

# Family nurses, oral hygiene, and educational implications: a cross-sectional study

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## SUMMARY

**Objective.** To describe family nurses self-reported oral hygiene practices and to compare them with those of their potential patients in a public, free, and universal primary healthcare system.

**Material and methods.** Cross-sectional study using an anonymous questionnaire applied to randomly selected participants and their family nurses.

**Results.** A total of 1,394 people entered the study (1,326 laypersons, 66 nurses). Not all nurses reported to brush their teeth daily. Daily interdental cleaning scored percentages lower than mouthwashes. Devices like oral irrigators or tongue scrappers were not used by family nurses.

**Conclusions.** Nurses' oral self-care routines are similar to those of university graduates, with poor reported interdental cleaning. Oral health promotion activities may contribute to nurse's oral health and could have a positive effect on their patients.

**Key words:** Family nurse practitioners; health promotion; oral hygiene; oral health.

## INTRODUCTION

Oral hygiene (OH) is usually understood as oral cleanliness and it has an effect not only on oral diseases (being the most prevalent caries and periodontitis) but also on the oral manifestations of systemic disorders.

The part of oral hygiene in caries prevention is well established, and a fair to poor OH has been reported to increase the risk of periodontitis by two- to five-fold (1). A growing body of evidence links periodontitis with certain systemic diseases, such as atherosclerosis and its sequelae, diabetes mellitus, neurodegenerative diseases, or pneumonia.

There is sound evidence supporting the effect of toothbrushing in reducing the risk for caries and periodontitis (1), although its ideal frequency remains open for discussion (2). The most important limita-

tion for toothbrushes – both manual and electric – is probably their impossibility to access interproximal areas properly, which results in an inadequate plaque removal in these areas which often causes tooth decay and/or gingival inflammation. Thus, different elements have been proposed to improve cleanliness in these areas, such as interdental brushes or dental floss. These devices are not always interchangeable due to anatomical constraints, but interdental brushes seem to be more effective than dental floss. Nevertheless, regular use of interdental cleaning devices is associated with decreased oral disease prevalence (3).

The interrelationship between oral and systemic health is nowadays beyond any doubt, and international institutions support policies based on the integration of oral health into national and community health programmes as essential to general health. Apart from the important presence of oral problems in Primary Health Care – even in areas with no shortage of dental workforce – the burden of chronic disorders with oral implications highlights the part of non-dental healthcare professionals in oral health. In this sense, and mostly because of overworked healthcare systems, chronic disease services have shifted from secondary to primary care, and from physicians to nurses (4).

The important role of socio-behavioural factors in oral diseases, particularly unhealthy lifestyles, is well established and nurses have proved to be efficient in lifestyle counselling. Moreover, primary healthcare clinics seem to be the natural place for health educa-

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tion, and patient education should be an integral part of communication between healthcare providers and patients (5). Thus, family nurses would be in an ideal position to deliver effective oral health messages promoting healthier lifestyles and sound oral hygiene habits, particularly among chronic patients (6, 7).

Health practices of physicians determine what they tell their patients (7). In the case of nurses, a previous report has identified a positive correlation between nurses' personal oral hygiene habits and their commitment with the oral hygiene of their patients (6). In the same vein, increasing education about oral hygiene for healthcare providers has been reported to improve their patients' oral hygiene (8). Under this assumption, investigating nurses' oral self-care routines gains significance but reports on this topic are scarce (6, 9, 10), particularly regarding family nurses, with no studies undertaken in Europe.

Therefore, the aim of this investigation was to describe family nurses self-reported oral hygiene practices and to compare them with those of their potential patients in a public, free, and universal primary healthcare system.

## METHODS

A cross-sectional study was designed using an anonymous questionnaire with two approaches: one for members of the public, where the instrument was applied in the community to randomly selected volunteers according to the methodology described by Rogers (12) and a different one for nurses, who were interviewed at their workplaces in primary health care centres. Participants gave their verbal consent to enter the study.

The study protocol was approved by the relevant Committee for Ethics in Research (#2014/600), and the results are presented following the STROBE guidelines.

The study was undertaken in the city of Ourense, with a population of 105,893 whose annual average income per capita was 21,155 €. These citizens were served by 85 nurses working at the primary care level through a free, universal, national healthcare system. Data from the public were obtained from 1 March to 30 June 2016, and data from nurses were collected from 1 October 2016 to 30 December 2016. Only adults (>18) entered the study. Exclusion criteria were being mentally handicapped and poor command of any of the official languages in the region.

The survey instrument has been described elsewhere (13) and piloted in both in a group of 10 undergraduate dental students and in a group of 97 participants in leisure-time activities at a community

centre (mostly elder than 65). In order to control for an information bias, interviewers attended a 1-hour workshop which included role-playing with volunteers (undergraduate dental students).

Sample size for the general population was determined by quota sampling considering an accessible population of 5% and an expected percentage of response of 28%, (12) resulting a sample size of 1,034 individuals. This size permitted a power higher than 80% to detect 10% differences in oral self-care routines. As all family nurses working in the city were invited to enter the study, no sample size determination was deemed necessary.

For the sake of this study, a sound oral health-related practice was defined as a dental visit at least once a year, and daily use of a toothbrush and an interdental cleaning aid.

Data were coded and typed into a spreadsheet (LibreOfficeCalc, Libre Office 5. The Document Foundation. Berlin. Germany). Each questionnaire was identified by a single number, which permitted the assessment of the processes of data coding and mechanization in 40 randomly selected set of data. Data were then transferred to a statistical package (SPSS 15.0. SPSS, Chicago, IL, USA) for analysis. Descriptive analysis of categorical data displays frequencies and percentages. Bivariate analysis was undertaken using the Chi square test with a chosen significance level of 5%.

## RESULTS

A total of 2,295 people were invited to enter the study (2,210 members of the public and 85 nurses). The response rate was 60% for the public (n=1,326) and 77.6% (n=66) for nurses. No person was excluded from the study, although some members of the public (about 4%) preferred not to answer certain questions (details in Tables 2 and 3). The main reason for declining the invitation was lack of time.

The main features of the participants are summarised in Table 1.

Regarding the qualifications of lay participants, most had completed compulsory education (48.9%;

**Table 1.** Distribution by age and gender

AGE	Nurses		General public		Total		Mean nasalance scores	
	M	F	M	F	M	F	M	F
18-34	1	4	197	117	198	123		
35-44	0	8	125	127	125	135		
45-64	7	46	236	194	243	240		
64+	0	0	208	122	208	122		
<b>Total</b>	<b>8</b>	<b>58</b>	<b>766</b>	<b>560</b>	<b>774</b>	<b>620</b>		

n=596), followed by high school (41.3%; n=502) and university graduates (9.8%; n=120).

Nurses report a high percentage of daily toothbrushers, but not 100%, even when the users of conventional and electric toothbrush are combined. Interdental cleaning scores low values in any of the possibilities considered in the study, both below the number of nurses using mouthwashes on a daily basis. Both electric toothbrushes and daily interdental cleaning were more frequent among family nurses. However, no significant differences in oral self-care routines were found between family nurses and the general public they serve. More sophisticated devices, such as oral irrigators or tongue scrappers are not used by family nurses in our sample (Table 2).

**Table 2.** Oral hygiene instruments and frequency of use

Instrument	General public (1274)	Nurses (66)	p-value
Toothbrush			0.850
Daily	1157 (90.8)	58 (87.8)	
Sometimes	33 (2.6)	1 (1.5)	
Every week	1 (0.1)	0 (0)	
Never	83 (6.5)	7 (10.7)	
Dental floss or tape			0.056
Daily	30 (2.3)	5 (7.5)	
Sometimes	25 (1.9)	2 (3)	
Every week	8 (0.6)	0 (0)	
Never	1211 (95.2)	59 (89.5)	
Interdental brush			0.635
Daily	49 (3.8)	2 (3)	
Sometimes	45 (3.5)	1 (1.5)	
Every week	0 (0)	0 (0)	
Never	1180 (92.7)	63 (95.5)	
Mouthwash			0.064
Daily	66 (5.1)	8 (12.1)	
Sometimes	96 (7.5)	6 (9)	
Every week	24 (1.8)	0 (0)	
Never	1088 (85.6)	52 (78.9)	
Electric toothbrush			0.001
Daily	34 (2.6)	7 (10.6)	
Sometimes	32 (2.5)	0 (0)	
Every week	1 (0.1)	0 (0)	
Never	1207 (94.8)	59 (89.4)	
Oral irrigator			0.855
Daily	2 (0.1)	0 (0)	
Sometimes	4 (0.3)	0 (0)	
Every week	0 (0)	0 (0)	
Never	1268 (99.6)	66 (100)	
Tongue cleaner / scraper			0.988
Daily	0 (0)	0 (0)	
Sometimes	0 (0)	0 (0)	
Every week	1 (0.1)	0 (0)	
Never	1273 (99.9)	66 (100)	

Absolute values. Percentages in brackets. P – value calculated by Fisher's exact test.

The frequency of regular dental visits is significantly higher for nurses than general public, although more than a quarter of the sample do not visit their dentist every year (Table 3).

When compared to other university graduates, nurses showed no significant differences in terms of frequency of sound oral disease prevention practices (table 4), defined as a dental visit at least once a year and daily use of a toothbrush and an interdental cleaning aid.

## DISCUSSION

Considering this was a cross-sectional study with face-to-face interviews, and despite the fact that anonymity was granted by the interviewer, the possibility for answers describing “ideal behaviours” cannot be fully ruled out. This phenomenon may well have been more important among nurses than among the general population, but a relevant influence of this hypothetical bias in our results can be discarded in view of the results obtained. The same applies with a conjectural selection bias, by which those with poorer attitudes towards oral health may have declined the invitation to enter the study more frequently than those with positive attitudes. In both situations, our results would have depicted a population with poorer oral health habits and also would require educational interventions on this topic. It may be also argued that generalisation of these result is limited by the reduced size of the sample of nurses. In fact, all family nurses working in the city were individually invited to enter the study with a high percentage of participants. Although no benchmarking approach was possible as no information on this topic could be retrieved for family nurses elsewhere in Spain or Europe, the results are consistent with those of their university graduate counterparts and similar gaps have been observed in the scarce nursing literature available on this issue (6, 9-11). In addition, the Bologna Declaration and the European Higher Education Area grant the acquisition of the same professional competences throughout the European Union and reinforce the external validity of the study.

**Table 3.** Frequency of dental visits

Frequency	General public (1265)	Nurses (66)	p-value
Once a year	547 (43.1)	40 (60.6)	<0.001
Every six months	166 (13.1)	11 (16.6)	
When it hurts	379 (29.9)	0 (0)	
When needed	175 (13.8)	15 (22.8)	
At least once a year	713 (56.2)	51 (77.2)	<0.001

Absolute values. Percentages in brackets. P – value calculated by Fisher's exact test.

Our results show that family nurses reported a better frequency of dental visits than the general population, with similar oral self-care routines. The main deficit appears to be in terms of interdental cleaning. Health professionals are reported to have better oral health habits than the general population and nurses usually rank in high positions (10, 11). Reported percentages of nurses undertaking yearly dental visits are close to our findings in certain reports (6, 10), and significantly higher in other studies (9). Interdental cleaning seems to be a consistent problem for nurses in the literature (6, 9-11) although in very variable degrees.

The use of over-the-counter antiseptic mouthwashes as part of the daily routines of oral self-care is often recommended but it somehow remains a controversial issue, with reported shortcomings like increased pre-diabetes or oral cancer risks (14). In this situation, we did not include them in the definition of a sound oral hygiene practice in our study. However, the positive effects of fluoride mouthwashes in adults may explain the two-fold frequency of nurses using mouthrinses when compared to the general public, as evidence supporting these benefits are relatively recent (15). Another interesting finding from our results is the low number of nurses using electric toothbrushes, when their efficiency in dental plaque removal over manual toothbrushes is well established. The same applies for oral irrigators, with comparable or better performance in removing dental plaque from tooth surfaces than interdental brushes (16). These devices offer interesting advantages, particularly for those undergoing orthodontic treatment, handicapped or elderly patients.

Oral healthcare and counselling is a fundamental part of nursing activity (17). However, an important gap between knowledge and practice has been described in nursing personnel's attitudes towards oral health (9). Nurses are well positioned to play an important role in oral health promotion and prevention of oral disorders across the life cycle (18). This is particularly decisive because of the relationships between oral and non-oral systemic diseases (19). The association between oral inflammation and systemic inflammation is the key for understanding the association between periodontitis and cardiovascular disease (1.14 times higher risk), and the poor metabolic control of diabetes type II patients with periodontal disorders (20). In addition, recent reports have linked periodontitis and Alzheimer's disease, where the patient synthesizes pro-inflammatory cytokines systemically in response to oral bacteria responsible for periodontitis (19). Moreover, periodontal pathogens (*Porphyromonas gingivalis* and *Treponema denticola*) have been isolated post-mortem in human brains with

Alzheimer's disease and it has been suggested that control of bacterial plaque (good oral health) could be a preventive measure for Alzheimer's disease (19). Fortunately, nowadays oral care is perceived by nurses as an essential part of neuro-rehabilitation care (17).

Preterm labour, low birthweight, and other adverse pregnancy outcomes have been also linked to periodontitis (19). *Treponema denticola*, *Porphyromonas gingivalis* and their endotoxins can cross the placental barrier, disturb the maternal fetal unity, and induce adverse pregnancy outcomes. However, an intensive regime or oral hygiene in pregnant women can minimise the levels of pro-inflammatory cytokines (21).

Despite the positive attitude of the Nursing profession towards oral care, knowledge on specific aspects of oral health is reported to be inadequate (22). Lack of knowledge and training among non-dental care professionals constitute a barrier to the provision of quality oral care. Thus, nursing educators are called to prioritise oral health as an essential component of overall health. In this vein, innovative and collaborative models has been proposed in the framework of interprofessional education (18). Particularly, nursing programs on oral health core competences should include the recognition of risks for oral disease, provide integrated oral health information, and consider also oral health evaluation, preventive interventions, communication and education, as well as interprofessional collaborative practice with track referrals to dental professionals (23). This approach is based both upon the overlap of core competencies and learning objectives between nurses and dentists (up to 38%), (24) and on the effectiveness of interprofessional education programmes.

It is beyond any doubt that when persuading an individual to acquire healthy lifestyles, the exemplary behaviour of healthcare workers has a paramount influence (25). Bearing in mind the results from the current study, the improvement of personal oral self-care practices may contribute to ameliorate both attitudes and practices of nursery towards their patients' oral hygiene.

## CONCLUSIONS

Family nurses' oral self-care routines do not significantly differ from those of other university graduates, with an important deficit in terms of interdental cleaning. Oral health promotion activities may contribute to nurse's oral health and could also have a positive effect on their patients.

## STATEMENT OF CONFLICTS OF INTEREST

The authors state no conflict of interest.

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