Intensive and Critical Care Nursing (2013) 29, 266—274

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/iccn

REVIEW

Mouth care for orally intubated patients: A critical ethnographic review of the nursing literature

Craig Dale[a,b,*], Jan E. Angus[b], Tasnim Sinuff[c], Eric Mykhalovskiy[d]

[a] *Trauma, Emergency and Critical Care Program, Sunnybrook Health Sciences Centre, B508 — 2075 Bayview Avenue, Toronto, Ontario, Canada M4N 3M5*
[b] *Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, 155 College Street, Suite 130, Toronto, Ontario, Canada M5T 1P8*
[c] *Department of Critical Care Medicine and Sunnybrook Research Institute, Sunnybrook Health Sciences Center and Interdepartmental Division of Critical Care, University of Toronto, 2075 Bayview Avenue, Toronto, Ontario, Canada M4N 3M5*
[d] *Department of Sociology, York University, 4700 Keele Street, 2078 Vari Hall, Toronto, Ontario, Canada M3J 1P3*

Accepted 22 September 2012

KEYWORDS
Institutional ethnography;
Intensive care;
Mouth care;
Oral hygiene;
Ventilator-associated pneumonia

Summary
Objectives: The aim of this critical ethnographic literature review was to explore the evolution of nursing discourse in oral hygiene for intubated and mechanically ventilated patients.
Methods: The online databases CINAHL and MEDLINE were searched for nurse-authored English language articles published between 1960 and 2011 in peer-reviewed journals. Articles that did not discuss oral problems or related care for intubated adult patients were excluded. Articles that met the inclusion criteria were chronologically reviewed to trace changes in language and focus over time.
Results: A total of 469 articles were identified, and 84 papers met all of the inclusion criteria. These articles presented an increasingly scientific and evaluative nursing discourse. Oral care originally focused on patient comfort within the literature; now it is emphasized as an infection control practice for the prevention of ventilator-associated pneumonia (VAP). Despite concern for its neglected application, the literature does not sufficiently address mouth care's practical accomplishment.
Conclusions: Mouth care for orally intubated patients is both a science and practice. However, the nursing literature now emphasises a scientific discourse of infection prevention. Inattention to the social and technical complexities of practice may inhibit how nurses learn, discuss and effectively perform this critical aspect of patient care.

* Corresponding author. Tel.: +1 416 998 8604; fax: +1 416 978 8222.
E-mail addresses: craig.dale@mail.utoronto.ca, craig.dale@sunnybrook.ca, craig.dale@utoronto.ca (C. Dale).

0964-3397/$ — see front matter © 2012 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.iccn.2012.09.003

Implications for clinical practice

- Oral hygiene for intubated and mechanically ventilated patients has evolved from a focus on patient comfort to the prevention of ventilator-associated pneumonia (VAP).
- The nursing literature's increasingly scientific and evaluative discourse may inhibit a clear understanding of how this work happens.
- Additional research is needed to describe the technical, social and contextual resources that support oral hygiene.

Introduction

Maintaining oral health in the critically ill patient is an essential nursing activity (Berry and Davidson, 2006). In the intensive care unit, the mouth often facilitates entry for life-sustaining interventions, such as endotracheal intubation for ventilation and orogastric tubes for enteral nutrition. Unfortunately, these interventions require the patient to maintain an open mouth (Kite, 1995) and impair the natural airway defenses (O'Keefe-McCarthy, 2006). This vulnerable position, in combination with other treatments, can contribute to a rapidly deteriorating oral state and a dependence on nursing (Stonecypher, 2010) to alleviate tube-related discomfort (Samuelson, 2011), thirst (Landström et al., 2009), oral lesions (Treloar and Stechmiller, 1995) and the accumulation of saliva, sputum and oral bacteria (Blot et al., 2008). Therefore, the state of a patient's mouth can be an index of nursing care received (Crosby, 1989).

Of the many oral problems that can arise during critical illness, ventilator-associated pneumonia (VAP) is now the major justification for frequent oral hygiene. Since the early 1970s, increasing concerns about the morbidity and mortality associated with nosocomial pneumonia prompted research to try to identify precursors to this often-lethal infection (Stevens et al., 1974; van Uffelen et al., 1984). Cumulative evidence suggested that inadequate mouth care for intubated patients may contribute to the aspiration of bacteria in oropharyngeal secretions, which can cause VAP (Kunis and Puntillo, 2003). Therefore, the current practice of nursing-led oral care is based upon this understanding that mouth care, together with other preventive measures, may reduce serious respiratory infection. Although the most effective regimen is yet to be determined in orally intubated patients (Berry et al., 2007), mouth care is known to reduce the risk of VAP (Chan et al., 2007).

Unfortunately, oral care is not always a priority in a busy critical care setting (Munro and Grap, 2004). Barriers to effective hygiene practices are contextual factors (e.g., time limitations) and nursing characteristics (e.g., lower education levels) (Furr et al., 2004). However, discussion of hygienic problems within the literature is often fraught with conceptual and pragmatic tension (Kitson, 2010). For example, oral hygiene is often described as ''basic'' care although critical care nurses define it as ''difficult'' (Binkley et al., 2004). Given the importance of oral care as nursing work, one would expect to find in the current literature clear explanations about patient oral hygiene and detailed solutions to the known bedside challenges. Instead, the available literature frequently focuses on its neglected features.

In considering the tensions posed by language, Smith's (1987) attention to discourse and ''work'' offers some assistance. Smith states that formal professional and expert accounts of work, such as those found it the established literature, offer a partial version of actual events and practices. This is because words can shift attention from the actualities of everyday practice to clean, logical concepts, thereby removing the conditions and means for practical activity. In turn, the literature may elide the fact that knowledge is inseparable from the body; expert practice requires a tacit sense of how and when to proceed.

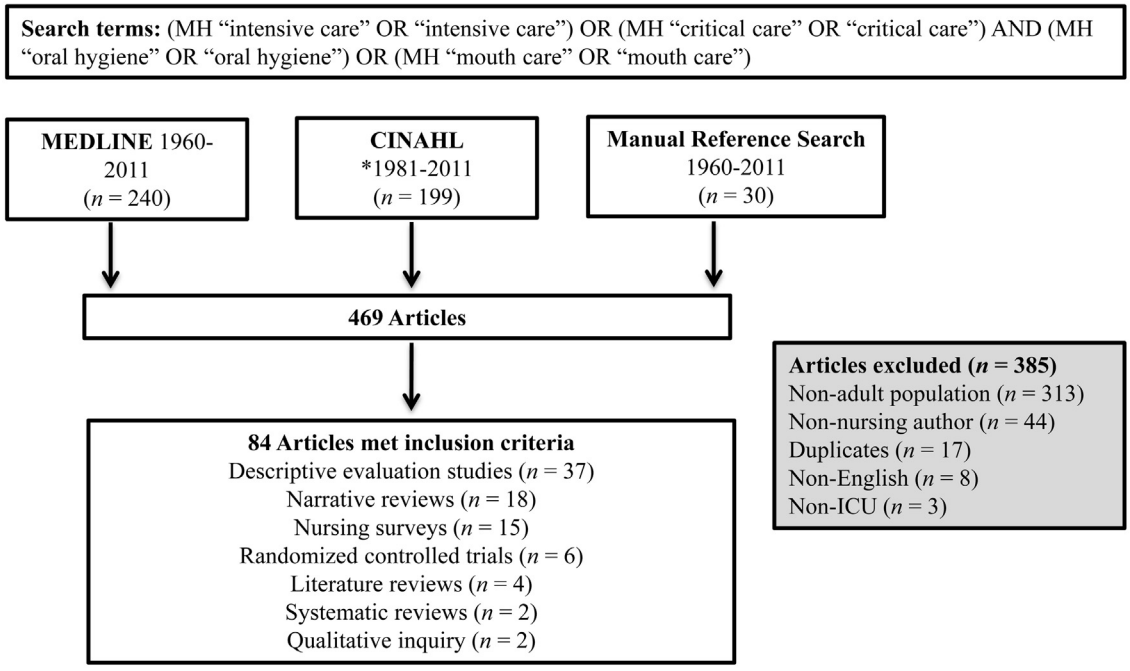
Smith (1987) suggests that our ''discourse'' (a particular way of talking, writing and reading) about oral care may be the problem. McCoy (2006) points to the scientific and health professions as examples and notes how they create distinct ways of speaking about particular health problems. For example, the nursing literature has recently represented VAP as a problem to be addressed through oral hygiene. In turn, it became important for nurses to enhance this practice. However, prominent ways of discussing VAP may be inadequate to describe the material practice of mouth care.

This paper is an institutional ethnographic review of the nursing literature on oral hygiene. Whereas previous systematic reviews (Berry et al., 2007) summarised a hierarchy of evidence, this paper traces how discussion of oral hygiene has evolved and considers how nursing activities are made visible or obscured within the literature (Rankin and Campbell, 2006). The first objective of this paper is to explore the evolution of nursing discourse in oral hygiene for intubated and mechanically ventilated patients. The second objective is to open a space for dialogue within the nursing community about the complexities of the work involved in mouth care.

Methods

A search of the literature was performed using the online databases MEDLINE and CINAHL. The following medical subject headings (MeSH) and keywords were used: *oral hygiene* OR *mouth care* AND *critical care* OR *intensive care*. Inclusion criteria were: (1) written in English, (2) published in a peer-reviewed journal, (3) published between 1960 and 2011 to include the inception of critical care as a specialty, (4) article described oral problems or related care for adult intubated patients and (5) authored or co-authored by nurse(s) to trace the evolution of nursing discourse in oral hygiene. The reference lists of included studies were manually crosschecked to identify additional relevant articles.

Articles meeting the inclusion criteria were reviewed in chronological order by one researcher (CD) using a modified PESICO appraisal form (Schlosser et al., 2007). Similar to the PICO (Population, Intervention, Comparison and



Note: **CINAHL references available from 1981 onward; MH = Medical Subject Headings (or MeSH) for indexed articles; Descriptive evaluation studies include retrospective, prospective and mixed-methods*

Figure 1 Search strategy.

Outcome) framework, the PESICO format functions to clarify the central research questions of each article. However, it also supports identification of environmental (E) and stakeholder (S) variables. Documenting the evolving material and social concerns addressed in published articles offers an ethnographic view to prevailing problems and terminology. Identified changes in nursing discourse were discussed by the authors (CD, JA, EM, TZ) and a secondary review of each paper was conducted to confirm frequently appearing words and phrases that supported the emerging analysis.

Results

Of the 469 articles initially identified, 84 met all of the inclusion criteria (Fig. 1). The majority were descriptive evaluation studies (44%), followed by narrative reviews (21%), nursing surveys (18%), randomised controlled trials (7%), literature reviews (5%), systematic reviews (2%) and qualitative investigations (2%). No ethnographic reports were retrieved. For organisational purposes, the literature was divided into two 25-year time periods; early (1960—1985) (Table 1) and late (1986—2011) (Table 2).

The four themes that follow discuss how mouth care has been constituted as an object of professional concern in the nursing literature. First, we describe a focus on the provision of patient comfort in the early literature. Second, the results note the rise of evaluative research methods and an associated accountability framework for reducing serious infection. Within this latter body of research, neglect of oral care is problematised. The final section discusses an increasing emphasis on documentary practices to mitigate ineffective or insufficient oral care and the problem of VAP.

Nurses as comforting agents

In the first half of the literature (1960—1985) nurses are described as relievers of dry and uncomfortable oral membranes in patients who are intubated and mechanically ventilated. Maintaining an open mouth and a nothing by mouth (NPO) status following intubation is recognized as inviting a confluence of oral stressors that impair the protective role of saliva (DeWalt and Haines, 1969). As one of the ''most persistent'' requirements for nursing care (Ginsberg, 1961), authors focused on the optimal frequency, cleansing agents and techniques to maintain oral comfort and cleanliness (Passos and Brand, 1966). Patient acceptance of the regimens under study were reported and considered relevant for successful implementation. This is important as the

Table 1 Early literature (1960—1985).

Type of article	*n*	Articles 1960—1985
Descriptive evaluative studies	3	Ginsberg (1961) Passos and Brand (1966) DeWalt and Haines (1969)
Narrative reviews	3	Large et al. (1969) Schweiger and Lang (1981) Fromme and Kaplow (1984)
Total	6	

Table 2 Late literature (1986–2011).

Type of article	*n*	Articles 1986–2011	
Descriptive evaluative studies	34	Nelsey (1986)	Hur et al. (2007)
		Liwu (1990)	McLellan et al. (2007)
		Woodtli (1990)	Munro et al. (2007)
		Day (1993)	Ross and Crumpler (2007)
		Kite (1995)	Westwell (2008)
		Treloar and Stechmiller (1995)	Chao et al. (2009)
		Holberton et al. (1996)	Garcia et al. (2009)
		Barnason et al. (1998)	McCaffery et al. (2009)
		Fitch et al. (1999)	Prendergast et al. (2009)
		Somerville (1999)	Sona et al. (2009)
		Stiefel et al. (2000)	Bingham et al. (2010)
		Zack et al. (2002)	Jones et al. (2010)
		Babcock et al. (2004)	Stonecypher (2010)
		Cutler and Davis (2005)	Jones et al. (2011)
		Hanneman and Gusick (2005)	Goss et al. (2011)
		Li and Puntillo (2006)	Hsu et al. (2011)
		Munro et al. (2006)	Samuelson (2011)
Nursing surveys	15	Sole et al. (2002)	Feider et al. (2007)
		Sole et al. (2003)	Labeau et al. (2008)
		Grap et al. (2003)	Ganz et al. (2009)
		Ricart et al. (2003)	Lin et al. (2011)
		Furr et al. (2004)	Feider et al. (2010)
		Binkley et al. (2004)	Kjonegaard et al. (2010)
		Jones et al. (2004)	Soh et al. (2011)
		Cason et al. (2007)	
Narrative reviews	15	Trenter Roth and Creason (1986)	O'Keefe-McCarthy (2006)
		Crosby (1989)	Vollman (2006)
		Jenkins (1989)	Blot et al. (2008)
		Kite and Pearson (1995)	Vollman (2009)
		Hixson et al. (1998)	Kitson (2010)
		McNeill et al. (2000)	Munro and Savel (2011)
		Munro and Grap (2004)	Berry et al. (2011a,b)
		Berry and Davidson (2006)	
Randomised controlled trials	6	Bopp et al. (2006)	Grap et al. (2011)
		Munro et al. (2009)	Prendergast et al. (2011)
		Berry et al. (2011a,b)	Yao et al. (2011)
Literature reviews	4	O'Reilly (2003)	Halm and Armola (2009)
		Jones and Munro (2008)	Roberts and Moule (2011)
Systematic reviews	2	Berry et al. (2007)	Chan et al. (2007)
Qualitative studies	2	Landström et al. (2009)	Yeung and Chui (2010)
Total	78		

literature notes that disoriented, semiconscious or sedated patients sometimes resist or cannot cooperate with mouth care (Ginsberg, 1961). In addition to obstacles within the mouth this poses the potential problem of endotracheal tube dislodgement.

Whereas oral comfort remains relevant, it is mentioned with less frequency in the later literature (1986–2011). Similarly, description of patients' oral problems, their cooperation and preferences are diminished over time (Table 3). These complex problems include lesions caused by the endotracheal tube (Kite, 1995) and its securement devices as they appear on the mucosa, tongue and lips (Treloar and Stechmiller, 1995). In response, patients may decline or resist care because of the discomforting side effects of cleansing solutions or equipment on irritated tissues (Holberton et al., 1996). Further, the unpleasant consequences of an unclean mouth, such as halitosis, can deter both family (Trenter Roth and Creason, 1986) and nurses (Furr et al., 2004) from having beneficial contact with the patient. This complex set of circumstances may further inhibit the provision of comfort.

Redefining nursing knowledge and work

Although oral discomforts remain a significant problem recalled by intubated patients (Li and Puntillo, 2006), the

Table 3 Themes and keywords.

Article themes and [a]keyword search topics	1960–1985 *n*/6 (%)	1986–2011 *n*/78 (%)
Comfort	5 (83%)	39 (50%)
Secretions	6 (100%)	51 (65%)
Lesions/ulcers	5 (83%)	28 (36%)
Dryness/xerostomia	4 (67%)	32 (41%)
Patient preference	3 (50%)	7 (9%)
Patient cooperation	3 (50%)	7 (9%)
Halitosis	1 (17%)	9 (12%)
Infection	2 (33%)	68 (87%)
VAP	n/a	59 (76%)
Morbidity/mortality	1 (17%)	67 (86%)
Prevention/control	n/a	59 (76%)
Economic implications	1 (17%)	49 (63%)
Neglect/low priority	2 (33%)	48 (62%)
Educational gap	3 (50%)	61 (78%)
Inadequate tools/supplies	2 (33%)	27 (35%)
Inadequate nursing time	1 (17%)	19 (24%)
Technologic imperatives	n/a	5 (6%)
Textual resources	3 (50%)	69 (88%)
Guideline	n/a	51 (65%)
CDC	n/a	26 (33%)
Policy	n/a	23 (29%)

n/a: not found in articles; CDC: Centers for Disease Control and Prevention Guidelines.
[a] Keywords or synonyms were counted once per article.

proliferation of evaluative research methods and articles after 1985 suggests nurses should focus beyond patient comfort (Berry and Davidson, 2006). Infection prevention becomes more prevalent in the later nursing literature when research focuses on causes of serious respiratory illness (Table 3). New scientific language is used in the literature describing displacement of normal oral flora by ''pathogenic organisms'' (Nelsey, 1986). There is also a transition in the literature from an emphasis on ''gram-negative'' bacterial infection (Kite and Pearson, 1995) to ''ventilator-associated pneumonia'' (Fitch et al., 1999); a shift in focus from the bacterial agent as vector to the presence of the endotracheal tube as a conduit of transmission. The nursing literature embraced this language to generate a rationale for care recommendations that limit transmission.

After 1985, research in oral care focused on the search for the best cleansing agents, equipment and care frequency to prevent VAP. Despite extensive evaluation and synthesis of the collected literature to address this problem, some authors voice concern that nurses lack scientific knowledge (Furr et al., 2004; Kite, 1995) as the best available evidence is inconsistently implemented (Cason et al., 2007). This has further relevance for nursing inquiry. For example, Trenter Roth and Creason (1986) studied the scientific basis for mouth care. In their paper, they de-emphasised empathic concerns for comfort by emphasising oral hygiene as the ''scientific care of the teeth and mouth.'' They noted the paucity of epidemiological data in nursing reports and called for controlled studies and validated tools to better inform nursing practice.

A discourse of neglect

Inadequate attention to the science and practice of oral care is a significant theme in more recent literature (Table 3). Low implementation of guidelines (Cason et al., 2007) may result in practice that is not ''evidence based [as it] focuses on patients' comfort rather than the removal of plaque and microbes'' (Munro and Grap, 2004). Berry et al. (2007) suggested that this ''elementary procedure'' is often relegated to a lower priority by other imperatives in the ''high pressure, highly technological critical care environment.'' In relation to competing priorities, Hixson et al. (1998) noted that mouth care may be erroneously ''performed by quickly swabbing the mouth.'' Lack of widespread toothbrushing is a serious problem because it is considered more effective than sponge swabs at removing the dental plaque to which bacteria bind.

A larger social problem of neglect begins to appear in the recent literature that extends beyond the intensive care unit. Although oral care falls within the responsibilities of nursing, Vollman (2009) suggested that this accountability has not been maintained relative to the increasing demands of bedside technology. Kitson (2010) argued that nursing education has not responded in kind. Although a majority of nurses in surveys reported mouth care as a medium-to-high priority (Grap et al., 2003; Hanneman and Gusick, 2005), they also reported low levels of training (Blot et al., 2008). Further, Feider et al. (2010) noted that neglect of hygiene extends to high-levels within health organizations. In an effort to endorse the adoption of oral care guidelines, professional bodies may neglect to include detailed recommendations for mouth care frequency, tools and techniques (Cason et al., 2007). These gaps delineated an opportunity for nursing authors to respond. In turn, the recent literature proposes a project of reconciliation; mouth care and the medical body have begun to determine their importance for one another. Further, these issues suggest a shift away from a discourse of the ventilator-as-vector to socially organised modes of transmission: neglect, deprioritisation, lack of guidelines and inadequate skill development.

The textual reorganisation of nursing practice

Recent literature attempts to reprioritise oral hygiene by promoting new nursing accountabilities. A shift in emphasis from individualised to standardised care is suggested by the emergence of recommendations about documentation practices and policy (Ross and Crumpler, 2007). Nursing processes emerging in the 1960s emphasised explicit observation and reporting of the patient's mouth by using an oral assessment guide (OAG) (Passos and Brand, 1966). With this guide, the patient's unique oral condition drove an individualized approach. Although OAGs are still recommended in practice and research (Feider et al., 2010), their use has been superseded by the Centers for Disease Control and Prevention (CDC) recommendations to implement a standardized oral care policy in each intensive care unit as part of a comprehensive VAP prevention program (Garcia et al., 2009).

More recently, the literature emphasises the assignment of new nursing work of guideline implementation including education and audit. Cason et al. (2007) highlighted the CDC recommendation for intensive care unit staff education in VAP epidemiology and infection control. Unit-based implementation projects following this guidance report multifaceted implementation methods including the creation and distribution of educational materials with accompanying practice audits (Babcock et al., 2004; Cutler and Davis, 2005). Although Zack et al. (2002) posit the importance of ''focusing the available efforts of clinicians on this issue,'' they do not describe oral care. This instructive omission may have implications for what Feider et al. (2010) acknowledge as important work of concept disambiguation; ''oral care'' may assume different meanings in spoken and written language. Therefore, it must be better defined to support practical activity.

Beyond unit level adherence, individual nurses' concordance with consensus recommendations also became a significant focus of the emerging science of oral care surveys. Questions focus on nurses' suctioning practices (Sole et al., 2002), frequency of oral care documentation (Grap et al., 2003), care priority (Jones et al., 2004), attitudes and beliefs (Binkley et al., 2004) and compliance with scientific recommendations (Feider et al., 2010). However, Goss et al. (2011) point out that findings about nursing work have been inconsistent across the literature. As an alternative, they recommend prospective observation because evaluative research methods have primarily relied upon quantitative data collection methods.

Social pressure also emerges in the recent nursing literature to coordinate a sustained focus on patient safety and fiscal restraint. Governments, professional groups and health insurers mandate education and accountability mechanisms to both report and reduce serious infection (Vollman, 2009). Several authors suggest this focus is distinguished by new language in which VAP is a ''never event'' in the eyes of insurers (Halm and Armola, 2009; Munro and Savel, 2011). This implies that VAP is a result of inadequate preventative care and attention is organised by managerial concerns. They caution that the convergence of fiscal restraint with patient safety may position nurses negatively because the ability to prevent VAP will vary alongside patient characteristics and care resources. In a call to reclaim nursing care, Kitson (2010) argues that nursing's established role in hygiene is under threat.

Discussion

As an essential activity, oral hygiene is now defined as both a ''science and practice'' of health maintenance (Vollman, 2009). Scientific views to patient outcomes have recently highlighted the critical nature of this work. However, there is still an opportunity to balance these large-scale views with insights drawn from proximal accounts of practice. Within a context of health resource conservation and prioritisation of patient safety, inquiry into the situated undertaking of oral hygiene lags behind a descriptive epidemiology of VAP. Nursing's unique accountability to perform oral care is not matched with a detailed discussion of its technical and social complexity.

In this literature review, an increasingly scientific and evaluative nursing discourse about oral hygiene has generated a distance from this material practice. Nurses encounter many complex problems in the care of orally intubated patients. Paradoxically, this work is described as ''basic'' although it now influences patient survival (Blot et al., 2008). It is much more difficult to describe the multiple variations in patient oral conditions and the countless contingencies that arise in trying to meet an expansive set of nursing accountabilities. Therefore, these are not equally explored and published in the literature. This lack of description may unintentionally hinder how nurses learn, discuss and perform this work.

The recent literature on oral hygiene emphasises nurses' deficiencies in this area. This is in keeping with Mykhalovskiy's (2003) argument that evidence-based medicine positions some health care practitioners as neglectful readers of biomedical science. The nursing literature on mouth care emphasises that nurses are not properly informed by the literature and identifies them as a group requiring surveillance. However, it does so in ways that frequently renders these problems through predetermined categories and health services metrics. In turn, this abstracts nursing knowledge and work by removing it from the social and material context in which it is anchored. The current focus on guideline implementation and health services data (Rankin and Campbell, 2006) creates a discourse that obscures the careful and important hygienic work that nurses do.

In this review, Smith's (1987) approach to work assists us to see the established literature as offering a partial account of nursing reality. While oral hygiene's transition from comfort to infection control may help to describe the ''big picture'' (Ross and Crumpler, 2007), it fails to critically explore the social organisation of hygienic work in the critical care unit. As a result, it is difficult to know if the literature is addressing the problems that nurses encounter in the delivery of oral care.

Conclusion and implications

The provision of mouth care for orally intubated patients is a complex, multifaceted practice. Changes in nursing discourse over time have produced a gap between the scientific and practical issues of mouth care. Nurses, educators and administrators may benefit from a critical discussion of the work being encouraged and the limitations of the literature in offering solutions to identified problems. Reuniting the practice of mouth care with a body of scientific literature may be further accomplished by a shift towards realist-driven, experiential forms of inquiry. Using descriptive, qualitative methods would add vital energy to this area of investigation (Sinuff et al., 2007) and may enhance understanding of a complex body of nursing work.

Conflict of interest statement

The authors have no conflict of interest to report.

Financial support

A Frederick Banting and Charles Best Canada Graduate Scholarship (GCS) Doctoral Award through the Canadian Institutes of Health Research (CIHR) supported this review.

Acknowledgment

The authors wish to thank Kristine Thornley for her editorial assistance.

References

Babcock HM, Zack JE, Garrison T, Trovillion E, Jones M, Fraser VJ, et al. An educational intervention to reduce ventilator-associated pneumonia in an integrated health system: a comparison of effects. Chest 2004;125(6):2224—31.

Barnason S, Graham J, Wild MC, Jensen LB, Rasmussen D, Schulz P, et al. Comparison of two endotracheal tube securement techniques on unplanned extubation, oral mucosa, and facial skin integrity. Heart Lung 1998;27(6):409—17.

Berry AM, Davidson PM. Beyond comfort: oral hygiene as a critical nursing activity in the intensive care unit. Intensive Crit Care Nurs 2006;22(6):318—28.

Berry AM, Davidson PM, Masters J, Rolls K. Systematic literature review of oral hygiene practices for intensive care patients receiving mechanical ventilation. Am J Crit Care 2007;16(6):552—62.

Berry AM, Davidson PM, Masters J, Rolls K, Ollerton R. Effects of three approaches to standardized oral hygiene to reduce bacterial colonization and ventilator associated pneumonia in mechanically ventilated patients: a randomized control trial. Int J Nurs Stud 2011a;48(6):681—8.

Berry AM, Davidson PM, Nicholson L, Pasqualotto C, Rolls K. Consensus based clinical guideline for oral hygiene in the critically ill. Intensive Crit Care Nurs 2011b;27(4):180—5.

Bingham M, Ashley J, De Jong M, Swift C. Implementing a unit-level intervention to reduce the probability of ventilator-associated pneumonia. Nurs Res 2010;59(1):S40—7.

Binkley C, Furr LA, Carrico R, McCurren C. Survey of oral care practices in US intensive care units. Am J Infect Control 2004;32(3):161—9.

Blot S, Vandijck D, Labeau SMNS. Oral care of intubated patients. Clin Pulm Med 2008;15(3):153—60.

Bopp M, Darby M, Loftin KC, Broscious S. Effects of daily oral care with 0.12% chlorhexidine gluconate and a standard oral care protocol on the development of nosocomial pneumonia in intubated patients: a pilot study. J Dent Hyg 2006;80(3):9.

Cason CL, Tyner T, Saunders S, Broome L. Nurses' implementation of guidelines for ventilator-associated pneumonia from the centers for disease control and prevention. Am J Crit Care 2007;16(1):28—38.

Chan EY, Ruest A, Meade MO, Cook DJ. Oral decontamination for prevention of pneumonia in mechanically ventilated adults: systematic review and meta-analysis. BMJ 2007;334(7599):889—93.

Chao YC, Chen Y, Wang KK, Lee R, Tsai H. Removal of oral secretion prior to position change can reduce the incidence of ventilator-associated pneumonia for adult ICU patients: a clinical controlled trial study. J Clin Nurs 2009;18(1):22—8.

Crosby C. Method in mouth care. Nurs Times 1989;85(35):38—41.

Cutler CJ, Davis N. Improving oral care in patients receiving mechanical ventilation. Am J Crit Care 2005;14(5):389—94.

Day R. Mouth care in an intensive care unit: a review. Intensive Crit Care Nurs 1993;9(4):246—52.

DeWalt EM, Haines SAK. The effects of specified stressors on health oral mucosa. Nurs Res 1969;18(1):22—7.

Feider LL, Mitchell P, Bridges E. Oral care practices for orally intubated critically ill adults. Am J Crit Care 2010;19(2):175—83.

Feider LL, Mitchell PH, Bridges E, Gallucci B, Loon L. Oral care practice survey for the orally intubated adult critically ill patient. Commun Nurs Res 2007;40:462.

Fitch JA, Munro CL, Glass CA, Pellegrini JM. Oral care in the adult intensive care unit. Am J Crit Care 1999;8(5):314—8.

Fromme LR, Kaplow R. High frequency jet ventilation. Am J Nurs 1984;84(11):1380—3.

Furr AL, Binkley CJ, McCurren C, Carrico R. Factors affecting quality of oral care in intensive care units. J Adv Nurs 2004;48(5):454—62.

Ganz FK, Fink NF, Raanan O, Asher M, Bruttin M, Ben Nun M, et al. ICU nurses' oral-care practices and the current best evidence. J Nurs Scholarsh 2009;41(2):132—8.

Garcia R, Jendresky L, Colbert L, Bailey A, Zaman M, Majumder M. Reducing ventilator-associated pneumonia through advanced oral—dental care: a 48-month study. Am J Crit Care 2009;18(6):523—32.

Ginsberg MK. A study of oral hygiene nursing care. Am J Nurs 1961;61:67—9.

Goss LK, Coty MB, Myers JA. A review of documented oral care practices in an intensive care unit. Clin Nurs Res 2011;20(2):181—96.

Grap MJ, Munro CL, Ashtiani B, Bryant S. Oral care interventions in critical care: frequency and documentation. Am J Crit Care 2003;12(2):113—9.

Grap MJ, Munro CL, Hamilton VA, Elswick RK, Sessler CN, Ward KR. Early, single chlorhexidine application reduces ventilator-associated pneumonia in trauma patients. Heart Lung 2011;40(5):e115—22.

Halm MA, Armola R. Effect of oral care on bacterial colonization and ventilator-associated pneumonia. Am J Crit Care 2009;18(3):275—8.

Hanneman SK, Gusick GM. Frequency of oral care and positioning of patients in critical care: a replication study. Am J Crit Care 2005;14(5):378—87.

Hixson S, Sole ML, King T. Nursing strategies to prevent ventilator-associated pneumonia. AACN Clin Issues 1998;9(1):76—90.

Holberton P, Liggett G, Lundberg D. Focus on quality. Researching mouth care in the ICU. Can Nurse 1996;92(5):51—2.

Hsu S, Liao C, Li C, Chiou A. The effects of different oral care protocols on mucosal change in orally intubated patients from an intensive care unit. J Clin Nurs 2011;20(7):1044—53.

Hur M, Park J, Maddock-Jennings W, Kim DO, Lee MS. Reduction of mouth malodour and volatile sulphur compounds in intensive care patients using an essential oil mouthwash. Phytother Res 2007;21(7):641—3.

Jenkins D. Oral care in the ICU: an important nursing role. Nurs Stand 1989;4(7):24—8.

Jones DJ, Munro CL. Oral care and the risk of bloodstream infections in mechanically ventilated adults: a review. Intensive Crit Care Nurs 2008;24(3):152—61.

Jones DJ, Munro CL, Grap MJ. Natural history of dental plaque accumulation in mechanically ventilated adults: a descriptive correlational study. Intensive Crit Care Nurs 2011;27(6):299—304.

Jones DJ, Munro CL, Grap MJ, Kitten T, Edmond M. Oral care and bacteremia risk in mechanically ventilated adults. Heart Lung 2010;39(6 Suppl.):S57—65.

Jones H, Newton JT, Bower EJ. A survey of the oral care practices of intensive care nurses. Intensive Crit Care Nurs 2004;20(2):69—76.

Kite K. Changing mouth care practice in intensive care: implications of the clinical setting context. Intensive Crit Care Nurs 1995;11(4):203—9.

Kite K, Pearson L. A rationale for mouth care: the integration of theory with practice. Intensive Crit Care Nurs 1995;11(2):71—6.

Kitson A. Reclaiming nursing care. Collegian 2010;17(1):1—2.

Kjonegaard R, Fields W, King ML. Current practice in airway management: a descriptive evaluation. Am J Crit Care 2010;19(2):168—74.

Kunis KA, Puntillo KA. Ventilator-associated pneumonia in the ICU: its pathophysiology, risk factors, and prevention. Am J Nurs 2003;103(8), 64AA—AA70.

Labeau S, Vandijck D, Rello J, Adam S, Rosa A, Wenisch C, et al. Evidence-based guidelines for the prevention of ventilator-associated pneumonia: results of a knowledge test among European intensive care nurses. J Hosp Infect 2008;70(2):180—5.

Landström M, Rehn IM, Frisman GH. Perceptions of registered and enrolled nurses on thirst in mechanically ventilated adult patients in intensive care units—a phenomenographic study. Intensive Crit Care Nurs 2009;25(3):133—9.

Large H, Tuthill JE, Kennedy FB, Pozen TF. In the first stroke intensive care unit. Am J Nurs 1969;69(1):76—80.

Li DT, Puntillo K. A pilot study on coexisting symptoms in intensive care patients. Appl Nurs Res 2006;19(4):216—9.

Lin Y, Chang J, Chang T, Lou M. Critical care nurses' knowledge, attitudes and practices of oral care for patients with oral endotracheal intubation: a questionnaire survey. J Clin Nurs 2011;20(21):3204—14.

Liwu A. Oral hygiene in intubated patients. Aust J Adv Nurs 1990;7(2):4—7.

McCaffery D, Grogan T, O'Bryan K. Rinsing away ventilator days with a peridex protocol in an abdominal transplant ICU. Crit Care Nurse 2009;29(2):e21.

McCoy L. Keeping the institution in view: working with interview accounts of everyday practice. In: Smith DE, editor. Institutional ethnography as practice. Toronto: Rowman & Littlefield Publishers; 2006. p. 109—25.

McLellan B, Kravutske M, Halash C, Patten S, Colpaert N, Phillips L, et al. A stringent oral care protocol and its effect on VAP in a medical intensive care unit. Am J Crit Care 2007;16(3):306.

McNeill HE. Biting back at poor oral hygiene. Intensive Crit Care Nurs 2000;16(6):367—72.

Munro C, Grap M, Sessler C, McClish D. Effect of oral care interventions on dental plaque in mechanically ventilated ICU adults. Am J Crit Care 2007;16(3):309.

Munro CL, Grap MJ. Oral health and care in the intensive care unit: state of the science. Am J Crit Care 2004;13(1):25—33.

Munro CL, Grap MJ, Elswick RJ, McKinney J, Sessler CN, Hummel III RS. Oral health status and development of ventilator-associated pneumonia: a descriptive study. Am J Crit Care 2006;15(5):453—60.

Munro CL, Grap MJ, Jones DJ, McClish DK, Sessler CN. Chlorhexidine, toothbrushing, and preventing ventilator-associated pneumonia in critically ill adults. Am J Crit Care 2009;18(5):428—37.

Munro CL, Savel RH. Adventures in neverland: challenges and alternatives. Am J Crit Care 2011;20(1):6—8.

Mykhalovskiy E. Evidence-based medicine: ambivalent reading and the clinical recontextualization of science. Health 2003;7(3):331—52.

Nelsey L. Mouthcare and the intubated patient—the aim of preventing infection. Intensive Care Nurs 1986;1(4):187—93.

O'Keefe-McCarthy S. Evidence-based nursing strategies to prevent ventilator-acquired pneumonia. Dynamics 2006;17(1):8—11.

O'Reilly M. Oral care of the critically ill: a review of the literature and guidelines for practice. Aust Crit Care 2003;16(3):101—10.

Passos JY, Brand LM. Effects of agents used for oral hygiene. Nurs Res 1966;15(3):196—202.

Prendergast V, Hagell P, Hallberg IR. Electric versus manual tooth brushing among neuroscience ICU patients: is it safe? Neurocrit Care 2011;14(2):281—6.

Prendergast V, Hallberg IR, Jahnke H, Kleiman C, Hagell P. Oral health, ventilator-associated pneumonia, and intracranial pressure in intubated patients in a neuroscience intensive care unit. Am J Crit Care 2009;18(4):368—76.

Rankin JM, Campbell ML. Managing to nurse: inside Canada's health care reform. Toronto: University of Toronto Press; 2006.

Ricart M, Lorente C, Diaz E, Kollef MH, Rello J. Nursing adherence with evidence-based guidelines for preventing ventilator-associated pneumonia. Crit Care Med 2003;31(11):2693—6.

Roberts N, Moule P. Chlorhexidine and tooth-brushing as prevention strategies in reducing ventilator-associated pneumonia rates. Nurs Crit Care 2011;16(6):295—302.

Ross A, Crumpler J. The impact of an evidence-based practice education program on the role of oral care in the prevention of ventilator-associated pneumonia. Intensive Crit Care Nurs 2007;23(3):132—6.

Samuelson KAM. Adult intensive care patients' perception of endotracheal tube-related discomforts: a prospective evaluation. Heart Lung 2011;40(1):49—55.

Schlosser RW, Koul R, Costello J. Asking well-built questions for evidence-based practice in augmentative and alternative communication. J Commun Disord 2007;40(3):225—38.

Schweiger J, Lang JW. Oral care and assessment in the critical care setting. Crit Care Update 1981;8(11):26—34.

Sinuff T, Cook DJ, Giacomini M. How qualitative research can contribute to research in the intensive care unit. J Crit Care 2007;22(2):104—11.

Smith DE. Institutional ethnography as practice: a feminist sociology. Boston: Northeastern University Press; 1987.

Soh KL, Soh KG, Japar S, Raman RA, Davidson PM. A cross-sectional study on nurses' oral care practice for mechanically ventilated patients in Malaysia. J Clin Nurs 2011;20(5—6):733—42.

Sole ML, Byers JF, Ludy JE, Ostrow CL. Suctioning techniques and airway management practices: pilot study and instrument evaluation. Am J Crit Care 2002;11(4):363—8.

Sole ML, Byers JF, Ludy JE, Zhang Y, Banta CM, Brummel K. A multisite survey of suctioning techniques and airway management practices. Am J Crit Care 2003;12(3):220—30.

Somerville R. Oral care in the intensive care setting: a case study. Nurs Crit Care 1999;4(1):7—13.

Sona CS, Zack JE, Schallom ME, McSweeney M, McMullen K, Thomas J, et al. The impact of a simple, low-cost oral care protocol on ventilator-associated pneumonia rates in a surgical intensive care unit. J Intensive Care Med 2009;24(1):54—62.

Stevens RM, Teres D, Skillman JJ, Feingold DS. Pneumonia in an intensive care unit. Arch Intern Med 1974;134:106—11.

Stiefel KA, Damron S, Sowers NJ, Velez L. Improving oral hygiene for the seriously ill patient: implementing research-based practice. Medsurg Nurs 2000;9(1):40.

Stonecypher K. Ventilator-associated pneumonia: the importance of oral care in intubated adults. Crit Care Nurs Q 2010;33(4):339—47.

Treloar DM, Stechmiller JK. Use of a clinical assessment tool for orally intubated patients. Am J Crit Care 1995;4(5):355—60.

Trenter Roth P, Creason NS. Nurse administered oral hygiene: is there a scientific basis? J Adv Nurs 1986;11(3):323—31.

van Uffelen R, van Saene HK, Fidler V, Lowenberg A. Oropharyngeal flora as a source of bacteria colonizing the lower

airways in patients on artificial ventilation. Intensive Care Med 1984;10(5):233—7.
Vollman K. Back to the fundamentals of care: why now, why us! Aust Crit Care 2009;22(4):152—4.
Vollman KM. Ventilator-associated pneumonia and pressure ulcer prevention as targets for quality improvement in the ICU. Crit Care Nurs Clin North Am 2006;18(4):453—67.
Westwell S. Implementing a ventilator care bundle in an adult intensive care unit. Nurs Crit Care 2008;13(4):203—7.
Woodtli AO. Thirst: a critical care nursing challenge. DCCN 1990;9(1):6—15.
Yao LY, Chang CK, Maa SH, Wang C, Chen CC. Brushing teeth with purified water to reduce ventilator-associated pneumonia. J Nurs Res 2011;19(4):289—97.
Yeung KY, Chui YY. An exploration of factors affecting Hong Kong ICU nurses in providing oral care. J Clin Nurs 2010;19(21—22):3063—72.
Zack JE, Garrison T, Trovillion E, Clinkscale D, Coopersmith CM, Fraser VJ, et al. Effect of an education program aimed at reducing the occurrence of ventilator-associated pneumonia. Crit Care Med 2002;30(11):2407—12.