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Research article

# Intensive care nurses fail to translate knowledge and skills into practice – A mixed-methods study on perceptions of oral care

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ABSTRACT

*Objectives:* To identify intensive care nurses' perceptions of oral care according to Coker et al.'s (2013) conceptual framework and to contribute to the knowledge base of oral care in intensive care.
*Design/methods:* This was a concurrent embedded mixed-methods design, with more weight given to the quantitative part. Participants responded to the Nursing Care related to Oral Health questionnaire, including perceptions of oral care antecedents (18 items), defining attributes (17 items), and consequences (6 items) and two open-ended questions. The data were analysed with descriptive and correlation statistics and qualitative content analysis.
*Setting:* Intensive care nurses ($n = 88$) in six general intensive care units.
*Results:* Intensive care nurses perceived that an important part of nursing care was oral care, especially to intubated patients. They perceived that the nursing staff was competent in oral care skills and had access to different kinds of equipment and supplies to provide oral care. The oral cavity was inspected on a daily basis, mostly without the use of any assessment instruments. Oral care seemed to be task-oriented, and documentation of the patients' experiences of the oral care process was rare.
*Conclusions:* The antecedents, knowledge and skills are available to provide quality oral care, but intensive care nurses seem to have difficulties translating these components into practice. Thus they might have to shift their task-oriented approach towards oral care to a more person-centred approach in order to be able to meet patients' needs.



**Implications for clinical practice**

- Oral care is a complicated and proactive nursing intervention that requires intensive care nurses' attention and both educational and institutional initiatives.
- Oral health assessments of intubated and non-intubated patients should guide oral care and not the intensive care units routines.
- Use of a reliable and valid oral health assessment instrument is necessary for more accurate measurement of patients' oral health status and outcomes.
- Knowing the patient through documentation might reduce oral care difficulties related to patient behaviour.

## Introduction

Intensive care unit (ICU) nurses are in a position to make an impact on oral health outcomes for patients in intensive care (American Association of Critical-Care Nurses 2016; Ames et al., 2011). Oral care reduces bacterial colonisation in the oropharyngeal cavity (Cecona et al., 2010) and might prevent adverse events such as deterioration in oral health (Terezakis et al., 2011) and respiratory infections (Hua et al., 2016). Intubation-associated pneumonia is considered the leading healthcare-associated infection cause of mortality in ICUs (Sousa et al., 2018) and is defined as a pneumonia occurring 48 hours or more after intubation, even if only intermittently (The European Centers for Disease Control and Prevention, 2010).

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The provision of oral care is complex and multifaceted (Dale et al., 2013) and depends on different external objective care conditions such as guidelines/protocols (Cutler and Sluman, 2014; El-Soussi and Asfour, 2017; Prendergast et al., 2013), documentation (Goss et al., 2011; Inan and Dinç, 2013) and the availability of equipment and supplies (Cutler and Sluman, 2014; Hua et al., 2016; Prendergast et al., 2013). Oral care also depends on ICU nurses' person-related care conditions such as awareness, knowledge and accurate beliefs about oral health and oral care (DeKeyser Ganz et al., 2013; Kiyoshi-Teo and Blegen, 2015; Lin et al., 2014; Saddki et al., 2014). Previous research, however, has often focused on different individual aspects of oral care (Cutler and Sluman, 2014; DeKeyser Ganz et al., 2013; Goss et al., 2011; Hua et al., 2016; Inan and Dinç, 2013; Kiyoshi-Teo and Blegen, 2015; Lin et al., 2014; Prendergast et al., 2013) and not on the oral care concept as a whole.

Coker et al. (2013) have developed a conceptual framework for older people who are dependent in oral care. This framework of oral care includes three areas: – antecedents of oral care, defining attributes of oral care and consequences of oral care. Oral care antecedents, which are established prior to the provision of oral care, include nine sub-areas, for example, awareness, knowledge, accurate beliefs, workload, protocols, care plans and guidelines/protocols. The defining attributes of oral care include seven sub-areas regarding care approaches, oral cavity inspection and different oral care interventions in order to disrupt plaque, reduce salivary microorganisms and clean and moisturise tissues. Additionally, oral care for patients receiving mechanical ventilation also includes the use of designated oral care protocols and the suctioning of the secretions that pool above the endotracheal tube cuff. The area of oral care consequences includes eight sub-areas, for example, prevention of microbial infections, prevention of oral discomfort, and enhanced cough reflex. The oral care emphasis in patients receiving mechanical ventilation is on preventing ventilator-associated pneumonia through decontamination and the prevention of aspiration (Coker et al., 2013). The areas and sub-areas are presented in Table 2.

The focus for oral care for ICU patients is on preventing respiratory infection, and this has received increased emphasis in recent years (American Association of Critical-Care Nurses, 2016), but still there is a lack of knowledge in Sweden about ICU nurses' perceptions of the oral care concept. Oral care is multifaceted; there is a need for a mixture of quantitative and qualitative approaches in order to gain a better understanding of this complex area of nursing. The use of Coker et al.'s (2013) conceptual oral care framework might contribute to better defining the knowledge base for oral care in the ICU, especially knowledge that might benefit ICU nurses and department managers when working with oral care quality improvements. This knowledge also might prevent adverse events in patients' physical health and might be important for patients' physiological well-being.

The aim of this study was to identify intensive care nurses' perceptions of oral care according to Coker et al.'s (2013) conceptual framework and to contribute to the knowledge base of oral care in intensive care. In following the mixed-methods approach, four specific questions were asked:

- How do intensive care nurses perceive oral care with its antecedents, defining attributes and consequences? (quantitative)
- How do intensive care nurses' perceptions of the antecedents and defining attributes of oral care correlate with each other? (quantitative)
- How do intensive care nurses' perceptions of consequences and defining attributes of oral care correlate with each other? (quantitative)
- How do intensive care nurses understand oral care? (qualitative)

## Methods

### *Design*

The study used concurrent embedded mixed-methods, mixed at one stage, and the quantitative part was given more weight (Leech and Onwuegbuzie, 2009). The quantitative data were collected with a study-specific questionnaire, and the qualitative data were generated from two open-ended questions (Fig. 1).

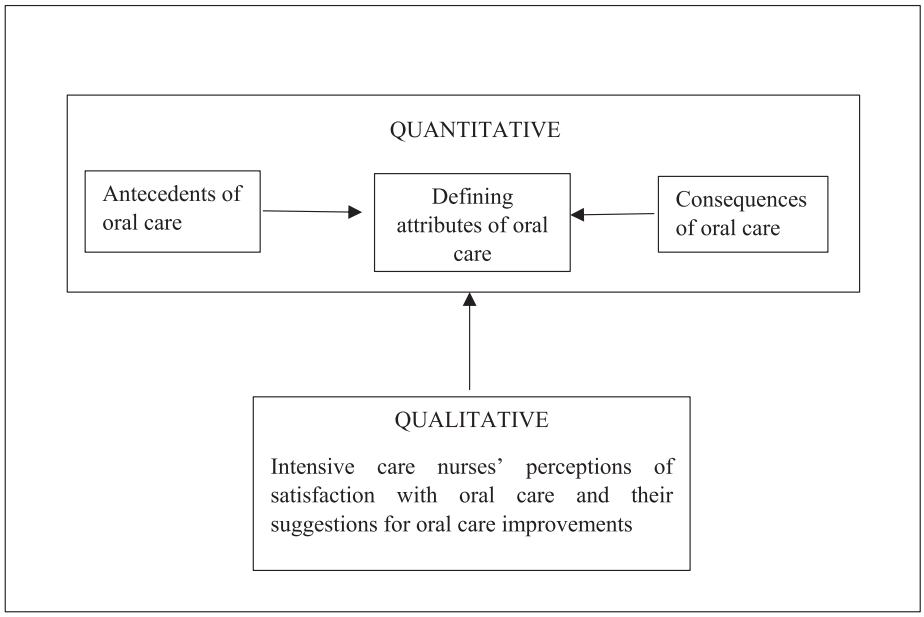


**Fig. 1.** Embedded Correlational Model of antecedents, defining attributes, and consequences of oral care in relation to Coker et al.'s (2013) theoretical framework and intensive care nurses' perceptions of satisfaction with oral care and their suggestions for oral care improvements.

The sampling was criterion based and included the same participants in both the quantitative and qualitative parts (Onwuegbuzie and Collins, 2007).

### Setting

Six out of seven general ICUs in four out of five healthcare regions in Sweden agreed to be involved in the study. There was no explanation for refusal from the ICU that declined involvement. The involved ICUs represented university hospitals (teaching hospitals that provide highly specialised care), county hospitals (that provide general and to some extent specialised care) and local hospitals (that provide general care).

### Ethical approval

The Regional Ethical Review Board Uppsala in Sweden approved the study (Dnr 2015/457). The head of the ICU departments gave permission to conduct the study. Participation in the study was voluntary, the participants' identities were kept confidential and informed consent was indicated by returning the questionnaire.

### Participants

Quantitative data. Participants were ICU nurses working in the involved ICUs and who met the following inclusion criteria: employed as a registered nurse, having a post-graduate education within intensive care on an advanced level (ICN, 2014) and working part or fulltime.

Eighty-eight out of 217 ICU nurses participated in the study (response rate 40%). The response rate varied from 32% to 75% among the ICUs. Table 1 presents the participants' characteristics. The dropout analysis showed that a higher percentage (71%) of men and those who were younger than the mean age of the participants (<48.4 years) chose to a greater extent not to participate in the study.

Qualitative data. Participants who answered the open-ended questions included 38 ICU nurses.

### Measures

Quantitative data. Because there was no valid or reliable questionnaire available, a study-specific questionnaire *Nursing Care related to Oral Health* (NCOH), based on Coker et al.'s (2013) conceptual oral care framework, was developed by the researchers for this study.

The NCOH consisted of 40 items that examined the participants' perceptions regarding oral care antecedents (18 items) divided into nine sub-areas, their perceptions of attributes of oral care (16 items) divided into seven sub-areas, and their perceptions of oral care consequences (6 items) divided into four sub-areas. In addition to those based on Coker et al.'s (2013) framework, one sub-area, documentation, was added in the area of oral care antecedents. All items in relation to the sub-areas are shown in Table 2.

Items regarding oral care antecedents could be answered in three different ways – as yes/no/do not know (six items), by using a four-point Likert-type scale ranging from 1 (never) to 4 (always) (eight items), or by using a five-point Likert scale ranging from 1 (very small) to 5 (very large) (four items) (Table 2).

Items regarding defining attributes of oral care could be answered in two different ways – as yes/no (three items) or by using a four-point Likert-type scale ranging from 1 (never) to 4 (always) (14 items) (Table 2).

Items regarding oral care consequences were answered by using a five-point Likert scale ranging from 1 (very small) to 5 (very large) (six items) (Table 2).

Cronbach's alpha coefficients were 0.59 for oral care antecedents, 0.48 for defining attributes of oral care, and 0.74 for consequences of oral care. The statistical analysis was performed on the item level.

The NCOH was pilot tested by three ICU nurses with 2–28 years of professional experience in intensive care, two of whom had master's degrees in health education and one of whom had a PhD in nursing. The ICU nurses tested the face and content validity of the NCOH; they were asked to judge whether the items covered relevant data in relation to Coker et al.'s (2013) conceptual framework. This pilot test resulted in minor linguistic and layout changes.

Qualitative data. Qualitative data were collected through the following two open-ended questions in the NCOH: "*What are you particularly satisfied with regarding oral care in your unit?*" and "*Do you have any suggestions for oral care improvements?*"

### Data collection

Quantitative and qualitative data. One of the researchers (MA) informed the nurse manager or nurse manager-appointed nursing staff in person or by phone about the aim of the study, the confidentiality of the data collected and the potential use of the findings. They in turn gave verbal information to the participants. Each participant received the NCOH together with an addressed and prepaid envelope. Along with the NCOH, the participants received written information about the study. Two reminders were sent via e-mail to the nurse manager or nurse manager-appointed nursing staff who put up reminders on the ICU notice board. The participants returned the answered NCOH to the researcher (MA). The data collection took place from January 2016 to February 2016.

### Data analysis

Quantitative data. Descriptive statistics such as means and standard deviations were used to describe ICU nurses' perceptions of the antecedents, defining attributes, and consequences of oral care. For descriptive purposes, the ICU nurses' perceptions were classified as high or low. The high group included the ICU nurses scoring high (3 and 4) on the four-point Likert-type scale and high (4 and 5) on the five-point Likert scale. The low group included ICU nurses scoring low (1 and 2) on the four-point Likert-type scale and low (1 and 2) on the five-point Likert scale.

Correlation analyses such as Pearson product-moment correlation coefficient ($r$) (interval-level data) and Spearman rank order correlation (rho) (nominal-level data) were used to examine correlations, strengths (strong 0.50–1.00, moderate 0.30–0.49 and weak

**Table 1**
Characteristics of ICU nurses with a post-graduate education within intensive care ($n$ = 88).

| Variable | $n$ (%) | Mean (SD) | Range (min–max) |
|---|---|---|---|
| *Age* | | 48 (11.77) | 25–65 |
| *Gender* | | | |
| Female | 78 (90) | | |
| Male | 9 (10) | | |
| *Work* | | | |
| Full time | 53 (61) | | |
| Part time | 34 (39) | | 50%–92% of 100% |
| *Years of experience in health care* | | 26 (12.97) | 4–46 |
| *Years of experience in ICU* | | 14 (11.16) | 0.5–38 |
| *Academic degree* | | | |
| Bachelor's degree in nursing | 50 (59) | | |
| Master's degree in nursing | 19 (23) | | |
| None | 15 (18) | | |

**Table 2**
Description of ICU nurses' ($n = 88$) perceptions of antecedents, defining attributes, and consequences of oral care based on Coker et al.'s (2013) conceptual framework for older people who are dependent on oral care.

| *Areas/subareas/items* | Participants *n* | Yes *n* (%) | No *n* (%) | Do not know *n* (%) | *Mean* (SD) | High[d] *n* (%) | Low[e] *n* (%) | Neither high or low[f] *n* (%) |
|---|---|---|---|---|---|---|---|---|
| **Antecedents of oral care** | | | | | | | | |
| *Awareness, knowledge, and accurate beliefs (A)* | | | | | | | | |
| To what extent do you consider yourself to have knowledge about oral health and its impact on patient's general health[a]? | 88 | | | | 3.6 (0.80) | 49 (56) | 3 (3) | 36 (41) |
| To what extent do you consider yourself to have knowledge of the oral health of the patients who are in your care[a]? | 88 | | | | 3.6 (0.67) | 52 (59) | 4 (4) | 32 (37) |
| Do you think there are patients for whom oral care is especially important[b]? | 87 | 82 (94) | 5 (6) | | | | | |
| *Positive attitudes (B)* | | | | | | | | |
| To what extent do you consider that oral care is important[a]? | 87 | | | | 4.6 (0.52) | 87 (1 0 0) | | |
| Competence in oral care skills (C) | | | | | | | | |
| To what extent do you consider that the nursing staff has the right skills to preserve patients' oral health[a]? | 88 | | | | 3.6 (0.78) | 50 (57) | 6 (7) | 32 (36) |
| *Workload and workflow (D)* | | | | | | | | |
| Is there sufficient nursing staff in your unit to preserve patients' oral health[c]? | 88 | | | | 3.2 (0.62) | 76 (86) | 12 (14) | |
| *Interdisciplinary collaboration (E)* | | | | | | | | |
| Have there been occasions when you have considered that the patient in your care has been in need of a dental hygienist[b]? | 85 | 76 (89) | 9 (11) | | | | | |
| If yes – was a dental hygienist available[c]? | 78 | | | 11 (14) | 2.2 (0.91) | 21 (27) | 46 (59) | |
| *Protocols, care plans, and guidelines in place (F)* | | | | | | | | |
| Are there oral care guidelines in place in your unit[b]? | 87 | 81 (93) | 4 (5) | 2 (2) | | | | |
| Are there oral care plans in place in your unit[b]? | 86 | 34 (39) | 36 (42) | 16 (19) | | | | |
| Is there an oral health assessment instrument in place in your unit[b]? | 86 | 9 (10) | 61 (71) | 16 (19) | | | | |
| *Available equipment and supplies (G)* | | | | | | | | |
| Is there access to different materials in order to perform good oral care[b]? | 86 | 85 (99) | 1 (1) | | | | | |
| *Organisational support (H)* | | | | | | | | |
| The results of the patient's oral health status is followed up in the unit[c] | 86 | | | 22 (26) | 1.8 (0.89) | 15 (17) | 49 (57) | |
| The results of the patient's oral health status is followed up by the hospital organisation[c] | 72 | | | 34 (47) | 1.2 (0.47) | 1 (1) | 37 (52) | |
| *Documentation (I)* | | | | | | | | |
| I document assessments of oral health status on patients[c] | 86 | | | | 2.6 (0.92) | 48 (56) | 38 (44) | |
| I document the patient's experience of oral care[c] | 87 | | | | 1.7 (0.57) | 3 (3) | 84 (97) | |
| I document the oral care provided to patients[c] | 86 | | | | 3.3 (0.86) | 67 (78) | 19 (22) | |
| I document what material I use for oral care[c] | 86 | | | | 1.8 (0.86) | 13 (15) | 73 (85) | |
| **Defining attributes of oral care** | | | | | | | | |
| *Using care approaches informed by knowing the patient (J)* | | | | | | | | |
| I know the patient's oral health has changed through evaluation of documentation[b] | 81 | 65 (80) | 16 (20) | | | | | |
| I know the patient's oral health status has changed through evaluation of flow sheets[b] | 74 | 42 (57) | 32 (43) | | | | | |
| I know the patient's oral health status has changed through communication among the staff[b] | 84 | 83 (99) | 1 (1) | | | | | |
| I involve the patient in their oral care when the patient is able[c] | 87 | | | | 3.2 (0.72)[b] | 75 (86) | 12 (14) | |
| I use the oral care guidelines available at my unit[c] | 85 | | | | 3.3 (0.82)[b] | 75 (88) | 10 (12) | |
| I use the oral care plans available at my unit[c] | 70 | | | | 2.6 (1.23)[b] | 44 (63) | 26 (37) | |
| *Inspecting the oral cavity (K)* | | | | | | | | |
| I assess oral health status daily in patients in my care[c] | 86 | | | | 3.0 (0.80)[b] | 63 (73) | 23 (27) | |
| I use an assessment instrument to assess patients' oral health status[c] | 85 | | | | 1.2 (0.53)[b] | 3 (4) | 82 (96) | |
| **Defining attributes of oral care** | | | | | | | | |
| *Inspecting the oral cavity (K)* | | | | | | | | |
| I evaluate the oral care that is provided by performing a new oral health status assessment[c] | 86 | | | | 2.2 (1.04) | 27 (31) | 59 (69) | |
| *Removing dental and/or plaque (L)* | | | | | | | | |
| Manual toothbrush[c] | 81 | | | | 3.1 (0.94) | 63 (78) | 18 (22) | |
| Powered toothbrush[c] | 84 | | | | 1.1 (0.34) | | 84 (1 0 0) | |
| *Cleansing the oral tissues (M)* | | | | | | | | |
| Foam swabs[c] | 81 | | | | 2.9 (1.02) | 58 (72) | 23 (28) | |
| Suction catheters[c] | 79 | | | | 3.3 (0.84) | 67 (85) | 12 (15) | |
| Oral care kits (e.g. mouth rinse, toothbrush, foam swabs, toothpaste, chlorhexidine, vaseline)[c] | 81 | | | | 1.6 (0.97) | 18 (22) | 63 (78) | |

**Table 2** (*continued*)

| *Areas/subareas/items* | Participants *n* | Yes *n* (%) | No *n* (%) | Do not know *n* (%) | *Mean* (SD) | High[d] *n* (%) | Low[e] *n* (%) | Neither high or low[f] *n* (%) |
|---|---|---|---|---|---|---|---|---|
| *Decontaminating the oral cavity (N)* | | | | | | | | |
| Chlorhexidine mouthwash or gel[c] | 80 | | | | 2.4 (1.15) | 44 (55) | 36 (45) | |
| *Maintaining oral tissues moisture (O)* | | | | | | | | |
| Mouth rinses[c] | 81 | | | | 2.6 (1.06) | 49 (60) | 32 (40) | |
| **Consequences of oral care** | | | | | | | | |
| *Prevention of microbial infections and/or oral candidiasis (P)* | | | | | | | | |
| To what extent do you consider that oral care might have an impact on the presence of microbial infections and oral candidiasis in the oral cavity[a]? | 87 | | | | 4.4 (0.81) | 81 (93) | 3 (3) | 3 (4) |
| *Prevention of oral discomfort (Q)* | | | | | | | | |
| To what extent do you consider that oral care might have an impact on the ability of the patients to eat and drink[a]? | 87 | | | | 4.5 (0.59) | 83 (94) | | 4 (6) |
| To what extent do you consider that oral care might have an impact on the patient's swallowing ability[a]? | 88 | | | | 4.2 (0.77) | 73 (83) | 2 (2) | 13 (15) |
| *Enhanced cough reflex (R)* | | | | | | | | |
| To what extent do you consider that oral care might stimulate the patient's cough reflex and thus the opportunity to bring up phlegm[a]? | 88 | | | | 3.9 (0.71) | 60 (68) | – | 28 (32) |
| *Enhanced functional and psychosocial well-being (S)* | | | | | | | | |
| To what extent do you consider that oral care might have an impact on the patient's ability to communicate[a]? | 88 | | | | 4.1 (0.79) | 72 (82) | 2 (2) | 14 (16) |
| To what extent do you consider that oral care might have an impact on the patient in need of care and his/her health-related quality of life[a]? | 88 | | | | 4.4 (0.60) | 83 (94) | – | 5 (6) |

[a] Likert-scale: 1 = very small to 5 = very large.
[b] Yes/no/do not know.
[c] Likert type-scale: 1 = never to 4 = always.
[d] High – proportion of intensive care nurses answering 4 and 5 on the 5-point scale and 3 and 4 on the 4-point scale.
[e] Low – proportion of intensive care nurses answering 1 and 2 on both the 4-point and 5-point scales.
[f] Neither high or low – proportion of intensive care nurses answering 3 on the 5-point scale.

0.10–0.29) and linear directions between items in antecedents and defining attributes of oral care, and correlations between items in consequences and defining attributes of oral care. Cronbach's alpha was used to test the internal consistency and reliability. Statistical significance was set at $p < 0.05$ (Field 2014). All data were analysed using SPSS 24.0 (IBM, Chicago, IL).

Qualitative data. We analysed the two open-ended questions using qualitative content analysis according to Elo and Kyngäs (2008), who provide a description of deductive content analysis in a healthcare context. The unit of analysis was open-ended answers about ICU nurses' satisfaction with oral care and their suggestions for oral care improvements. The analysis was carried out with a manifest approach in five steps. (i) The open-ended answers were read through several times to obtain a sense of the whole; (ii) an analysis matrix was developed according to Coker et al.'s (2013) conceptual framework regarding oral care antecedents; (iii) the meaning units were coded using the analysis matrix; (iv) data that did not fit the analysis matrix were gathered by content, coded and used to create a new sub-area and (v) a new analysis matrix for the ICU was developed (Elo and Kyngäs, 2008) (Table 5).

## Results

In the area *antecedents of oral care* (see Table 2), the ICU nurses perceived that there were patients for whom oral care was especially important (94%), that the dental hygienist was a necessity (89%), that oral care guidelines (93%) and oral care plans (39%) were in place, and that different materials and equipment were available (99%). Only 10% of the ICU nurses answered that there were existing oral health assessment instruments in their units.

The ICU nurses perceived to a large or to a very large extent that their knowledge about oral health had impact on patients' general health (56%), that they had knowledge about patients' oral health (59%), that oral care was important (99%), and that the nursing staff had the right skills to maintain patients' oral health (57%).

The ICU nurses perceived often or always that there was sufficient nursing staff to maintain oral health (86%), that assessments of oral health status were documented (56%), and that the provision of oral care was documented (78%).

The ICU nurses perceived never or sometimes that a dental hygienist was available (59%), that the patients' oral health status was followed up in the unit (57%) and by the hospital organisation (52%), that patients' experiences of oral care were documented (97%), and that they documented what materials and equipment they used (85%).

In the area *defining attributes of oral care* (see Table 2), the ICU nurses perceived that they evaluated patients' oral health through documentation (80%), flow-sheets (57%) and through communication among the staff (99%).

The ICU nurses perceived often or always that they involved the patient in their oral care when the patient was able (86%), that they used available oral care guidelines (88%) and oral care plans (63%), that they assessed patients' oral health status daily (73%), that they used a manual toothbrush (78%), that they used foam swabs (72%), that they used suction catheters (85%), that they used chlorhexidine mouthwash or gel (55%) and that they used mouth rinses (60%).

The ICU nurses perceived never or sometimes that they used assessment instruments to assess patients' oral health status (96%), that they evaluated the oral care that was given by perform-

**Table 3**
Correlations of ICU nurses' perceptions of oral care antecedents and defining attributes of oral care based on the conceptual framework for older people who are dependent on oral care (Coker et al., 2013).

| *Areas/subareas/items*<br>Antecedents of oral care | Defining attributes of oral care | | | | | |
|---|---|---|---|---|---|---|
| *Awareness, knowledge and accurate beliefs (A)* | Care approaches (J) | Inspecting oral cavity (K) | Removing dental and/or plaque (L) | Cleaning the oral tissues (M) | Decontaminating the oral cavity (N) | Maintaining oral tissue moisture (O) |
| To what extent do you consider yourself to have knowledge about oral health and its impact on patient's general health? | | Daily assessments 0.264* Evaluation of oral care 0.215* | | Foam swabs 0.234* | Mouth rinses 0.278* | |
| To what extent do you consider yourself to have knowledge of oral health in the patients who are in your care? | | Daily assessments 0.344** Evaluation of oral care 0.271* | | | | |
| *Positive attitudes (B)* | NS | NS | NS | NS | NS | NS |
| *Competence in oral care skills (C)* | | | | | | |
| To what extent do you consider that the nursing staff has the right skills to preserve patients' oral health? | Patient involvement 0.249* | Daily assessments 0.248* | | | | |
| *Workload and workflow (D)* | NS | NS | NS | NS | NS | NS |
| *Interdisciplinary collaboration (E)* | | | | | | |
| If yes – was a dental hygienist available? | | | | | Chlorhexidine 0.264* | |
| *Protocols, care plans, and guidelines in place (F)* | | | | | | |
| Are there oral care guidelines in place in your unit? | Use of guidelines 0.319** | | | | | |
| Are there oral care plans in place in your unit? | Use of care plans 0.681** | | | | | |
| Is there an oral health assessment instrument in your unit? | Use of instruments 0.439** | | | | | |
| Available equipment and supplies (G) | NS | NS | NS | NS | NS | NS |
| *Organisational support (H)* | | | | | | |
| The results of the patient's oral health status are followed up in the unit | | | | | | Mouth rinses 0.260* |
| The results of the patient's oral health status are followed up by the hospital organisation | | | | | | Mouth rinses 0.336* |
| *Documentation (I)* | | | | | | |
| I document assessments of patients' oral health status | Use of guidelines 0.358** | Daily assessments 0.247* Evaluation of oral care 0.486** | | | | |
| I document the patient's experience of oral care | | Evaluation of oral care 0.483** | Powered toothbrush 0.331** | | | |
| I document what material I use for oral care | Use of guidelines 0.221* | Evaluation of oral care 0.364** | Manual toothbrush 0.323** | Foam swabs 0.248* | Chlorhexidine 0.304* | |

Statistical analysis – Pearson product-moment correlation coefficient and Spearman Rank Order Correlation.
Statistical significance at $p < .05$ * and $p < 0.01$ **. Correlations with significance at $p < .05$ are listed.
NS = no statistical significance.

ing a new oral health status assessment (69%), that they used a powered toothbrush (100%) and that they used oral care kits (78%).

In the area *consequences of oral care* (see Table 2), the ICU nurses perceived to a large or to a very large extent that oral care has an impact on the presence of microbial infections and oral candidiasis in the oral cavity (93%), that oral care might stimulate the cough reflex (68%) and that oral care might have an impact on patients' health-related quality of life (94%) and their ability to eat and drink (94%), to swallow (83%) and to communicate (82%).

Positive correlations between ICU nurses' perceptions of *the antecedents of oral care* and *the defining attribute of oral care* were found in 24 items (see Table 3). Oral health knowledge in general correlated weak with daily assessments ($r = 0.264$), oral care evaluation ($r = 0.215$), the use of foam swabs ($r = 0.234$), and the use of mouth rinses ($r = 0.278$). Knowledge of patients' oral health correlated moderate with daily assessments ($r = 0.344$) and weak with oral care evaluation ($r = 0.271$). Nursing staff having the necessary skills correlated weak with patient involvement ($r = 0.249$) and daily assessments ($r = 0.248$). The availability of a dental hygienist correlated weak with the use of chlorhexidine ($r = 0.264$). Moderate correlations were found between items in the subarea of protocols, care plans, and guidelines in place and the use of guidelines ($r = 0.319$), the use of oral health assessment instruments ($r = 0.439$) and a strong correlation with the use of care plans ($r = 0.681$). Oral health status followed up in the unit correlated weak with the use of mouth rinses ($r = 0.260$), and oral health status followed up by the hospital organisation also correlated moderate with the use of mouth rinses ($r = 0.336$). Patients' oral health status documentation correlated moderate with the use of guidelines ($r = 0.358$), oral care evaluation ($r = 0.486$) and weak with daily assessments ($r = 0.247$). Documentation of patients' oral care experiences correlated moderate with oral care evaluation ($r = 0.483$) and the use of a powered toothbrush ($r = 0.331$). Material documentation correlated weak with the use of guidelines ($r = 0.221$), the use of foam swabs ($r = 0.248$) and moderate with oral care evaluation ($r = 0.364$), the use of a manual toothbrush ($r = 0.323$) and the use of chlorhexidine ($r = 0.304$).

Both positive correlations (two items) and negative correlations (two items) were found between ICU nurses' perceptions of *the consequences of oral care* and *the defining attributes of oral care* (see Table 4). A positive weak correlation was found between oral care and its impact on infections and oral candidiasis and the use of flow sheets ($r = 0.240$). A positive moderate correlation was also found between oral care might stimulate the cough reflex and the use of oral care kits ($r = 0.300$). Negative weak correlations were found between the stimulation of cough reflex and the use of assessment instruments ($r = -0.226$) and the use of a manual toothbrush ($r = -0.272$).

The *oral care understanding* (see Table 5) of ICU nurses was that oral care was provided regularly as a standard nursing intervention, but without consideration of patients' needs and that independent of workload intubated patients always received oral care. "*That routines are followed even when the need for oral care is not great*". The nurses were satisfied with the adherence to plain written memos and with the availability of different oral care products.

The ICU nurses suggested that they themselves needed to be more involved in providing oral care to patients, that they needed increased knowledge and awareness through additional training in oral care and that they needed to ask both intubated and non-intubated patients about their oral health. They suggested improved oral care protocols and guidelines, the use of assessment instruments regarding oral health status and the provision of oral care based on patients' needs and not on routines. The ICU nurses gave suggestions for oral care documentation on flow sheets and documentation of the oral care process, including patients' oral health problems, oral care interventions, and evaluations. "*We always document that it is done, but rarely do we document identified problems or interventions. Evaluation procedures are completely lacking.*"

The i*dentification* and *contribution* to the knowledge base of oral care in the ICU was obtained by mixing quantitative and qualitative results. ICU nurses perceived that an important part of nursing care was oral care. This was especially the case in some patient groups such as intubated patients, where oral care was always provided regardless of workload. Despite the importance of oral care, the perceptions among ICU nurses were that management, either at the unit or hospital level, rarely indicated patients' oral health status as an outcome measure of oral care quality. The positive attitude that oral care was important showed no statistically significant correlation with any defining attributes of oral care.

ICU nurses perceived that the nursing staff was competent in oral care skills and had access to different kinds of equipment and supplies to provide oral care. However, when they needed support and assistance from dental hygienists for patients with severe oral health, the dental hygienists were seldom available. ICU nurses perceived that their knowledge base about the consequences of oral care on patients' physical health and physiological

**Table 4**
Correlations of ICU nurses' perceptions of oral care consequences and the defining attributes of oral care based on the conceptual framework for older people who are dependent on oral care (Coker et al., 2013).

| *Areas/subareas/items* Consequences of oral care | Defining attributes of oral care | | | | | |
|---|---|---|---|---|---|---|
| | Care approaches (J) | Inspecting the oral cavity (K) | Removing dental and/or plaque (L) | Cleaning the oral tissues (M) | Decontaminating the oral cavity (N) | Maintaining oral tissues moisture (O) |
| *Prevention of microbial infections and/or oral candidiasis (P)* | | | | | | |
| To what extent do you consider that oral care might have an impact on the presence of microbial infections and oral candidiasis in the oral cavity? | Use of flow sheets 0.240* | | | | | |
| *Prevention of oral discomfort (Q)* | NS | NS | NS | NS | NS | NS |
| *Enhanced cough reflex (R)* | | | | | | |
| To what extent do you consider that oral care might stimulate the patient's cough reflex and thus the opportunity to bring up phlegm? | | Use of an assessment instrument – 0.226* | Manual toothbrush – 0.272* | Oral care kits 0.300** | | |
| *Enhanced functional and psychosocial well-being (S)* | NS | NS | NS | NS | NS | NS |

Statistical analysis – Pearson product-moment correlation coefficient and Spearman Rank Order Correlation.
Statistical significance at $p < .05$ * and $p < .01$ **. Correlations with significance at $p < .05$ are listed.
NS = no statistical significance.

**Table 5**
Analysis matrix for intensive care: ICU nurses' perceptions of oral care antecedents based on the conceptual framework for older people who are dependent on oral care (Coker et al. (2013)).

| Antecedents of oral care | Satisfaction with oral care | Suggestions for oral care improvement |
|---|---|---|
| Awareness, knowledge, and accurate beliefs | Staff proactive regarding oral care | *Increased commitment of the ICU nurses Training of oral care skills Ask all patients about their oral health* |
| Positive attitudes | An important part of nursing care | |
| Competence in oral care skills | Low incidence of ventilator-associated pneumonia Patients' oral health status usually looks good Patients' teeth are brushed Try to provide oral care even if patients say no or clench their teeth | Inspection of the oral cavity |
| Workload and workflow | *Oral care provided even at high workloads Oral care is carried out regularly Intubated patients always receive oral care* | Increased staffing |
| Interdisciplinary collaboration | Collaboration between intensive care and dental care Dental hygienist's control of products | Dental hygienist attached to intensive care unit |
| Protocols, care plans and guidelines in place | *Plain written memos for how the oral care should be provided Oral care based on routines Adherence to oral care routines that are not always written down* | *Use of an assessment instrument Oral care based on patients' needs Improved protocols/guidelines* |
| Available equipment and supplies | *Different products Oral care kits for intubated patients* | Equipment and supplies available close to the patient |
| Organisational support | | Nursing group with the responsibility for improving oral care quality |
| Documentation | Documentation of provided care Documentation of flow sheets | *Separate line on flow sheets Documentation of patient's oral health problem, intervention and oral care evaluation* |

Italicised text represents sub-areas with the greatest number of open-ended answers.

well-being was good, but correlations between consequences and defining attributes of oral care were mostly weak.

ICU nurses inspected the oral cavity on a daily basis. For the most part, they did not use any assessment instruments because none were available. However, the patient's daily oral health status assessments tended not to affect oral care because the oral care was based mainly on routines and not on patients' needs. The regularity of oral care was important even if patients declined or exhibited defensive behaviours.

The oral care focus seemed to be task-oriented and formulated in plain written memos and not always written down. Even approaches to getting to know the patient and his/her oral health were mostly through communication within the nursing staff and/or documentation reduced to marks on flow sheets. Documentation of the patients' experiences and the oral care process was rare.

## Discussion

ICU nurses perceived that they inspected patients' oral cavities daily. According to Ames et al. (2011), ICU nurses are responsible for ensuring that oral health assessments are systematically carried out and that symptoms of complications are identified. Performing systematic oral health assessments identifies patient's oral health problems and the intervention's effectiveness (Ames et al., 2011; National Institute for Health and care Excellence, 2016; Prendergast et al., 2013).

Despite the scientific rationale for performing systematic assessments, 70% of ICU nurses did not use any validated instrument to assess patients' oral health, and 18% of ICU nurses did not know about such instruments. Patient's oral health status was instead determined based on subjective assessments by the ICU nurse. Previous research (Celik and Eser, 2017; Prendergast et al., 2013) shows that subjective oral health assessments in ICUs are common and that ICU nurses even feel frustrated when they are asked to perform oral health assessments with assessment instruments (Prendergast et al., 2013). However, the use of a reliable and valid instrument would make measurement of patients' oral health outcomes more accurate and is necessary for the provision of quality oral care.

ICU nurses perceived that nursing staff always tried to provide oral care even when patients were uncooperative. Difficulty in providing oral care due to patient behaviour such as coughing/gagging, closing the mouth, and biting is commonly observed in ICUs (Dale et al., 2018). Patients' defensive behaviours might be explained by ICU patients experiencing negative feelings such as moderate to severe pain during oral care procedures (Puntillo et al., 2004) as well as physiological changes such as alternating mean arterial pressure, coughing and increased respiratory rate (Engström et al., 2017).

One strategy to reduce patients' negative oral care experiences is to get to know the patient (Jablonski et al., 2011). This includes relational aspects of health and well-being as well as biological aspects (Edvardsson, 2015) and such person-centredness is an indicator of quality care (Beattie et al., 2012; McCormack, 2004; Edvardsson et al., 2017). However, the ICU nurses in the present study perceived that they rarely documented patients' experiences and thus it might be more difficult to provide person-centred care. Further investigation of oral care practice in the ICU is needed, and it is important to investigate the ICU setting because the setting has an impact on the operationalisation of person-centred care (McCormack, 2004; Moore et al., 2017).

The ICU nurses perceived that patients' oral health information was exchanged through communication among the nursing staff or through documentation on flow sheets. Nursing documentation is an activity that attempts to facilitate information exchange and contributes to the continuity of care, safety and well-being of patients (Jefferies et al., 2010; Urquhart et al., 2009). In addition, nursing documentation can be used for quality improvement, health planning, allocation of resources, nursing development and research.

Nursing documentation's purpose is to record valid and reliable information (Idvall and Ehrenberg, 2002; Urquhart et al. 2009) and is considered to be a quality indicator (Connolly and Wright, 2017). In the present study, the oral care documentation did not correspond to the requirements of what such documentation should contain. Without adequate oral care documentation, it will be difficult for ICU nurses to provide oral care based on patients' needs and instead oral care will be based on routines.

The ICU nurses perceived that oral care guidelines were in place and that they provided oral care according to those guidelines. However, those guidelines seemed to be task-oriented and plainly written memos. Our results confirm the prior study by Kiyoshi-Theo and Blegen (2015) who showed that plain memos with minimal directions related to oral care had a higher level of adherence among ICU nurses than comprehensive and detailed oral care guidelines.

There might, however, be discrepancies between perceived oral care practices and guidelines because Feider et al. (2010) found in their study that even if oral care guidelines in the ICU were present, they were not always used. Based on the present study, it appears that there is some uncertainty about how oral guidelines are designed and what they contain. A survey of current oral care guidelines in Sweden is needed for further oral care quality development.

There were mostly weak and moderate correlations between the defining attributes of oral care and its antecedents and between the defining attributes of oral care and its consequences. This result indicates that despite ICU nurses' perception that they had the antecedents and the knowledge about consequences they perceived difficulty in using this in oral care. Good knowledge, however, does not automatically result in adequate practice (Afonso et al., 2017; Labeau et al., 2008) and this also has consequences for oral care. One explanation of the knowledge-practice gap in the present study might be that ICU nurses might consider oral care to be a basic nursing task and that there is no need for them to pay it more attention (Dale et al., 2013; Lin et al., 2011). However, the ICU nurses in the present study were aware of the need for their increased involvement in oral care. In order to achieve this, they might need organisational support and additional training in oral care skills.

Basic nursing care is an autonomous activity for registered nurses and occurs independently of physicians' orders (Englebright et al., 2014). The goal is to proactively intervene with nursing interventions in order to reduce health care-acquired infections and skin injuries (Vollman, 2013). ICU nurses might consider oral care to be secondary to the more advanced and technological aspects of nursing care in the ICU (Dale et al., 2013; Lin et al., 2011; Vollman, 2013) even though oral care is still a proactive intervention to prevent adverse events such as intubation-associated pneumonia (Hua et al., 2016). This issue might require a change in nursing culture and an increased emphasis on the significance of basic nursing (McGuckin et al., 2008; Vollman, 2013). The link between both antecedents and consequences and the delivery of oral care requires further research for a deeper understanding of how ICU nurses put their knowledge into practice.

## Methodological considerations

This study used a criterion-based (Onwuegbuzie and Collins, 2007) selection of ICU nurses meeting the inclusion criteria working in ICUs located in different counties in Sweden. The total response rate was 40%. This might be considered low, but low responses rates for questionnaires are not unusual (Feider et al., 2010; Kiyoshi-Teo and Blegen, 2015). The response rates varied between 32% and 75% in the different ICUs, and this might be explained by high workloads having a negative impact on the participant's ability to answer the questions.

More female than male ICU nurses participated in the study. However, the percentage of participating female (90%) and male (10%) ICU nurses in the present study reflects the current employment status in Sweden for nurses regarding gender (The National Board of Health and Welfare, 2018). Older (>48.4 years) ICU nurses chose to participate more than younger nurses, and this might be explained by Malfait et al. (2017) who showed that younger nurses perceive a greater lack of time than older nurses and by the fact that almost 50% of employed registered nurses at an advanced level in Sweden are 55 years or older (The National Board of Health and Welfare, 2016).

A concurrent mixed-methods design with identical sampling offers the opportunity to have the same participants answering the questionnaire and open-ended questions at the same time (Onwuegbuzie and Collins, 2007). There is a possibility that items in the NCOH influenced participants' answers to the two open-ended questions. However, having the same participants in both parts offers the opportunity for comparison of both forms of data in order to search for congruent findings (Onwuegbuzie and Collins, 2007) and it allows participants to describe their perceptions of oral care in their own words.

The NCOH was developed based on Coker et al.'s (2013) conceptual framework for oral care. The NCOH contains three sub-areas representing different aspects of oral care. The internal consistency was acceptable (0.74) in one sub-area and not acceptable (0.59 and 0.48) in two sub-areas. Therefore, the statistical analysis was performed on the item level. The NCOH needs to be further psychometrically tested in the ICU.

The correlational analysis resulted in few correlations. The explanation for this might be that the conceptual framework was not developed in an ICU setting. However, the results of the pilot study and the open-ended answers show that the NCOH can be considered as a valid instrument. It is notable that an item related to suctioning secretions that pool above the endotracheal tube cuff is missing.

Deductive content analysis is often used when testing existing research in a new context (Elo and Kyngäs, 2008; Hsieh and Shannon, 2005). There is a possibility that by using deductive content analysis researchers might be more likely to find evidence that is supportive rather than nonsupportive of a theory (Hsieh and Shannon, 2005). However, the present study identified a new subarea of documentation that was not included in Coker et al.'s (2013) conceptual framework.

## Conclusions

The identification of ICU nurses' perceptions of oral care according to Coker et al.'s (2013) conceptual framework together with a mixed-method design has made it possible to add new knowledge to the understanding of oral care in ICUs. Although the ICU nurses perceived that they have the antecedents, knowledge and skills to provide quality oral care, they seem to have difficulties in putting this knowledge and skill into practice. ICU nurses might have to shift their task-oriented approach towards oral care to a more person-centred approach in order to be able to meet ICU patients' needs.

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Conflict of interest statement.

The authors declare no conflict of interest.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.iccn.2018.09.006.

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