cross-sectional survey	<p>Knowledge of nurses: Mean (SD)</p> <ul style="list-style-type: none"> <li>The mean total knowledge score of participants was 6.74 (SD = 2.439) out of a total possible score of 22</li> <li>Majority of participants knew of the importance of oral care in inpatients and the association between oral hygiene and systemic disease, having the highest adjusted scores of 0.98 and 0.96</li> <li>Participants achieved the lowest adjusted knowledge scores regarding common medications that interfere with oral health (0.15), and care of dentures (0.18)</li> </ul> <p>Attitude of nurses: Mean (SD)</p> <ul style="list-style-type: none"> <li>The mean attitude score of participants was 40.32 out of a possible 60 points</li> <li>Two factors that were associated with participants having higher attitudes; having a bachelor degree or higher as the highest educational qualification (41.89 vs below bachelor 39.55), or working in a department that typically treats patient with a longer length of stay (40.76 vs short stay 38.62)</li> </ul> <p>Practices of nurses:</p>
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					<ul style="list-style-type: none"> <li>• More than three-quarters of respondents (80.2%) indicated they assessed the oral health needs of patients within 24 h of admission</li> <li>• Approximately half of respondents indicated that their department had a formal unit protocol for oral health assessment and provision of care (51.4%), with less than half of respondents indicating their department had a formal protocol for oral care (42.9%)</li> <li>• Just under two-thirds of respondents (36.6%) performed oral care at least twice per day, with perceptions of inadequate supplies, working in a paediatric department, and a low total knowledge score associated with providing oral health care less than twice per day</li> </ul> <p>There were inconsistencies in the oral health assessment and care protocols followed and documentation</p>
Ahmed et al. 2018 [53]	India	To study the knowledge, attitude and behaviour towards	170 hospital nurses	Cross-sectional survey	<p>Knowledge of oral health among the respondents:</p> <ul style="list-style-type: none"> <li>• Good oral health is important for overall health of the child: 100%</li> </ul>



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oral health care  
among nurses

- Early loss of milk teeth may result in malocclusion of permanent teeth: 23.5%
- Child should be seen by a dentist by 1 year: 61.8%
- Dental caries can be transmitted from mother to the child: 10.6%
- Transmission of caries through utensils: 25.9%
- Sugar and poor oral hygiene form the important etiology for caries development: 90%
- Fluoridated toothpaste is not recommended for children as small as 2 years old: 69%
- They obtained the above knowledge during the training provided in nursing college: 22.9%
- They received the information by reading on their own: 69.4%
- Through exchange of information from colleagues and friend: 2.4%

Attitude of nurses:

- Majority of the nurses showed positive attitudes toward their role in preventive OHC
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- Willing for training in OHC: 83%
  - OHC provided by them would be inefficient: 69%
  - Milk tooth does not need care as it will be shed: 81%

Behaviour:

- Not consistent in recommending dental visits for pregnant mothers: 69%
- Do not enquire about pregnant mother's oral health: 73%
- Rarely counsel them regarding importance of milk tooth and tooth brushing: 57%
- Majority of them used toothbrush and paste for brushing themselves, but only 24% of them are regular users of floss
- Nurses visited dentist every 6 months for checkup: 9.4%

Appropriate training and encouragement for promotion of oral health and to provide suitable care for the prevention of dental diseases should be included in the curriculum of nurses training

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Ab Malik et al. 2018 [34]	Malaysia	To investigate oral health knowledge for stroke care	806 hospital nurses	Cross-sectional survey	Oral health knowledge: <ul style="list-style-type: none"> <li>• Mean score was 3.7 (SD: 1.1) out of a possible 5.0</li> </ul>
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		and the clinical practices performed for oral hygiene care in Malaysia			<p>Oral hygiene practices:</p> <ul style="list-style-type: none"> <li>• Oral Hygiene Care: Routinely: 63.6%</li> <li>• Physical means <ul style="list-style-type: none"> <li>- Manual toothbrush: 19.4%</li> <li>- Powered toothbrush: 9.7%</li> <li>- Suction toothbrush: 0.7%</li> <li>- Forceps &amp; cotton/gauze: 16.7%</li> <li>- Spatula &amp; cotton/gauze: 38.3%</li> <li>- Orange stick &amp; cotton: 5%</li> <li>- Mouth rinses only: 4.6%</li> </ul> </li> <li>• Chemical means <ul style="list-style-type: none"> <li>- Thymol gargle: 53.3%</li> <li>- Chlorhexidine: 12.2%</li> <li>- Sodium bicarbonate: 2.1%</li> <li>- Difflam: 0.7%</li> </ul> </li> <li>• The clinical practice of providing oral hygiene care is less than ideal and there are deficiencies in oral health knowledge for stroke care. Oral health knowledge was associated with clinical practice of providing oral hygiene care</li> </ul>
Haresaku et al. 2018 [40]	Japan	To identify the weak points in the knowledge and attitudes of first-year oral health	119 Nursing students	Questionnaire study	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> <li>• The level of knowledge and attitudes in NSs regarding oral health care were likely to be lowest amongst the student groups</li> </ul>

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care and nursing  
students towards  
oral health care  
and to identify the  
factors associated  
with their positive  
willingness to  
practice oral  
health care after  
becoming a health  
professional in  
order to develop  
oral healthcare  
curricula

(dental students & dental hygiene  
students)

- They did 'Not very much' know about oral health care (40.9%)
- 'Not very much' interested in oral health care practice (39.2%)

Perceptions of oral health:

- Oral healthcare affects?
  - Prevention of dental caries (98.3%)
  - Prevention of periodontal disease (96.5%)
  - Prevention of general disease (39.1%)
  - Prevention of cardiovascular disease (43.5%)
  - Prevention of aspiration pneumonia (34.8%)
  - Care prevention (Prevention of becoming frail) (31.3%)
  - Improvement of anorexia (31.3%)

Nursing students' high interest towards oral health care was associated with their positive willingness to practice oral health care in the future although oral health students' high perceptions and interest regarding oral health care were associated with

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					the willingness
Saddki et al. 2017 [55]	Malaysia	To determine attitudes and practices of intensive care unit (ICU) nurses towards provision of oral care for intubated patients	108 nurses	Cross-sectional survey	<p>Attitudes of nurses towards oral care</p> <ul style="list-style-type: none"> <li>• Oral cavity is difficult to clean (40.8%)</li> <li>• Cleaning oral cavity is unpleasant task (16.2%)</li> <li>• Oral care is very high priority (100%)</li> </ul> <p>Attitudes towards oral care training</p> <ul style="list-style-type: none"> <li>• Nurses agreed that their training in oral care provision was adequate: 55.9%</li> <li>• Majority thought that they need more information on research-proven oral care standards (94.7%)</li> <li>• Would you like to learn more about the best way to provide oral care?: Yes: 97.9%</li> </ul> <p>Hospital support:</p> <ul style="list-style-type: none"> <li>• Supplies and equipment to perform oral care to patients were available (93.6%) and suitable (88.2%)</li> <li>• They need better supplies and equipments: 88.2%</li> <li>• Nurses agreed that they have enough time to provide oral care (87.1%)</li> <li>• Some preferred the task to be performed</li> </ul>

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by a dental staff (43%)

Methods and frequency of oral care:

- Moisturizers (98.9%)
- Cotton/gauze swab (93.5%)
- Suction toothbrush (93.5%)
- Mouthwashes (88.2%)
- They brushed their patients' teeth at least twice daily using suction toothbrush (90.3%)
- They brushed their patients' teeth at least twice daily using manual toothbrush (49.5%)
- Petroleum jelly (88.2%)
- Chlorhexidine gluconate oral rinse (97.8%)
- Swabs (93.5%)
- Tap water to wash their patients' mouth (4.3%)
- Moisturize their patients' lips (12.9%)

The nurses' attitudes towards oral care were generally positive and most oral care methods were appropriate. However, some methods and products used were inconsistent with the current recommendations and they have mixed views about the suitability of oral care supplies and

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					equipment provided by the hospital
Ab Malik et al. 2017 [72]	Malaysia	To determine the oral health care practices among health care providers of patients hospitalized after an occurrence of stroke and how background of the health care providers and work environment affect these practices	806 head nurses and staff nurses in hospitals	Cross sectional questionnaire study	<p>Oral care practices:</p> <ul style="list-style-type: none"> <li>• Almost half of the respondents (48.1%) reported that they recommended tooth brushing twice or more per day to stroke patients</li> <li>• Two-thirds (64.7%) reported that they performed daily mouth washing on their patient, while less than half (38.8%) reported daily oral hygiene assistance</li> <li>• Nurses in rehabilitation wards were more likely to recommend tooth brushing at least twice or more daily to their patients (56.7%) compared with nurses working in the medical wards (46.5%)</li> <li>• Higher percentage of nurses with higher qualifications recommended tooth brushing at least twice or more daily to patients (64.5%) compared to nurses with a lower qualification (45.5%)</li> <li>• Brushing frequency was higher (51.5%) in the wards with the oral hygiene kits available compared to that in the wards without the oral hygiene kit (42.0%)</li> <li>• Head nurses assisted patients with their</li> </ul>

					<p>oral care more often (62.0%) compared to the staff nurses (36.5%)</p> <ul style="list-style-type: none"> <li>• Oral health care guidelines (68.7%) were associated with daily mouth washing performed by the staff nurses compared to those without oral health care guidelines (50.3%)</li> <li>• Staff nurses who had attended oral care training were also more likely to perform daily mouth washing to stroke patients (75.6%) compared to those without oral care training (60.6%)</li> <li>• Oral hygiene practices were significantly associated with having working wards (<math>p&lt;0.05</math>), level of qualification (<math>p&lt;0.05</math>), having oral health care guidelines (<math>p&lt;0.001</math>), specific resources (<math>p&lt;0.05</math>), and attending previous training in oral care (<math>p&lt;0.001</math>)</li> <li>• Lack of oral health care guidelines, support from dental professionals, specific resources, training, and assistance in daily oral care for patients is evident and detrimental to oral hygiene practices</li> </ul>
Qu et al. 2015 <a href="#">[56]</a>	China	To explore the current status of	57 head ICU nurses	Survey questionnaire	<p>Oral care practices:</p> <ul style="list-style-type: none"> <li>• ICU head nurses chose oral care</li> </ul>



<p>oral care practices, attitudes, education and knowledge among intensive care unit (ICU) nurses caring for ventilator-assisted patients</p>	<p>practices complied with national nursing regulation (49.4%)</p> <ul style="list-style-type: none"> <li>• Oral care practices complied with regional nursing regulation (12.7%)</li> <li>• Oral care practices complied with inner-hospital nursing regulation (29.1%)</li> <li>• Foam swab, that is, scrubbing the teeth and mucous membrane of the oral cavity with cotton balls, was the most common oral care practice (62.0%)</li> <li>• Mouth washing oral practice (21.5%)</li> <li>• Combination of foam swab plus mouthwashing (16.5%)</li> <li>• Saline, followed by mouthwashes containing antibiotics or disinfectants, were the mouthwashes routinely used for ventilator-assisted patients</li> <li>• Oral care should be given 'high priority' (36.7%)</li> <li>• Oral care was 'somewhat important' (63.3%)</li> <li>• Academic journals, websites and professional books were the most popular sources of oral care knowledge (48.1%, 41.8% &amp; 36.7%)</li> <li>• Evidence-based oral care standard</li> </ul>
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					manual is urgently needed for oral practice in ICUs in mainland China
<b>Europe (n=11)</b>					
Weening-Verbree et al. 2022 [16]	Netherlands	To evaluate the impact of the implementation of an Oral Care Program on home care nurses' attitudes and knowledge about oral health (care)	296 home care nurses	Observational study	<p>Oral care program:</p> <p>Attitude of nurses</p> <ul style="list-style-type: none"> <li>• Clients think a healthy mouth is important: Before OCP: Agree (84%), After OCP (83%)</li> <li>• Our clients do not ask support for oral care: Before OCP: Agree (65%), After OCP (70%)</li> <li>• Important to take care of clients' oral care: Before OCP: Agree (100%), After OCP (97%)</li> <li>• I have enough skills to perform oral care: Before OCP: Agree (79%), After OCP (89%)</li> <li>• I have enough time to perform oral care: Before OCP: Agree (72%), After OCP (72%)</li> <li>• There are enough materials available to perform oral care (toothbrushes etcetera): Before OCP: Agree (46%), After OCP (54%)</li> <li>• I think oral care should be part of the</li> </ul>

					<p>clients' general personal care plan: Before OCP: Agree (92%), After OCP (92%)</p> <ul style="list-style-type: none"> <li>• I feel insecure to perform oral care for clients: Before OCP: Agree (8%), After OCP (7%)</li> <li>• I think it is an unpleasant task to perform oral care for clients: Before OCP: Agree (11%), After OCP (12%)</li> <li>• I think it is difficult to perform oral care for clients: Before OCP: Agree (16%), After OCP (15%)</li> </ul> <p>Knowledge of nurses: Mean (SD)</p> <ul style="list-style-type: none"> <li>• Before OCP: 22.7 (3.1), After OCP 24.3 (2.3)</li> </ul>
Janssens et al. 2018 [14]	Belgium	To evaluate the effect of an oral healthcare programme in nursing homes on care staff knowledge and attitude regarding oral health	<p>Intervention group: 1888 nurses and nurse aids</p> <p>Control group: 521 nurses and nurses aids</p>	Non randomized controlled trial	<p>Oral healthcare programme</p> <p>Intervention: Education given in 3 levels:</p> <ul style="list-style-type: none"> <li>• Theoretical background on the guideline and the oral healthcare protocol was provided to the managing director, the oral health coordinator and the ward heads</li> <li>• The oral healthcare team received theoretical background on oral health (common oral pathologies and prosthetic devices, oral hygiene equipment and</li> </ul>

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protocols), along with practical advice and training on how to perform oral hygiene with the residents of the nursing home on site

- Mobile dental team visiting the nursing homes to support the implementation of the oral healthcare protocol and to deliver preventive and curative treatment on site to those residents who were unable to visit regular dental service facilities due to physical or cognitive impairment

Control group:

- Did not receive any aspect of the intervention

Knowledge of nurses:

- Intervention: Mean (SD): Baseline: 49.44 (18.74); After study period: 67.22 (18.23)
  - Control: Mean (SD): Baseline: 41.84 (21.45); After study period: 52.63 (27.68)
  - The higher the score, the better the corresponding outcome variable
  - After the intervention period, knowledge significantly improved in both study groups (I:  $p < 0.001$ ; C:  $p < 0.001$ ), the intervention group significantly showing
-

					<p>the largest increase (<math>p &lt; 0.001</math>)</p> <p>Attitude of nurses:</p> <ul style="list-style-type: none"> <li>• Intervention: Mean (SD): Baseline: 77.36 (5.89); After study period: 78.49 (6.05)</li> <li>• Control: Mean (SD): Baseline: 76.45 (5.61); After study period: 76.01 (5.59)</li> <li>• The higher the score, the better the corresponding outcome variable</li> <li>• Attitude only showed a significant improvement in the intervention group (<math>p &lt; 0.001</math>)</li> </ul> <p>The presence of an oral healthcare programme, including a mobile dental team, resulted in a significant increase in the nurses' and nurses' aides' knowledge of oral health and their attitude towards it</p> <p>The integration of a dental professional team in nursing home organisations should be encouraged because it could be valuable to take away barriers for the provision of daily oral hygiene and to support the continuous integration of oral health care into general care</p>
Janssens et al. 2016 [21]	Belgium	To explore the impact of a supervised	46 nurses, 72 nursing aides	Multicentre, cluster-randomised	Oral health care protocol: Three different educational stages with a pyramid-based structure

implementation of an oral healthcare protocol, in addition to education, on nurses' and nurses' aides' oral health-related knowledge and attitude	controlled trial	<ul style="list-style-type: none"> <li>• Intervention: <ul style="list-style-type: none"> <li>- 1.5-hour lecture by investigator for managing director, project supervisor and ward heads</li> <li>- 2-hour lecture and 1 hour of practical education for the oral health care team</li> <li>- 1.5-hour theoretical and practical education session at each ward for all ward nurses and nurses' aides</li> </ul> </li> <li>• Knowledge of nurses: Mean (SD) <ul style="list-style-type: none"> <li>- Baseline: Intervention: 65.52 (11.57)</li> <li>- 6 Months: Intervention: 83.83 (9.09)</li> <li>- Baseline: Control: 63.38 (11.10)</li> <li>- 6 Months: Control: 68.31 (12.87)</li> <li>- Significant differences were found between the intervention and the control group for the variable knowledge in favour of the intervention group (<math>p &lt; 0.0001</math>)</li> <li>- 100-point scale with higher score indicates high level of knowledge</li> </ul> </li> <li>• Attitude of nurses: <ul style="list-style-type: none"> <li>- Baseline: Intervention: 51.95 (13.79)</li> <li>- 6 Months: Intervention: 54.86 (13.36)</li> <li>- Baseline: Control: 50.73 (15.02)</li> </ul> </li> </ul>
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					<ul style="list-style-type: none"> <li>- 6 Months: Control: 54.57 (14.39)</li> <li>- No difference for the variable attitude (p=0.78) between 2 groups</li> <li>- 100-point scale with higher score indicates better attitude</li> </ul>
de Mey et al. 2016 [22]	Netherlands	To test (a) the effects of an educational intervention about oral hygiene on the knowledge of mental health nurses, and (b) the effects of an oral care intervention on oral health in patients with severe mental illness (SMI)	32 nurses, 26 students nurses, 10 social workers	Questionnaire study	<p>Education intervention:</p> <ul style="list-style-type: none"> <li>• A 20-min presentation provided by two oral hygienists/researchers</li> <li>• The presentation was based on existing evidence and addressed the following subjects: oral care and available tools, oral diseases (gingivitis, periodontal disease, and caries), and oral health related to smoking, alcohol, and drugs</li> </ul> <p>Oral health knowledge by nurses: Post test at 5 weeks</p> <ul style="list-style-type: none"> <li>• How often should one brush teeth daily for optimal oral hygiene? Correct answer: Twice a day <ul style="list-style-type: none"> <li>- Pretest (N=27) Correct (%): 77.8%; Posttest (N=27) Correct (%): 88.9%</li> </ul> </li> <li>• Toothpaste should always contain fluoride? Correct answer: Correct <ul style="list-style-type: none"> <li>- Pretest (N=27) Correct (%):</li> </ul> </li> </ul>

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44.4%; Posttest (N=27) Correct (%) : 70.4%

- What is the effect of fluoride? A. Fluoride protects teeth against tooth decay. B. Fluoride protects teeth against tooth sensitivity on teeth: Correct answer: Both statements are correct
    - Pretest (N=27) Correct (%) : 25.9%; Posttest (N=27) Correct (%) : 55.6%
  - Electric brush is better than manual brushing: Correct
    - Pretest (N=27) Correct (%) : 22.2%; Posttest (N=27) Correct (%) : 48.1%
  - What does preventive application in dental care mean? Sealant and fluoride
    - Pretest (N=27) Correct (%) : 40.7%; Posttest (N=27) Correct (%) : 37.0%
  - What tools are used for cleaning between the teeth?
    - Pretest (N=27) Correct (%) : 29.6%; Posttest (N=27) Correct (%) : 33.3%
  - Two times mouth rinse is as effective as
-



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brushing two times per day. Incorrect

- Pretest (N=27) Correct (%): 96.3%; Posttest (N=27) Correct (%): 100%

- Gingivitis is another name for (Inflammation of the gums)

- Pretest (N=27) Correct (%): 44.4%; Posttest (N=27) Correct (%): 81.5%

- Periodontitis is another name for: Inflammation of the gums and jawbone

- Pretest (N=27) Correct (%): 33.3%; Posttest (N=27) Correct (%): 70.4%

- What is the primary cause of gingivitis?: Plaque

- Pretest (N=27) Correct (%): 59.3%; Posttest (N=27) Correct (%): 88.9%

- Periodontal disease is a: Multifactorial disease

- Pretest (N=27) Correct (%): 63%; Posttest (N=27) Correct (%): 63%

- What is another word for tooth decay?: Caries

- Pretest (N=27) Correct (%):
-

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88.9%; Posttest (N=27) Correct (%) : 96.3%

- What are the characteristics of gingivitis?  
Red, swollen, and bleeding gums that are not tightly around the teeth
    - Pretest (N=27) Correct (%) : 74.1%; Posttest (N=27) Correct (%) : 92.6%
  - Every smoker has gingivitis, periodontitis, and caries: Incorrect
    - Pretest (N=27) Correct (%) : 77.8%; Posttest (N=27) Correct (%) : 74.1%
  - Which of the following statements is correct? Alcohol increases the risk of developing oral cancer
    - Pretest (N=27) Correct (%) : 40.7%; Posttest (N=27) Correct (%) : 66.7%
  - By xerostomia we mean: Dry mouth
    - Pretest (N=27) Correct (%) : 51.9%; Posttest (N=27) Correct (%) : 70.4%
  - By hyposalivation we mean: Reduces saliva production
    - Pretest (N=27) Correct (%) :
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					<p>55.6%; Posttest (N=27) Correct (%): 66.7%</p> <ul style="list-style-type: none"> <li>• A side effect of antidepressants is: Dry mouth <ul style="list-style-type: none"> <li>- Pretest (N=27) Correct (%): 81.5%; Posttest (N=27) Correct (%): 92.6%</li> </ul> </li> <li>• One side effect of antipsychotics is: Dry mouth or excessive salivation and muscle stiffness <ul style="list-style-type: none"> <li>- Pretest (N=27) Correct (%): 59.3%; Posttest (N=27) Correct (%): 48.1%</li> </ul> </li> <li>• Number of correct answers: Mean (SD): Baseline: 11.33 (3.63); 5 Weeks: 14.30 (2.22)</li> </ul>
Narbutaitė et al. 2023 [45]	Lithuania	To examine the attitudes and practices of ICU nurses towards the provision of oral care to their patients	108 ICU nurses	Cross-sectional survey	<p>Attitudes and practices of ICU nurses:</p> <ul style="list-style-type: none"> <li>• Oral health is important: 88 (82%)</li> <li>• Adequate training: 83 (77%)</li> <li>• Willingness to learn more: 98 (91%)</li> <li>• Oral cavity too difficult to clean: 78 (72%)</li> <li>• Found cleaning oral cavity unpleasant: 71 (66%)</li> </ul> <p>Behaviour:</p> <ul style="list-style-type: none"> <li>• Nurses that stated that their ICU has a</li> </ul>

					<p>protocol for providing oral hygiene to patients (69%)</p> <ul style="list-style-type: none"> <li>• Almost all reported providing oral hygiene care to their patients (94%)</li> <li>• They removed dental prostheses from patients' mouths (72%)</li> <li>• Nurses reported knowing how to treat a coated tongue (94%)</li> <li>• Used a toothbrush (70%)</li> <li>• Used gauze (30%)</li> </ul> <p>Oral care:</p> <ul style="list-style-type: none"> <li>• Oral care performed using: Foam swabs: (61%), moisturizers (53%)</li> <li>• Need more hospital support: (57%)</li> </ul>
Archer et al. 2022 <a href="#">[60]</a>	UK	To understand previous oral health promotion experience of staff within community nursing teams, including identification of previous training, barriers to OHP	132 community health care nurses	Training need analysis	<p>Management strategies utilized when oral health concerns were identified:</p> <ul style="list-style-type: none"> <li>• Managed yourself: 45%</li> <li>• Spoke to manager: 14%</li> <li>• Spoke to colleague: 26%</li> <li>• Spoke to family: 64%</li> <li>• Signposted to trust services: 32%</li> <li>• Signposted external to trust GP: 63%</li> </ul> <p>Barriers to health promotion:</p> <ul style="list-style-type: none"> <li>• Time: 44%</li> <li>• Lack of training: 78%</li> </ul>

					<ul style="list-style-type: none"> <li>• Equipment: 49%</li> <li>• Not a priority: 19%</li> <li>• Patient co-operation: 41%</li> <li>• Don't want to: 5%</li> <li>• None: 14%</li> </ul>
Weening-Verbree et al. 2021 [4]	Netherlands	To explore attitudes, perceptions, and perceived barriers to and the perceived facilitators of daily oral health care and the actual daily oral health care performances among nursing home staff	21 Nursing homes	Survey questionnaire	<p>Oral care performance:</p> <ul style="list-style-type: none"> <li>• Oral care is fairly important or very important (98%)</li> <li>• Oral care is a very unpleasant task (10%)</li> <li>• Oral care is 'performed at least twice-a-day (55%)</li> <li>• Oral care performed once-a-day (43%)</li> <li>• Oral care performed once or twice-a-day (2%)</li> <li>• Oral care is performed in the morning before or after breakfast time and before bedtime (57%)</li> <li>• Oral care is performed 'before bedtime' (38%)</li> <li>• Oral care is performed 'when the time was most convenient' (3%)</li> <li>• Oral care is performed 'when the resident asks for it' (2%)</li> <li>• They 'always provide oral care to patients with natural teeth' (76%)</li> </ul>

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- 'Sometimes provide oral care to patients with natural teeth' (13%)
  - 'Never provide oral care' (mostly due to the resident's refusal) (10%)

Oral care products used

- Manual toothbrush (97%)
- Powered toothbrush (54%)
- Denture brush (70%)
- Denture case (80%)
- Interdental brushes (29%)
- Wood sticks (10%)
- Detergent tablets for dentures (6%)
- Gauzes (34%)
- Toothpaste (92%)
- Chlorhexidine (33%)
- (Fluoride) mouth rinse (8%)
- Liquid soap (42%)
- Vinegar (13%)
- Tongue cleaners (1%)

Barriers to oral care:

- Lack of support of dental staff
- Oral care for clients with cognitive impairment
- Lack of education

Increasing facilitators could be; more (practical)

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					education combined with tailored advice from internal dental staff
Cianetti et al. 2020 [32]	Italy	To assess the knowledge of oral health care practices by nurses working in three Italian heart failure units	44 nurses in heart failure cardiology units	Observational cross sectional study	<ul style="list-style-type: none"> <li>• Oral health knowledge:</li> <li>• It is necessary to check the mouth of each patient during his hospital admission visit (54.8%)</li> <li>• The patient's chewing, swallowing and speaking functions should be well performed to certify the patient's good oral status (76.2%)</li> <li>• Presence of all natural teeth, teeth health status, gingival health status, presence oral mucosal lesions, presence, integrity and hygienic status of partial or complete denture, presence of oral pain and/or burning are necessary to be evaluated during patients oral check (47.6%)</li> <li>• Twice daily patient's oral health care to be performed by nursing personnel (52.4%)</li> <li>• Fluoride tooth paste, toothbrush, chlorhexidine mouthwash or gels, gauze soaked in the disinfectant solution for moisturizing the lips and washing dental prostheses oral hygiene tools should be used to clean the patient's teeth and oral mucosa or their dental prostheses (64.3%)</li> </ul>

					<ul style="list-style-type: none"> <li>Psychiatric antidepressant and diuretic antihypertensive drugs reducing the saliva secretion, antibiotics and cortisone facilitating opportunistic infection after long term usage have potential oral health side effects (30.9%)</li> </ul> <p>Low levels of interest in and knowledge of oral health care among these nurses were found</p>
Hilton et al. 2016 <a href="#">[63]</a>	Australia, UK, Canada, USA	To determine the views of nurses and on the feasibility of implementing current evidence-based guidelines for oral care, examining barriers and facilitators to implementation	46 nursing or nursing assistant workers	Survey	<ul style="list-style-type: none"> <li>Nurses and residential care workers have little or no training in recommended oral care techniques</li> <li>Lack access to the equipment and professional supports needed to provide adequate oral care.</li> <li>Basic oral care might be performed less than once per day in some settings</li> <li>Patients with problematic behaviours, dysphagia, or sensitivities associated with poor oral health might be less likely to receive oral care</li> <li>Lack of time was highlighted as a barrier in the survey findings, focus group members considered that time should not be a barrier to prioritising oral care practices on a daily basis in residential care settings</li> </ul>



					<ul style="list-style-type: none"> <li>Nursing and residential care staff considered adequate oral care to be feasible if access, funding and training barriers are removed and facilitators enhanced</li> </ul>
Groenkjaer et al. 2015 [36]	Denmark	To explore hepatology nurses' knowledge and education in the oral care and oral health assessments of patients with liver cirrhosis	63 registered nurses, 6 student nurses in gastroenterology and hepatology wards	Questionnaire study	<p>Knowledge and education in oral care:</p> <ul style="list-style-type: none"> <li>The signs that most nurses sought for oral health <ul style="list-style-type: none"> <li>Clean teeth (63.8%)</li> <li>A pink cavity (27.5%)</li> <li>Healthy gingiva (27.5%)</li> <li>Absence of coating (26.1%)</li> <li>No odor (24.6%)</li> <li>Uncoated tongue (17.4%)</li> </ul> </li> <li>The overall favorite equipment available on units and preferred by nurses: <ul style="list-style-type: none"> <li>Toothbrushes (95.7% vs. 88.4%)</li> <li>Toothpaste (82.6% vs. 76.8%),</li> <li>Sponge swabs (73.9% vs. 47.8%)</li> <li>Other equipment for oral care was available on wards sparkling water (33.3%), chlorhexidine mouthwash (23.2%), and artificial saliva (23.3%)</li> </ul> </li> <li>Oral health education: <ul style="list-style-type: none"> <li>60.9% reported that they had</li> </ul> </li> </ul>

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received theoretical and practical education in oral care during their training

- 18.8% had received education initial training
- Nurses with 4–6 years or <6 years of experience had received significantly more education in oral care than nurses with <4 years of experience ( $p=0.026$ )
- 27.3% thought that education should be given once a year
- 15.9% thought that it should be given every second year
- 14.5% believed that it should be given when new knowledge appeared
- 7.2% stated that it should be given upon employment in a department

- Medication that effects oral health:
    - 75.4% nurses were aware of medications' adverse effects
    - 42.2% and 30.8% who stated that inhalers and antibiotics
    - Nurses from university hospitals had significantly greater
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knowledge of medication effects  
than nurses from regional  
hospitals ( $p < 0.001$ )

- Nurses with four or more years of experience had significantly greater knowledge of medications' impacts on oral health than nurses who had fewer than 4 years of experience ( $p = 0.048$ )

Oral care practices:

- 15.9% answered that registered nurses or enrolled nurses performed oral care for cirrhosis patients
  - 2.9% stated that nursing students administered oral care alone, and 81.2% stated that nurses and nursing students provided oral care equally
  - 69.6% thought that nursing students received training in oral care
  - 11.6% did not think that nursing students received any training in oral care
  - 53.6% stated that their supervisor on the ward taught the students, while 24.6% and 15.9% stated that the students were taught by nurses on the units and at
-

					nursing school
					Barriers to oral care:
					<ul style="list-style-type: none"> <li>• Lack of time or the low priority of oral care (59.4%)</li> <li>• Patients who do not want help (36.2%)</li> <li>• Patients who are confused or uncooperative (14.5%)</li> <li>• Patients with hepatic encephalopathy of Grade 3 or 4 (7.2%)</li> <li>• Acute severe conditions in patients (1.4%)</li> </ul>
					Respondents lacked substantial oral care education, both in connection with their initial training and after qualifying as nurses
					The respondents had inadequate knowledge of basic oral health, the equipment used for oral care, and medications' adverse effects on oral health. These results indicate a need for educational updates in cooperation with dentists and for the promotion of specific oral assessment guides in patients with liver cirrhosis
Jordan et al. 2014 <a href="#">[57]</a>	Croatia	To explore knowledge, attitudes, and oral care practice in Croatian intensive	241 ICU nurses	Cross-sectional survey	Attitude of nurses, mean (SD): <ul style="list-style-type: none"> <li>• Oral care is performed properly: 4.1 (0.8)</li> <li>• Hospital provides us with enough material to perform adequate oral care: 3.4 (1.2)</li> </ul>

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care units and  
influencing factors

- Sufficiently educated about the importance of oral care in ICU patients: 4.3 (0.8)
- Sufficiently educated about oral care methods in ICU patients: 4.2 (0.8)
- Oral care is an important part of caring for patients in ICUs: 4.7 (0.6)
- Providing adequate oral care may prevent complications in ICU patients: 4.3 (0.7)
- Patient's oral care is one of daily tasks of ICU nursing staff: 4.8 (0.5)
- Oral care does not significantly affect the outcome of treatment of ICU patients: 2.7 (1.3)
- Other forms of care activities are more important for patient welfare than oral care: 3.3 (1.1)
- Oral care tasks in ICU patients should be performed by specialized staff, not nurses: 1.9 (1.1)
- 1 (strongly disagree) to 5 (strongly agree)

Oral care:

- Oral care for patients 2-3 times a day (65%)
  - Gauze soaked with paraffin oil and rinsing the oral cavity with chlorhexidine were the
-

					most frequently performed (74.7% & 58.1%)
					Barriers to provision of oral care:
					<ul style="list-style-type: none"> <li>• Lack of time (58.1%)</li> <li>• Lack of Staff (48.5%)</li> <li>• Lack of supplies and equipment (44.4%)</li> </ul>
<b>North America (n=15)*</b>					
Dsouza, et al. 2019 [17]	USA	To evaluate the influence of an educational intervention on knowledge, confidence, practice behaviors, and perceived barriers of nursing students regarding preventive oral health services	64 first year accelerated Bachelor of Nursing (ASBN) students	Quasi-experimental survey	Interprofessional collaborative practice <ul style="list-style-type: none"> <li>• Oral health knowledge:               <ul style="list-style-type: none"> <li>- Dental caries: Baseline (75%); 5 months post intervention (93%)</li> <li>- Medication use: Baseline (91%); 5 months post intervention (86%)</li> <li>- Dental Treatment During Pregnancy: Baseline (61%); 5 months post intervention (98%)</li> <li>- Periodontal Disease: Baseline (93%); 5 months post intervention (98%)</li> <li>- Systemic health: Baseline (100%); 5 months post intervention (96%)</li> <li>- Participants showed a significant increase in knowledge from pre-post questionnaires for two of five</li> </ul> </li> </ul>

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questions ( $p=0.04$ ;  $p<0.0001$ )

- Self-reported confidence changes in providing preventive oral health services
    - Oral screening: Very: Baseline (0%); 5 months post intervention (9.3%); Somewhat: Baseline (13.9%); 5 months post intervention (34.88%); Only a Little: Baseline (20.93%); 5 months post intervention (34.88%); Not at all: Baseline (65.12%); 5 months post intervention (9.3%)
    - Oral counselling: Very: Baseline (13.9%); 5 months post intervention (23.26%); Somewhat: Baseline (41.8%); 5 months post intervention (58.1%); Only a Little: Baseline (34.8%); 5 months post intervention (16.2%); Not at all: Baseline (9.3%); 5 months post intervention (2.3%)
    - Dental referrals: Very: Baseline (25.5%); 5 months post intervention (18.6%); Somewhat: Baseline (34.8%); 5 months post intervention (43.5%); Only a Little:
-

					<p>Baseline (23.2%); 5 months post intervention (20.9%); Not at all: Baseline (11.6%); 5 months post intervention (13.9%)</p> <ul style="list-style-type: none"> <li>- Confidence scores in performing oral screenings (<math>p&lt;0.0001</math>) and counseling (<math>p=0.006</math>) increased; while scores regarding referrals decreased (<math>p=0.718</math>)</li> <li>• Post-intervention, 37% reported performing oral screenings, 45% counseling, and 8% dental referrals</li> </ul>
Khanbodaghi et al. 2019 [18]	USA	To evaluate the effects of an oral health educational program on the dental knowledge, awareness, attitude, confidence, and behavior of pediatric nurse practitioner (PNP) students and to emphasize the importance of IPE	16 PNP nursing students	Survey	<p>Interprofessional oral health program</p> <p>Oral health knowledge:</p> <ul style="list-style-type: none"> <li>• Pretest: 77.68%; Post test: 91.07%; Postpost-test: 96.43%; 1 Month: 83.93%; <math>p=0.0002</math></li> </ul> <p>Oral health awareness: Median (IQR)</p> <ul style="list-style-type: none"> <li>• Pretest: 3.93 (3.43 – 4.25); Post test: 4.88 (4.38 – 5); Post post-test: 5 (5.0 – 5.0); 1 Month: 4.63 (4.19 – 4.94); <math>p&lt;0.0001</math></li> </ul> <p>Oral health confidence: Median (IQR)</p> <ul style="list-style-type: none"> <li>• Pretest: 1.75 (1.13 – 2.88); Post test: 3.88 (2.88 – 4.5); Post post-test: 4.5 (4.0 – 5.0); 1 Month: 4.0 (3.25 – 4.25); <math>p&lt;0.0001</math></li> </ul>



		for PNP			<p>Oral attitude: Median (IQR)</p> <ul style="list-style-type: none"> <li>• Pretest: 3.67 (3.33 – 4.0); Post test: 4.83 (4.5 – 5.0); Post post-test: 5 (5.0 – 5.0); 1 Month: 4.67 (4.17 – 5.0); <math>p &lt; 0.0001</math></li> </ul> <p>Oral behavior: Median (IQR)</p> <ul style="list-style-type: none"> <li>• Pretest: 4.06 (3.88 – 4.25); Post test: 4.5 (4.25 – 4.63); Post post-test: 4.75 (4.5 – 4.75); 1 Month: 4.5 (4.31 – 4.63); <math>p &lt; 0.0001</math></li> </ul> <p>Significant improvement was seen in all subjects' overall knowledge of oral health topics. The confidence, attitude, and behavior scores were differed by time of test (<math>p &lt; 0.01</math>). It was the highest after post-test and the lowest in pretest</p>
Coan et al. 2019 [20]	USA	To implement and evaluate an innovative collaborative event with hospitalized patients to help develop dental hygiene and nursing students'	25 Nursing students	Survey	<p>Interprofessional Collaborative Competency Attainment Survey (ICCAS) items:</p> <ul style="list-style-type: none"> <li>• Item 1: Promote effective communication among members of an interprofessional (IP) team</li> <li>• Item 2: Actively listen to IP team members' ideas and concerns</li> <li>• Item 3: Express my ideas and concerns without being judgmental</li> <li>• Item 4: Provide constructive feedback to</li> </ul>

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interprofessional  
competence

IP team members

- Item 5: Express my ideas and concerns in a clear, concise manner
  - Item 6: Seek out IP team members to address issues
  - Item 7: Work effectively with IP team members to enhance care
  - Item 8: Learn with, from, and about IP team members to enhance care
  - Item 9: Identify and describe my abilities and contributions to the IP team
  - Item 10: Be accountable for my contributions to the IP team
  - Item 11: Understand the abilities and contributions of IP team members
  - Item 12: Recognize how others' skills and knowledge complement and overlap with my own
  - Item 13: Use an IP team approach with the patient to assess the health situation
  - Item 14: Use an IP team approach with the patient to provide whole person care
  - Item 15: Include the patient/family in decision making
  - Item 16: Actively listen to the perspectives of IP team members
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- Item 17: Take into account the ideas of IP team members
  - Item 18: Address team conflict in a respectful manner
  - Item 19: Develop an effective care plan with IP team members
  - Item 20: Negotiate responsibilities within overlapping scopes of practice

Respondents were asked to rate their ability on each of these items using the following response options: 1=poor, 2=fair, 3=good, 4=very good, and 5=excellent; Mean (SD)

	Pre-program	Post-program
Item 1:	3.52 (1.08)	4.56 (0.51)
Item 2:	3.88 (0.93)	4.72 (0.46)
Item 3:	4.20 (0.87)	4.60 (0.58)
Item 4:	3.48 (1.19)	4.64 (0.70)
Item 5:	4.12 (1.13)	4.76 (0.52)
Item 6:	3.36 (1.32)	4.60 (0.58)
Item 7:	3.60 (1.38)	4.64 (0.57)
Item 8:	3.68 (1.11)	4.80 (0.41)

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					Item 9: 3.72 (0.94) 4.76 (0.44)
					Item 10: 4.08 (0.95) 4.60 (0.65)
					Item 11: 3.60 (1.26) 4.72 (0.54)
					Item 12: 3.56 (1.04) 4.80 (0.41)
					Item 13: 3.72 (1.02) 4.60 (0.65)
					Item 14: 3.80 (1.12) 4.64 (0.64)
					Item 15: 3.88 (1.13) 4.24 (1.16)
					Item 16: 3.96 (1.10) 4.76 (0.44)
					Item 17: 4.08 (1.08) 4.76 (0.44)
					Item 18: 4.20 (1.15) 4.40 (1.00)
					Item 19: 3.76 (1.05) 4.68 (0.48)
					Item 20: 3.56 (1.04) 4.56 (0.58)
					All students had statistically significant improvement on the ICCAS items from pretest to posttest
Farokhi et al. 2018 [15]	USA	To assess the oral health literacy knowledge gained by patients who are refugees, community	151 refugees, 38 medical students, 34 nursing students, 17 community/parish	Questionnaire study	Interprofessional education: <ul style="list-style-type: none"> <li>Oral health questionnaire: Each group had a significant increase in mean oral health literacy score from pre- to posttest <ul style="list-style-type: none"> <li>% of correct answers: Nursing</li> </ul> </li> </ul>

		members, and medical and nursing students after participating in an interprofessional education collaborative of students and faculty from the University of Texas Health San Antonio Schools of Dentistry, Medicine, and Nursing	members		<p>students: Before intervention: 67.4%; After intervention: 88.2%</p> <p>- Score: Nursing students Mean (SD): pre intervention: 67.40 (15.95); Post intervention: 88.24 (9.65); Change: 20.83 (16.82); % change: 37.90 (36.63)</p> <ul style="list-style-type: none"> <li>• Oral health literacy initiative helped increase all participants' oral health literacy and knowledge of preventive care</li> </ul>
Czarnecki et al. 2014 [69]	USA	To evaluate interprofessional education among nursing and dental students, and pediatric dentistry residents	30 Nursing students	Survey questionnaire	<ul style="list-style-type: none"> <li>• After the rotation, the nursing students' tooth brushing frequency increased, and their comfort level with dental visits and oral health-related knowledge improved</li> <li>• Overall, nursing students showed positive responses to interprofessional education</li> </ul>
Golinveaux et al. 2013 [23]	USA	To evaluate whether an interdisciplinary,	30 Nursing students	Survey	The interdisciplinary, multifaceted educational intervention:

<p>multifaceted oral health education program delivered to pediatric nurse practitioner students would improve their knowledge, confidence, attitudes, and behaviors regarding the provision of oral health assessments, consultations, referrals, and services to young children during well-child visits</p>	<ul style="list-style-type: none"><li>• First, a one-hour lecture developed by pediatric nurse practitioner faculty members based on the First Smiles and AAP curricula was given</li><li>• A week later, a one-hour skills simulation exercise was administered to reinforce the topics presented in the lecture, The participants then practiced examination techniques and applied fluoride varnish on each other's teeth</li><li>• The third component was a half-day observation session at the UCSF Pediatric Dentistry Clinic as part of the students' clinical rotations; this was supervised by a pediatric dental resident</li></ul> <p>Oral health knowledge: Mean (SD)</p> <ul style="list-style-type: none"><li>• Pre-test: 8.9 (1.86)</li><li>• Post-test: 10.4 (1.3) (p&lt;0.0001)</li></ul> <p>Confidence: Mean (SD)</p> <ul style="list-style-type: none"><li>• Pre-test: 7.8 (4.1)</li><li>• Post-test: 14.1 (2.8) (p&lt;0.0001)</li></ul> <p>Attitude: Mean (SD)</p> <ul style="list-style-type: none"><li>• Pre-test: 9.7 (1.8)</li><li>• Post-test: 10.8 (1.6) (p=0.0057)</li></ul> <p>Between pre-intervention and post-intervention, a</p>
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					significant improvement was seen in the pediatric nurse practitioners' knowledge of oral health topics ( $p<0.001$ ), confidence when providing oral health counseling ( $p<0.001$ ), and attitudes about including oral health counseling in their examinations ( $p=0.006$ )
Zurmehly et al. 2013 [66]	USA	To evaluate the effectiveness of a nursing quality improvement program on oral care practice in reducing the incidence of VAP within the ICU	44 registered nurses	Questionnaire study	<p>Ventilator-Associated Pneumonia Prevention Program</p> <ul style="list-style-type: none"> <li>• A self-study module and a 10-item questionnaire</li> <li>• The online education module included best practice techniques, with information on topics related to VAP: epidemiology and scope of the problem, risk factors, definitions, strategies to reduce VAP, and prevention</li> </ul> <p>Oral care: Score: Mean (SD)</p> <ul style="list-style-type: none"> <li>• Pre: 8.45 (8.0)</li> <li>• Post-test: 9.84 (10.0)</li> </ul> <p>Frequency of oral care documentation:</p> <ul style="list-style-type: none"> <li>• Not documented <ul style="list-style-type: none"> <li>- Pre: 51.1%</li> <li>- Post: 2.05%</li> </ul> </li> <li>• Every 2 hours</li> </ul>

					<ul style="list-style-type: none"> <li>- Pre: 6.67%</li> <li>- Post: 27.7%</li> <li>• Every 4 hours <ul style="list-style-type: none"> <li>- Pre: 7.7%</li> <li>- Post: 60.0%</li> </ul> </li> <li>• &gt; Every 4 hours <ul style="list-style-type: none"> <li>- Pre: 34.44</li> <li>- Post: 10.26%</li> </ul> </li> </ul> <p>After the education intervention, the frequency of oral care increased significantly (<math>p=0.001</math>) to tooth brushing every 4 hours and swabbing every 12 hours with 0.12% chlorhexidine solution. The evidence-based practice education intervention decreased VAP rates by 62.5%</p>
Walker et al. 2018 [25]	USA	To gather preliminary data to assess and compare nursing, nurse practitioner, dental, and dental hygiene students' oral and oropharyngeal cancer knowledge and their perceptions of	29 Nursing, 59 nursing practitioner, 58 dental 12 dental hygiene students	Cross-sectional survey	<p>Confidence: Mean (SD)</p> <ul style="list-style-type: none"> <li>• Nursing: 13.79 (2.32); Nurse practitioner: 16.68 (3.13); <math>p&lt;0.001</math></li> <li>• The total possible confidence score is 20 (range = 4–20). Higher scores indicate more confidence in training and education</li> </ul> <p>Perceived scope: Mean (SD)</p> <ul style="list-style-type: none"> <li>• Nursing: 18.02 (3.55); Nurse practitioner: 22.54 (3.57); <math>p=0.024</math></li> <li>• The total possible perceived scope score is 25 (range = 5–25). Higher scores</li> </ul>



		<p>their perceived scope of practice and level of confidence for counseling patients about oral and oropharyngeal cancer risk and performing oral examinations</p>			<p>indicate higher perception that it is their role to counsel</p> <p>Knowledge: Mean (SD)</p> <ul style="list-style-type: none"> <li>Nursing: 9.81 (1.27); Nurse practitioner: 10.08 (1.36)</li> </ul> <p>Implications for practice:</p> <ul style="list-style-type: none"> <li>Expand the perceived scope of practice for nursing education to include oral cancer education, oral cancer screening examinations, and human papillomavirus (HPV) counseling</li> <li>Become knowledgeable about oral cancer, particularly linking it to HPV and developing clinical skills that will provide confidence to perform oral cancer assessments</li> <li>Increase HPV counseling and screening self-efficacy through observation and modeling of behaviors that include clinical rotations, interprofessional education, and use of curriculum and university experiences posted on websites and professional organizations</li> </ul>
Dolce et al. 2018 [80]	USA	To assess OH curricular	459 NP program directors	Cross-sectional survey	<p>Oral health topics covered in NP curricula:</p> <ul style="list-style-type: none"> <li>Risk assessment: Medical conditions that</li> </ul>

<p>integration in primary care NP programs and to examine factors that influence integration and satisfaction with graduates' level of OH competence</p>	<p>affect OH (90.4%); Oral cancer (87.2%); Oral conditions that affect overall health (e.g., periodontitis) (83.5%); Effect of medications on OH (79%); Caries/cavity risks and cause (78.8%); Urgent/emergent oral issues (e.g., infections, trauma): (77.6%); Assessment of the effect of OH on a patient's quality of life (70.2%)</p> <ul style="list-style-type: none"> <li>• OH evaluation: Pediatric/infant oral screening examination (including teeth) (93.2%); Adult/adolescent oral screening examination (including teeth) (83%)</li> <li>• Prevention intervention: Fluoride risks, benefits, and promotion (69.9%); Fluoride varnish indications and application (59.5%); Applying fluoride varnish in a clinical setting (35.6%)</li> <li>• Communication and education: Oral disease prevention/anticipatory guidance (including brushing and flossing, no bottle in crib) (78.7%)</li> <li>• Interprofessional collaborative practice: Interprofessional education with an OH component (35.3%)</li> <li>• Other topics: Adult oral lesions (e.g.,</li> </ul>
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					<p>lichen planus, mouth ulcers) (81.9%); Adult/geriatric OH issues (root caries, periodontitis, dentures) (77.6%); Oral anatomy (74.8%); Disparities in OH/social determinants of health (60.7%); Pregnancy oral health issues (57.6%)</p> <ul style="list-style-type: none"> <li>• The presence of a faculty OH champion was a key factor influencing OH curriculum integration</li> <li>• Overall, programs that reported having a faculty champion were significantly more likely to provide 7 or more hours of OH curriculum (<math>X^2=14.67</math>; <math>p &lt; 0.001</math>), evaluate students on their OH competencies (<math>X^2=4.92</math>; <math>p=0.027</math>), cover interprofessional education with an OH component (<math>X^2=26.84</math>; <math>p &lt; 0.001</math>), and be satisfied with the level of OH competency of their graduates (<math>X^2=10.97</math>; <math>p=0.001</math>)</li> </ul>
Nierenberg et al. 2018 [26]	USA	To assess the dental and nursing students' reflections on this interprofessional service-learning experience in	36 dental and nursing students	Cross-sectional qualitative study	<ul style="list-style-type: none"> <li>• Exposure to patients who lack dental care and have severe oral health problems can impact developing nursing and dental professionals in ways that can increase their appreciation of interprofessional practice and their future willingness to provide care in underserved settings</li> </ul>

		Appalachia			<ul style="list-style-type: none"> <li>• IPE facilitating care through teamwork, gaining mutual respect, gaining confidence, understanding dental role in overall health, and relieving suffering</li> </ul>
Stowers et al. 2017 [73]	USA	To explore the perspectives among nursing educators and program directors on the adequacy of oral health education in nursing assistant curricula	26 program directors, 60 nursing educators	Cross-sectional survey	<ul style="list-style-type: none"> <li>• Oral health education was provided in both didactic and clinical settings: 81%</li> <li>• Spending 1 to 2 hours for the didactic portion and clinical portion of their oral health program: 38%</li> <li>• Spending more than three hours on the didactic portion: 10%</li> <li>• Spending more than three hours on the clinical portion: 14%</li> <li>• Students received feedback during clinical instruction: 86%</li> <li>• Utilized both written and clinical evaluations in their program: 77%, 1% reported written only and 9% reported clinical only</li> <li>• Educational material: <ul style="list-style-type: none"> <li>- Nursing assistant textbook: 92%</li> <li>- Utilize videos/DVD's: 8%</li> <li>- Incorporate online resources: 6.7%</li> <li>- Use no specific materials: 6.7%</li> </ul> </li> <li>• Clinical instructional methods:</li> </ul>

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- Brushing on patients (educators 75%; program directors 92%)
  - Use of foam swabs on patients (educators 73%; program directors 84%)
  - Denture cleaning (educators 73%; program directors 80%)
  - Providing students instruction on flossing, either on models, patients, or other students: Educators and program directors: 10%
  - Oral health is an important part of their nursing assistant: Educators (54%), program directors (57%)
  - Oral health education was adequate: Educators (18%), program directors (15%)
  - 66% had recommendations including the following: 32% recommended more time, hours and/or practice; 13% recommended the curricula include education on the oral systemic health connection; 2.7% recommended instruction with either dentists or dental hygienists, and 4% were unsure
  - Perception of nursing educators and
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					program directors is that the level of oral health education within the nursing assistant curricula is adequate in preparing students with the skills and knowledge needed to provide oral health care to patients
Suminski, et al. 2017 [27]	USA	To explore oncology nurses' perceptions of their educational experiences, professional attitudes, and behavior related to providing oral healthcare education to patients with breast cancer	164 nurses	Web-based survey	<ul style="list-style-type: none"> <li>• 31% indicated that they were well or very well educated to provide oral health instructions</li> <li>• 35% felt that they had sufficient knowledge and confidence to perform oral health assessments</li> <li>• Barriers to performing oral care: Mean <ul style="list-style-type: none"> <li>- Lack of time (2.98)</li> <li>- Lack of knowledge (2.39)</li> <li>- Lack of interest (1.87)</li> <li>- Low importance of oral health (2.14)</li> <li>- Lack of resources (1.75)</li> <li>- Uncooperative patient (2.32)</li> <li>- Lack of staff (2.57)</li> </ul> </li> <li>• Responses ranged from 1 (not at all) to 5 (very much)</li> </ul>
Perry et al. 2015 [81]	USA	To examine the knowledge, perceived ability	232 Nurses	Cross-sectional survey	<ul style="list-style-type: none"> <li>• Respondents reported receiving 3 hours or less of education and/or training related to oral health care in nursing school</li> </ul>

<p>and practice behaviors of pediatric oncology and hematology nurses in assisting with the various oral health care needs of pediatric oncology patients</p>	<p>(75%)</p> <ul style="list-style-type: none"> <li>• Did not have a clinical requirement regarding the assessment of the teeth and gums during their nursing school education (60%)</li> <li>• Survey respondents expressed a desire to take continuing education (CE) courses relating the oral health care for pediatric oncology patients (91%)</li> <li>• 25% had taken such a CE course in the last 5 years</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>• Aware of potential oral complications related to cancer treatment (100%)</li> <li>• Professional oral health care recommendations for pediatric oncology patients such as the use of a soft bristled toothbrush (97%)</li> <li>• Daily inspection of the child's mouth by his/her caregivers to determine the presence or absence of oral complications (87%)</li> <li>• The use of fluoridated toothpaste and referrals to a dentist for consultation prior to cancer treatment received lower rates of correct responses (57% &amp; 29%)</li> </ul>
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					<p>Perceived ability:</p> <ul style="list-style-type: none"> <li>• Comfortable performing oral procedures on patients (77%)</li> <li>• Adequately trained to provide oral health care instructions/education to patients (72%)</li> <li>• Perform oral care procedures (84%)</li> </ul> <p>Practice behaviors:</p> <ul style="list-style-type: none"> <li>• Examining all of their patients for the presence of oral pathology or oral pain (63% &amp; 69%)</li> </ul>
Blevins et al. 2013 [84]	USA	To determine the level of oral health care provided to hospitalized children on acute care units at a children's hospital	49 pediatric hospital nurses	Survey questionnaire	<p>Oral assessments:</p> <ul style="list-style-type: none"> <li>• They performed oral assessments on two out of every 10 patients (20%)</li> <li>• Following admission, nurses reported performing <ul style="list-style-type: none"> <li>- Occasional oral assessments (43%)</li> <li>- When patients complained (35%)</li> <li>- Rarely (12%)</li> <li>- Daily (10%)</li> </ul> </li> <li>• Areas that nurses inspect during an oral assessment <ul style="list-style-type: none"> <li>- Lips (93.9%)</li> <li>- Mucous membranes (87.8%)</li> </ul> </li> </ul>



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- Tongue (87.3%)
  - Teeth (73.5%)
  - Throat (40.8%)
  - Tonsils, palate, and gingival (31%)

- Ensured the availability of a toothbrush and toothpaste on admission for all of their patients (61.2%)
- Always document the presence of an oral infection (46.9%)

Recommendations to enhance oral health care for hospitalized children

- Ensure that all children brush their teeth twice daily with a soft-bristled brush and fluoridated toothpaste while hospitalized, as able
  - Ask when the child has last seen a dentist. Refer children with poor oral health and without a family dentist to a dentist after discharge
  - Include an oral assessment with teeth and gingival inspection at least on admission and in response to parent/ child concerns. Note overt decay, broken or missing teeth, red and swollen gingiva, foul odor, dryness of oral tissue, and signs of
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					<p>irritation, trauma, or infection</p> <ul style="list-style-type: none"> <li>• Lift the top lip to allow a cursory check of teeth and gingiva for young or uncooperative children</li> <li>• Include oral health promotion in parent/child education, especially for those children with poor oral hygiene or those lacking a family dentist</li> <li>• Document assessment findings, mouth care, and oral health teaching provided</li> <li>• Incorporate oral health nursing diagnoses into nursing care plans (written/electronic), as appropriate</li> </ul>
<b>Middle East (n=9)</b>					
Behzadi et al. 2019 [68]	Iran	To determine the effectiveness of the nurse education program on the performance of nurses in providing oral care for mechanically ventilated children	100 ICU nurses	Quasi-experimental pretest-posttest design	<p>Intervention details: Education program</p> <p>Intervention group: Formal and structured education program in addition to the usual service</p> <p>Control group: Usual service</p> <ul style="list-style-type: none"> <li>• Oral care performance: Mean (SD) <ul style="list-style-type: none"> <li>- The mean performance scores of nurses before the education program in the intervention and control groups were 42.8 (18.5) and 48.7 (15.7), respectively.</li> </ul> </li> </ul>

					<p>These scores improved to 68.6 (31.4) and 48.6 (15.4) four weeks after the intervention (<math>p&lt;0.001</math>)</p> <ul style="list-style-type: none"> <li>- It is recommended to implement this program for all nurses, regardless of their ward or specialty, based on the clinical practice guidelines</li> <li>- The periodic refreshing in-service training program should be provided to nurses in PICU in order to enhance their performance in providing oral care</li> </ul>
Ganz et al. 2013 [83]	Israel	To determine whether there was a change in the oral care practices of intensive care unit (ICU) nurses for ventilated patients	218 ICU nurses – 2004-2005 (T1) 233 ICU nurses – 2012 (T2)	Survey questionnaire	<p>Oral care practical guideline:</p> <ul style="list-style-type: none"> <li>• Equipment <ul style="list-style-type: none"> <li>- Gauze pad: T1: 84%; T2: 10%</li> <li>- Tongue depressor: T1: 55%; T2: 27%</li> <li>- Toothbrush: T1: 35%; T2: 75%</li> <li>- Gloved finger: T1: 21%; T2: 16%</li> </ul> </li> <li>• Solution <ul style="list-style-type: none"> <li>- Chlorhexidine: T1: 75%; T2: 76%</li> <li>- Sodium bicarbonate: T1: 42%; T2: 15%</li> <li>- Petroleum jelly: T1: 40%; T2:</li> </ul> </li> </ul>

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37%

- Toothpaste: T1: 33%; T2: 38%
- Lemon water: T1: 26%; T2: 10%
- Glycerin: T1: 19%; T2: 16%
- Saline: T1: 14%; T2: 19%
- Sterile water: T1: 11%; T2: 9%

- Oral care practice

- Clean the tongue: T1: 91%; T2: 91%
- Clean the upper mouth: T1: 88%; T2: 77%
- Clean the lower mouth: T1: 87%; T2: 74%
- Brush teeth: T1: 44%; T2: 69%

- Assessment

- Does oral assessment: T1: 95%; T2: 75%
  - Does assessment on admission: T1: 25%; T2: 35%
  - Does assessment each shift: T1: 33%; T2: 36%
  - Uses assessment tool: T1: 2%; T2: 27%
  - Documents assessment and care: T1: 57%; T2: 60%
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Alkhtib et al. 2020 [52]	Qatar	To examine the knowledge, attitudes and practices of all health professionals	174 PHC nurses	Cross-sectional survey	<p>Association between type of health professional and oral health practices (Attitude):</p> <ul style="list-style-type: none"> <li>Inquire about nocturnal bottle feeding: Very likely/likely: 59 (30.7%); Neutral/unlikely/very unlikely: 96 (50%)</li> <li>Assess dental problems: Very likely/likely: 98(47.6%); Neutral/unlikely/very unlikely: 59 (28.6%)</li> <li>Discuss importance of tooth brushing with mother: Very likely/likely: 114(55.9%); Neutral/unlikely/very unlikely: 40 (19.6%)</li> <li>Assess child's fluoride intake: Very likely/likely: 60 (30%); Neutral/unlikely/very unlikely: 91 (45.5%)</li> <li>Inquire about mother's dental health: Very likely/likely: 76 (37.3%); Neutral/unlikely/very unlikely: 78 (38.2%)</li> </ul>
Yavuz et al. 2020 [70]	Turkey	To examine the oral care practices of pediatric nurses	90 pediatric hospital nurses	Cross sectional study	<p>Oral care education:</p> <ul style="list-style-type: none"> <li>62.2% received oral care education</li> </ul> <p>Materials and solutions the nurses used in oral care</p> <ul style="list-style-type: none"> <li>Toothbrush (17.8%)</li> <li>Tongue depressor (100%)</li> <li>Gauze (100%)</li> <li>Toothpaste (3.3%)</li> </ul>

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- Mouthwash (57.8%)
  - Glutamine (4.4%)
  - Chlorhexidine (12.2%)
  - Sodium bicarbonate ampoule (21.1%)
  - Diluted sodium bicarbonate ampoule (75.6%)
  - Powdered sodium bicarbonate (4.4%)
  - Saline solution (20%)
  - Distilled water/boiled water (12.2%)

Oral care frequency:

- Once a day (2.2%)
- Twice a day (26.7%)
- 3 times a day (23.3%)
- 4 times a day (24.4%)
- When needed (23.3%)

In their oral care practices with tongue depressors and gauze, the nurses mostly used diluted sodium bicarbonate ampoules, sodium bicarbonate ampoules, saline solution, distilled or warm water, chlorhexidine or powdered sodium bicarbonate, in order of prevalence. In addition, more than half of them used mouthwash in oral care practices

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El-Soussi et al.	Egypt	To identify the level of nurses'	39 Nurses in	Observational	Oral care practice:
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2017 [35]		practice and knowledge about interventional patient hygiene and identify barriers for implementing interventional patient hygiene in critical care units	critical care units	study	<ul style="list-style-type: none"> <li>7.7% of nurses carried out proper oral care practice</li> </ul> <p>Knowledge of nurse:</p> <ul style="list-style-type: none"> <li>Nurses' knowledge was unsatisfactory regarding oral care (100%)</li> </ul> <p>Barriers for implementing interventional patient hygiene in critical care units:</p> <ul style="list-style-type: none"> <li>Not foreseen in unit policy (12.82%)</li> <li>Work load (12.82%)</li> </ul>
Alotaibi et al. 2014 [79]	Saudi Arabia	To evaluate the impact of oral care guidelines on the oral care delivered to mechanically ventilated patients by ICU nurses	215 ICU nurses	Cross-sectional survey	<p>Oral care practices:</p> <ul style="list-style-type: none"> <li>Oral care system <ul style="list-style-type: none"> <li>Never (34.6%)</li> <li>Once daily or less (2.3%)</li> <li>Every 12 h (7.9%)</li> <li>Every 8 h (10.7%)</li> <li>Every 4 h (29.4%)</li> <li>Every 1-3 h (15.0%)</li> </ul> </li> <li>Foam swabs <ul style="list-style-type: none"> <li>Never (31.6%)</li> <li>Once daily or less (7.0%)</li> <li>Every 12 h (11.2%)</li> <li>Every 8 h (7.4%)</li> <li>Every 4 h (27.0%)</li> <li>Every 1-3 h (15.8%)</li> </ul> </li> <li>Manual tooth brushes</li> </ul>

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- Never (28.8%)
  - Once daily or less (13.0%)
  - Every 12 h (26.5%)
  - Every 8 h (10.2%)
  - Every 4 h (12.6%)
  - Every 1-3 h (8.8%)
  - Electric tooth brushes
    - Never (96.3%)
    - Once daily or less (3.7%)
    - Every 12 h (0.0%)
    - Every 8 h (0.0%)
    - Every 4 h (0.0%)
    - Every 1-3 h (0.0%)
  - Moisture agents
    - Never (27.4%)
    - Once daily or less (3.7%)
    - Every 12 h (8.4%)
    - Every 8 h (13.0%)
    - Every 4 h (30.7%)
    - Every 1-3 h (16.7%)
  - Toothpaste
    - Never (40.9%)
    - Once daily or less (7.4%)
    - Every 12 h (25.1%)
    - Every 8 h (11.6%)
    - Every 4 h (10.2%)
-



					<ul style="list-style-type: none"> <li>- Every 1-3 h (4.7%)</li> </ul>
					<ul style="list-style-type: none"> <li>• Mouthwashes               <ul style="list-style-type: none"> <li>- Never (4.2%)</li> <li>- Once daily or less (5.1%)</li> <li>- Every 12 h (9.3%)</li> <li>- Every 8 h (16.3%)</li> <li>- Every 4 h (47.0%)</li> <li>- Every 1-3 h (18.1%)</li> </ul> </li> <li>• Participants governed by oral care guidelines had significantly higher oral care practice scores compared with their counterparts from ICUs without similar guidelines (Mean [SD], 2.46 [1.10] vs 2.06 [1.13]; p=0.034)</li> </ul>
Rabiei et al. 2014 [58]	Iran	To study primary care nurses' knowledge of oral health care (OHC) and their attitudes toward delivering OHC, as well as to assess their willingness to obtain OHC information	680 nurses	Cross-sectional survey	<p>Oral health knowledge:</p> <ul style="list-style-type: none"> <li>• The mean score for the pediatric dentistry domain (3.6 [SD: 1.5]) was lower than that for the medical (4.4 [SD: 2.3]) and dental (5.8 [SD: 1.5])</li> <li>• Nurses knew the correct time of tooth eruption (24%)</li> <li>• Nurses knew correct time to use fluoride tooth paste (26%)</li> <li>• Knowledgeable of lesser carcinogenicity of breast milk compared to formula (80%)</li> <li>• Lowest percentage of correct answer was</li> </ul>

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for the first sign of dental caries (48%)

- Highest percentage of correct answer for the aetiology of dental caries (92%)
- The percentage of correct answers regarding the relationship between periodontal and systemic diseases (60%–79%)
- The percentage of correct answer for the effects of drugs on dental caries (20–40%)
- The nurses working in the affluent area had higher scores in total knowledge and in the medical domain than did their colleagues working in the non-affluent area
- The knowledge of medicine score was the lowest among nurses with low OHB scores ( $p < 0.05$ ).

Attitude towards OHC:

- The mean score of the nurses' attitudes toward OHC was 22 (SD: 5.5)
  - Most of them were aware of the relationship between dental and general health (91%)
  - Some of them interested in implementing preventive activities for their patients (60%)
-

					<ul style="list-style-type: none"> <li>• Some thought that they should examine the oral cavity and teeth during routine patient visits (40%)</li> <li>• Most of them believed that they could play an important role in preventing oral diseases (72%)</li> <li>• Some interested in implementing preventive activities for their patients (60%)</li> <li>• Nurses believed that OHC delivered by nurses is efficient (49%)</li> <li>• Obtaining higher scores in the paediatric (OR=1.2) and dental (OR=1.3) domains, and a greater willingness to receive OHC information (OR=5.3), were associated with a positive attitude toward OHC</li> <li>• Nurses with a lower education (OR=1.9) and better oral health behaviour (OR=1.1) as well as those working in a non-affluent region (OR=1.6) had a more positive attitude toward OHC those with a higher educational degree, a lower OHB score, and those working in the affluent area (p&lt;0.05)</li> </ul>
Adib-Hajbaghery et al. 2013 [64]	Iran	To evaluate the nurses' opinions	130 ICU nurses	Cross-sectional study	Oral care <ul style="list-style-type: none"> <li>• Oral care: Mean: 5.7 (1-10 range)</li> </ul>

		and practice about oral care in patients under mechanical ventilation			<ul style="list-style-type: none"> <li>• Prevention of ventilator-associated pneumonia" (VAP) as the aim of oral care (21%)</li> <li>• They do not administer oral care for patients (21.5%)</li> <li>• They use a special written checklist for administering oral care (16.2%)</li> <li>• Oral care method: <ul style="list-style-type: none"> <li>- Simple suctioning (83.8%)</li> <li>- Normal saline swabs (69.2%)</li> <li>- Chlorohexidine paint (53.8%)</li> <li>- Tooth brush (14.6%)</li> </ul> </li> <li>• Barriers to oral care: <ul style="list-style-type: none"> <li>- Too much writing tasks</li> <li>- Lack of time</li> <li>- Staff shortage</li> </ul> </li> <li>• 86% of nurses stated that they recorded all oral care practices</li> </ul>
Dogan et al. 2013 [59]	Turkey	To assess the difference in oral health attitudes and behavior between dental and nursing students	159 Nursing students, 94 dental students	Survey questionnaire study	<p>Attitude and behaviours:</p> <ul style="list-style-type: none"> <li>• The nursing students were significantly more concerned about the appearance of their teeth (<math>p&lt;0.001</math>), and gums compared to dental students (<math>p&lt;0.001</math>)</li> <li>• Percent of agree response to worrying less about visiting dentist (<math>p&lt;0.001</math>), and postponing to go to dentist until they had</li> </ul>

					<p>toothache (<math>p&lt;0.001</math>) were higher in nursing students than in dental ones</p> <ul style="list-style-type: none"> <li>• More dental students compared to nursing students used a toothbrush with hard bristles (<math>p=0.004</math>), child-sized toothbrushes (<math>p&lt;0.001</math>), brushed each of their teeth carefully (<math>p=0.006</math>) and had used a dye to see how clean their teeth were (<math>p&lt;0.001</math>)</li> <li>• Compared to the nursing students, a higher proportion of dental students thought that they could clean their teeth well without using toothpaste (<math>p&lt;0.001</math>)</li> <li>• Dental students showed better oral health attitudes and behavior compared to nursing students</li> </ul>
<b>Africa (n=7)</b>					
Olatosi et al. 2019 [19]	Nigeria	To assess the impact of an interdisciplinary educational intervention on the knowledge of nursing practitioners regarding	110 Nurses	Survey questionnaire study	<p>Interdisciplinary education intervention:</p> <ul style="list-style-type: none"> <li>• Participants received hands-on training and didactic lectures, which included dental caries etiology and risk factors; oral hygiene and dietary education; teething and its management; dental trauma and its prevention; nonnutritive habits; screening, referrals, and counseling; and</li> </ul>

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perinatal and  
infant oral health  
(PIOH) care

fluoride varnish application  
Oral health knowledge: Mean (SD)

- Oral hygiene:
  - Baseline: 4.31 (1.9)
  - Post test: 7.58 (0.8)
  - 6 months: 6.21 (1.8)
- Teething:
  - Baseline: 9.84 (2.6)
  - Post test: 11.79 (1.3)
  - 6 months: 10.27 (3.1)
- Trauma:
  - Baseline: 2.59 (1.7)
  - Post test: 4.34 (1.9)
  - 6 months: 4.39 (1.5)
- Caries:
  - Baseline: 4.24 (1.8)
  - Post test: 6.19 (1.8)
  - 6 months: 5.91 (1.8)
- Oral habits:
  - Baseline: 1.45 (0.6)
  - Post test: 1.82 (0.4)
  - 6 months: 1.79 (0.5)

There was a positive impact of the educational intervention as evidenced by an increase in the knowledge of the nurses on PIOH care and the inclusion of PIOH education in their general health

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education					
Dagneu et al. 2020 [30]	Eritrea	To assess nurses' barriers to quality oral care practice at a generalized hospital	73 Hospital nurses	Cross-sectional survey	Barriers for nurses to oral care: <ul style="list-style-type: none"> <li>• Lack of oral care equipment: 91.2%</li> <li>• Absence of guideline: 73.5%</li> <li>• Shortage of nurses: 67.6%</li> <li>• Time constraint: 66.2%</li> <li>• Lack of knowledge: 54.4%</li> <li>• Poor supervision: 47.1%</li> <li>• High workload: 44.1%</li> <li>• Not priority: 33.8%</li> <li>• Not enthusiastic: 7.4%</li> <li>• No onjob training: 5.9%</li> </ul>
Yimenu et al. 2020 [31]	Ethiopia	To identify oral health-related knowledge and practice among Bahir Dar community health care providers and the perceived barriers to oral health care services	77 nurses at public and private health care facilities	Cross-sectional survey	Oral health knowledge: <ul style="list-style-type: none"> <li>• 52.8% answered correctly that teeth should be cleaned twice per day</li> <li>• Healthy gums look like pink and firm (18.2%)</li> <li>• Sugary diets like soft drinks and juices cause tooth decay (42.9%)</li> <li>• Dental calculus and dental plaque needs dental intervention (44.2%)</li> <li>• Correct method of brushing teeth is horizontal (31.2%)</li> <li>• Oral health affects rest of the body (44.2%)</li> </ul>

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- Fluoride tooth paste and mouthwash are important in maintaining dental hygiene (46.8%)

Oral health practice:

- Brushed their teeth once per day (61%)

Barriers for nurses to oral care:

- Limited finances: 79.2%
- Lack of adequate health/dental insurance: 70.1%
- Limited awareness of available dental care: 84.4%
- Fear of pain: 68.8%
- Work schedules: 63.6%
- Limited dental professionals: 63.6%
- Mistrust of health care professionals: 61%
- Inability to recognize signs of dental disease: 70.1%
- Lack of transportation: 67.5%

Oral health-related knowledge of health professionals in Bahir Dar city is low. Oral health awareness of health professionals should be improved. Oral health topics must be incorporated into the health care professionals training programs and continuing medical education

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Andargie et al. 2019 [33]	Ethiopia	To assess nurses' knowledge, attitude, and factors associated with the patients' oral care among nurses	382 hospital nurses	Cross-sectional questionnaire study	<p>Knowledge &amp; attitude of nurses:</p> <ul style="list-style-type: none"> <li>Nurses' knowledge and attitude towards patients' oral care were 53.4% (95% CI: 47.7–57.9) and 57.3% (95% CI 53.4–62.2) respectively</li> <li>The odds of having good knowledge for those degree holders and above were 5 times more likely to have good knowledge as compared to that of diploma holder nurses (AOR=5.05, 95% CI:1.85–13.83)</li> <li>The odds of having good knowledge for those who were working in the emergency ward have 3.1 times more likely to have good knowledge of those working in the surgical ward (AOR=3.1, 95% CI: 1.32–7.28)</li> <li>Not having oral care protocol in the working unit can reduce the probability of having good knowledge by 63% among nurse (AOR=0.37, 95% CI: 0.17–0.82)</li> <li>The odds of having a positive attitude for those degrees and above holders have 2 times more likely for those diploma holders (AOR=2.01, 95% CI: 1.012–4.01)</li> <li>The odds of having a positive attitude for those who were trained about oral care is</li> </ul>
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					<p>3.54 times more likely have a positive attitude as compared to for those who did not take about oral care (AOR=3.54, 95% CI:1.61–7.79)</p> <ul style="list-style-type: none"> <li>• Odds of having a good attitude for those who were experiencing greater than 10 years 5.72 times more likely have a positive attitude as compared to for those nurses who experienced less than 10 years (AOR=5.72, CI=2.40, 13.63)</li> <li>• Nurses' knowledge and attitude towards patients' oral care were inadequate</li> </ul>
Rwakatema et al. 2015 [37]	Tanzania	To determine the prevalence and severity of dental caries, oral hygiene levels and assessment of the oral health knowledge and practices of nursing students	135 were pursuing Diploma in Nursing, 79 Bachelor of Science in Nursing	Cross-sectional survey	<p>Oral health knowledge:</p> <ul style="list-style-type: none"> <li>• Do you know what causes easy bleeding of gums? Correct: 9.8%</li> <li>• How can you prevent your gum from bleeding? Correct: 31.8%</li> <li>• Do you know what causes dental decay?: Correct: 43.9%</li> <li>• How can you prevent your teeth from decaying?: Correct: 33.6%</li> <li>• Once caries has occurred, how can you timely manage it?: Correct: 47.2%</li> <li>• What is the content of a tooth paste which prevents tooth decay? Correct: 73.8%</li> <li>• More students pursuing Bachelor of</li> </ul>

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Science in Nursing had significant adequate oral health knowledge than those who were pursuing Diploma in Nursing ( $p=0.05$ )

Oral health care practices:

- When did you last visit dental personnel?:  
Correct: 14.5%
- How often do you brush your teeth?:  
Correct: 81.8%
- How often do you use dental floss?:  
Correct: 38.8%
- Do you use a tooth paste to brush your teeth?: Correct: 98.6%

Students afflicted with caries were significantly more in those pursuing Diploma in Nursing than in the students pursuing Bachelor of Science in Nursing

More students in the older age group had more missing and filled teeth than in the young age group

There was poor basic oral health knowledge and poor recall visit to dental personnel

Curriculum development in these school programmes should strengthen or encompass comprehensive oral health education

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					components. This will empower nursing professional with basic oral health knowledge and promotive oral health behaviors and hence to disseminate to the clients
Braimoh et al. 2014 [38]	Nigeria	To assess the views of PHC workers on integrating oral health care into the PHC system	51% Nurses/midwives	Survey questionnaire	<p>Oral health knowledge:</p> <ul style="list-style-type: none"> <li>Nurse/midwife: Adequate (36.7%)</li> </ul> <p>Oral health formal training:</p> <ul style="list-style-type: none"> <li>Nurse/midwife: Yes (34.7%)</li> </ul> <p>Oral health knowledge:</p> <ul style="list-style-type: none"> <li>Nurse/midwife: Good (38.8%)</li> <li>Nurse/midwife: Average knowledge score (55.1%)</li> <li>Nurse/midwife: Poor (6.1%)</li> </ul> <p>Overall, the nurses displayed better oral health knowledge than the community health officers and community health extension workers. This is probably because they are better educated; a few of the nurses 13 (13.5%) had additional qualifications such as university degrees</p> <p>The knowledge of the respondents on the causes of the common oral diseases was deficient. Oral health education should be included in the future curriculum of these personnel</p>

Azodo et al. 2013 <a href="#">[28]</a>	Nigeria	To assess the roles of Nigerian nurses in the assessment of oral conditions of hospitalized patients.	384 Nurses	Cross-sectional survey	<p>Knowledge of common oral diseases:</p> <ul style="list-style-type: none"> <li>• Good knowledge (28.1%)</li> <li>• Fair knowledge (18.8%)</li> <li>• Poor knowledge (53.1%)</li> </ul> <p>Quality of oral examination:</p> <ul style="list-style-type: none"> <li>• Good examination (38.0%)</li> <li>• Fair examination (10.4%)</li> <li>• Poor examination (51.6%)</li> </ul> <p>Perceived needs and assessment of oral conditions of hospitalized patients</p> <ul style="list-style-type: none"> <li>• Suspicious and abnormal findings in hospitalized patients to the attending doctor (80.7%)</li> <li>• It is compulsory for nurses to assess the oral condition of hospitalized patients (73.4%)</li> <li>• The majority considered oral care as an important aspect of nursing care (94.3%)</li> <li>• Oral health component in their nursing school curriculum (73.4%)</li> </ul> <p>Preferred mode on the training on assessment oral health status</p> <ul style="list-style-type: none"> <li>• Seminar (54.3%)</li> <li>• Workshop (26.0%)</li> </ul>
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					<ul style="list-style-type: none"> <li>• Classroom lecture (7.5%)</li> <li>• Pamphlet/posters (7.5%)</li> <li>• Multiple modes (4.6%)</li> </ul> <p>Frequency of contact with denture wearing patients</p> <ul style="list-style-type: none"> <li>• Never (23.4%)</li> <li>• Rarely (40.6%)</li> <li>• Sometimes (16.1%)</li> <li>• Often (4.7%)</li> <li>• Regularly (15.1%)</li> </ul>
<b>Rest of the world (n=10)*</b>					
Sanchez Pena et al. 2021 [65]	Colombia	To evaluate the impact of an educational intervention on oral hygiene care aimed at nursing care staff, on the incidence of Ventilator-Associated Pneumonia (VAP) in adults from an ICU in Colombia	40 ICU nurses, 20 nursing aides	Questionnaire study	<p>Educational intervention:</p> <ul style="list-style-type: none"> <li>• This has 3 stages: diagnostic, intervention, and evaluation</li> <li>• The diagnostic stage applied a questionnaire to the health staff to identify knowledge on oral care of patients in ICU</li> <li>• Theoretical-practical sessions during 12 weeks, which explained different techniques of oral hygiene according to patient's oral condition. The sessions addressed themes regarding the anatomy and physiology of the oral cavity, oral pathologies common in ICU patients, identification model of oral problems,</li> </ul>

					<p>ventilator-associated pneumonia, and oral hygiene techniques for intubated patients focused on the use of the toothbrush and dental floss to remove bacterial plaque, application of chlorhexidine with gauze to clean the teeth and all the mouth structures, the change of tube clamping to avoid ulcers, and the importance of hydrating the lips</p> <ul style="list-style-type: none"> <li>• The evaluation stage conducted follow up of the nursing staff three times per week, identifying the use of these supplies and application of oral health in the patients. In addition, follow up was conducted of the hygiene activity records in the clinical charts</li> </ul> <p>Oral care:</p> <ul style="list-style-type: none"> <li>• Activities with oral care rose from 29.6% to 92.8%</li> <li>• Tooth brushing from 0.9% to 48.6%</li> <li>• Chlorhexidine mouthwash from 2.9% to 70%</li> <li>• Aides participating in caring from 32.7% to 94.3%</li> </ul>
Branco et al.	Brazil	To evaluate nursing	ICU nurses	Retrospective	Ventilator-Associated Pneumonia prevention

2020 [67]		adherence to the Ventilator-Associated Pneumonia Prevention Bundle and the incidence rate, before and after Continuing education		study	bundle education <ul style="list-style-type: none"> <li>Oral hygiene with chlorhexidine: Before Continuing education: 1206 (89.5%); After Continuing education: 1327 (98.2%)</li> </ul> Teeth brushing: Before Continuing education: 1088 (80.8%); After Continuing education: 1303 (96.4%)
Veerasamy et al. 2023 [13]	New Zealand	To investigate the present educational content relevant to the oral health of older adults, the oral-systemic connection, and assessment methods in New Zealand nursing education	12 undergraduate nursing students	Cross-sectional survey	Topics related to the oral health of the older population <ul style="list-style-type: none"> <li>33% and 41.7% of the participants indicated not teaching caries and periodontal conditions and their risk factors to general health</li> <li>Half of the participants indicated not teaching dental examination and oral hygiene procedures within their curricula</li> <li>Almost 30% of institutes reported not teaching oral health intervention methods and the use of fluoride rinses and toothpaste</li> <li>Care for crowns and implants were not taught in 83.3% institutes</li> </ul> Oral health teaching practices



					<ul style="list-style-type: none"> <li>• The participants (41.7%) indicated only nurses teach oral health topics in their institutes</li> <li>• 75% of participants indicated sourcing oral health topic materials from nursing textbooks</li> <li>• 70% of participants indicated that less than 5 h were devoted to oral health care educational teaching throughout the entire program</li> <li>• 53% of participants indicated they used direct observation in a clinical setting to assess the oral health skills of students</li> <li>• Three institutes (25%) heads reported not assessing the oral health care skills of nursing students</li> </ul> <p>Barriers preventing from teaching oral health topics:</p> <ul style="list-style-type: none"> <li>• Insufficient time in the curriculum (8.3%)</li> <li>• Don't see this as a priority area (8.3%)</li> <li>• No national nursing core competencies in oral health (8.3%)</li> <li>• No nursing accreditation standards addressing oral health (33.3%)</li> </ul>
Veerasamy et al.	New Zealand	To investigate the oral health care	148 third year	Cross-sectional	General oral health knowledge:

2022 [29]	knowledge of nursing graduates across Aotearoa New Zealand	nursing students	survey	<ul style="list-style-type: none"> <li>• Regular dental appointments (70.27%), Daily oral care (97%), healthy diet and nutrition (75%), drinking water frequently (60.13%) are strategies for good health</li> <li>• After breakfast and after last meal of the day (97.3%) is ideal time for brushing</li> <li>• Pink (99.3%) is the color of healthy gum</li> <li>• Brushing teeth too hard (70.9%), Insufficient brushing (53.4%), Bacteria on the teeth and gums (75.7%), Smoking (43.9%) are causes of gingival bleeding</li> <li>• Advantage of fluoride in toothpaste in strengthening the teeth (92.56%)</li> <li>• Factors contributing to tooth decay is smoking (88.5%), Not brushing teeth (93.9%), constantly eating sugar-based food (100%)</li> </ul> <p>Knowledge on oral health care for older people:</p> <ul style="list-style-type: none"> <li>• How to tell someone suffering from bone loss: The teeth appear very long (45.3%), The teeth are worn down (51.4%), Spacing between teeth (56.1%), Teeth are loose or mobile (73.6%)</li> <li>• Calculus look like: Hard with light color (73%), soft, with a light color (25%)</li> <li>• Best time to perform oral hygiene</li> </ul>
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					<p>procedure for older people: Morning and evening (73%)</p> <ul style="list-style-type: none"> <li>• How you usually clean dentures?: Clean using a toothbrush and denture cleaner (38.7%), Clean using water and a toothbrush (32.2%), Frequency of cleaning denture: Once daily (80.6%)</li> <li>• How long would it take to do an oral health examination?: Never done an oral health examination (83.9%)</li> </ul> <p>Nursing graduates have good basic oral health knowledge; however, their knowledge of the oral–systemic disease connection and an examination of the oral cavity or screening was found to be poor, which it is suggested is due to lack of oral health care content in nursing curricula</p>
Wong et al. 2021 [78]	Australia	To assess the oral health literacy level among undergraduate nursing students	729 undergraduate nursing students	Cross-sectional survey	<p>Comprehensive Measure of Oral Health Knowledge (CMOHK) score</p> <ul style="list-style-type: none"> <li>• Mean (SD): 15.48 (3.27) “good” (15–23 correct scores), “fair” (12–14 correct scores) and “poor” (0–11 correct scores) oral health knowledge</li> <li>• 72% were categorized as having good, 16% fair and 12% poor oral health knowledge</li> </ul>

					<ul style="list-style-type: none"> <li>• Lower percentages of correct responses in the periodontal disease and oral cancer knowledge domains</li> <li>• Students with English as their second language, on average, scored 2 fewer correct responses (<math>p &lt; .001</math>) than students whose first language was English</li> <li>• Low socioeconomic status was not associated with a low level of oral health literacy</li> </ul>
Lewis et al. 2018 [54]	Australia	To evaluate whether a set of oral health resources designed for workforce training was relevant for students undertaking an entry-level nursing or aged care qualification	Bachelor of Nursing (n = 41), Diploma of Nursing (n = 66) and Certificate in Aged Care course students (n = 17) and two educators from each course	Questionnaire study	<ul style="list-style-type: none"> <li>• Students used the Building Better Oral Health Communities resources as prescribed study materials</li> <li>• Evaluation showed high levels of student and educator satisfaction</li> <li>• Student learning outcomes demonstrated consistently positive attitudes and significant self-reported improvements in oral health knowledge and skills</li> <li>• Irrespective of course type, students gained similar levels of oral health knowledge and skills following use of the resources</li> </ul>
Pai et al. 2016 [82]	Australia	To assess final-year nursing students about	100 third year nursing students	Cross-sectional Likert-style survey	<p>Questions relating to periodontal health and the nurse's role</p> <ul style="list-style-type: none"> <li>• Do you think periodontal disease is</li> </ul>

		<p>their awareness of periodontal disease and its impact on general health; and to ascertain their knowledge about the periodontal links to systemic disease as well as their perceived knowledge and abilities to provide informed advice and referrals to at-risk patients</p>			<p>evidence in the mouth? (98%)</p> <ul style="list-style-type: none"> <li>• Do you think periodontal disease is a risk factor for adverse pregnancy outcomes? (54%)</li> <li>• Do you think diabetes is a precursor of periodontal disease? (79%)</li> <li>• Does smoking affect tissues in the mouth? (100%)</li> <li>• Are you comfortable looking into the patients mouth to detect gum disease? (70%)</li> <li>• Do you think oral hygiene should be incorporated into the Nursing curriculum? (84%)</li> </ul>
Pesaressi et al. 2014 [62]	Peru	To identify barriers to participation in a primary oral health care programme aimed at preventing early childhood caries, as perceived by nurses	123 nurses in government health centres	Questionnaire study	<p>Barrier factors: Mean (SD)</p> <ul style="list-style-type: none"> <li>• Importance of oral health: 3.81 (0.31)</li> <li>• Perceived responsibility: 3.44 (0.50)</li> <li>• Intention to give to advice: 3.31 (0.53)</li> <li>• Training: 3.17 (0.64)</li> <li>• Social norms: 3.04 (0.63)</li> <li>• Experience in seeking carious lesions: 2.84 (0.55)</li> <li>• Knowledge on caries prevention: 1.70</li> </ul>

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(0.69)

- 1=lowest; 4=highest
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**Abbreviations:**AOR, adjusted odds ratio; A-PMC, Attitudes for Providing Mouth Care; CI, confidence interval; GCF,geriatric care facilities; ICU, intensive care unit; OH,oral health; OHB,oral health behavior; OR,odds ratio; PHC,primary health care; SE-PMC, Self-Efficacy for Providing Mouth Care; SD,standard deviation; UCSF,University of California, San Francisco.

**Notes:** \* Few studies are conducted in more than one country so we have extracted the data of the study in one region.



2022 [71]								
Wei et al. 2022 [61]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Zagade et al. 2022 [48]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Lakshmi et al. 2022 [43]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Paulsamym et al. 2022 [49]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Veerasamy et al. 2022 [29]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Bashir et al. 2021 [50]	Yes	Yes	Yes	Yes	No	Yes	Yes	0.8
Wong et al. 2021 [78]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Sánchez Peña et al. 2021 [65]	Yes	Yes	Yes	Yes	No	Yes	Yes	0.8
Branco et al. 2020 [67]	Yes	Yes	Yes	Yes	No	Yes	Yes	0.8
Alkhtib et al. 2020 [52]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Yavuz et al. 2020 [70]	Yes	Yes	Yes	Yes	No	Yes	Yes	0.8
Yimenu et al. 2020 [31]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Yavagal et al. 2020 [41]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Haresaku et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0





2014 [57]								
Braimoh et al. 2014 [38]	Yes	Yes	Yes	Yes	No	Yes	Yes	0.8
Alotaibi et al. 2014 [79]	Yes	Yes	Yes	Yes	No	Yes	Yes	0.8
Pesaressi et al. 2014 [62]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Rabiei et al. 2014 [58]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Adib-Hajbaghery et al. 2013 [64]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Blevins et al. 2013 [84]	Yes	Yes	Yes	Yes	Yes	Yes	No	0.8
Azodo et al. 2013 [28]	Yes	Yes	Yes	Yes	No	Yes	No	0.6
Dogan et al. 2013 [59]	Yes	Yes	Yes	Yes	Yes	Yes	No	0.8
Narbutaitė et al. 2023 [27]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0

**Abbreviations:** SQ, screening question

**Notes:**\*Overall quality score: Studies met all assessment criteria scored one and studies met fewer criteria scored less than one

b) Mixed method critical review analysis of identified studies (n=6)

	<b>SQ1. Are there clear research questions?</b>	<b>SQ 2. Does the collected data address the research questions?</b>	<b>Is there an adequate rationale for using a mixed-method design to address the research questions?</b>	<b>Are the different components of the study effectively integrated to answer the research question(s)?</b>	<b>Are the outputs of the integration of qualitative and quantitative components adequately interpreted?</b>	<b>Are divergences and inconsistencies between qualitative and quantitative results adequately addressed?</b>	<b>Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?</b>	<b>Overall quality score*</b>
Veerasamy et al. 2023 [13]	Yes	Yes	Yes	Yes	Yes	No	Yes	0.8
Weening-Verbree et al. 2021 [4]	Yes	Yes	Yes	Yes	Yes	No	Yes	0.8
Ahmad et al. 2021 [51]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Dagnew et al. 2020 [30]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Lewis et al. 2018 [54]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Hilton et al. 2016 [63]	Yes	Yes	Yes	Yes	Yes	No	Yes	0.8

**Abbreviations:** SQ, screening question

**Notes:**\*Overall quality score: Studies met all assessment criteria scored one and studies met fewer criteria scored less than one.

c) Qualitative critical review analysis of the included studies (n=1)

	<b>Screening question (SQ)1. Are there clear research questions?</b>	<b>SQ 2. Does the collected data address the research questions?</b>	<b>Is the qualitative approach appropriate to answer the research question(s)?</b>	<b>Are the qualitative data collection methods adequate to address the research question(s)?</b>	<b>Are the findings adequately derived from the data?</b>	<b>Is the interpretation of results sufficiently substantiated by data?</b>	<b>Is there coherence between qualitative data sources, collection, analysis and interpretation?</b>	<b>Overall quality score*</b>
Nierenberg et al. 2018 [26]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0

**Abbreviations:** SQ, screening question

**Notes:**\*Overall quality score: Studies met all assessment criteria scored one and studies met fewer criteria scored less than one.

d) Quantitative critical review analysis of the included studies (n=15)

[illegible]

Czarnecki et al. 2014 [69]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0
Adib-Hajbaghery et al. 2013 [64]	Yes	Yes	Yes	Yes	Yes	No	Yes	0.8
Golinveaux et al. 2013 [23]	Yes	Yes	Yes	Yes	Yes	No	Yes	0.8
Ganz et al. 2013 [83]	Yes	Yes	Yes	Yes	Yes	No	Yes	0.8
Zurmehly et al. 2013 [66]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.0

**Abbreviations:** SQ, screening question

**Notes:**\*Overall quality score: Studies met all assessment criteria scored one and studies met fewer criteria scored less than one.

e) Quantitative critical review analysis of the included studies (n=1)

	<b>SQ1. Are there clear research questions?</b>	<b>SQ 2. Does the collected data address the research questions?</b>	<b>Are the participants representative of the target population?</b>	<b>Are measurements appropriate regarding both the outcome and intervention(or exposure)?</b>	<b>Are there complete outcome data?</b>	<b>Are confounders accounted for in the design and analysis?</b>	<b>During the study period, is the intervention administered (or exposure occurred) as intended?</b>	<b>Overall quality score*</b>
Janssens et al. 2016 [21]	Yes	Yes	Yes	No	Yes	No	Yes	0.6

**Abbreviations:** SQ, screening question

**Notes:**\*Overall quality score: Studies met all assessment criteria scored one and studies met fewer criteria scored less than one.