ORIGINAL ARTICLE

Referral of pregnant women to dentists and advice for dental visit by medical nurses

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ABSTRACT

Objective: Dental attendance among pregnant women has been low although they frequently experience oral health problems. Nurses who provide antenatal health care are well positioned to advise and refer their pregnant patients to dentists. This study aimed to assess the practices of medical nurses regarding advice for dental visits and referral of their pregnant patients to dentists.

Methods: A total of 202 medical nurses who provide antenatal health care at Ministry of Health facilities in the district of Kota Bharu, Kelantan, Malaysia were included in this cross-sectional study. A structured self-administered questionnaire was used to obtain information on variables of interest.

Results: Most nurses frequently advised (90.6%) and referred (91.1%) their pregnant patients to dentists, although some (9.4%) advised their patients to defer dental visits until after parturition. Multivariable analysis indicated that individuals who worked as nurses for 10 years or fewer and had their own dental visits within the past year were more likely to advise their patients to see dentists with adjusted OR of 3.98 (95% CI=1.37-11.54) and 2.58 (95% CI=0.99-6.70) respectively. Nurses who visited dentists within the past year were also more likely to make dental referrals (OR=3.46, 95% CI=1.32-9.10).

Conclusions: Most nurses routinely advise and refer their pregnant patients for dental visits. The time since a nurse's last personal dental visit was associated with their advice and referral of patients to dentists, and duration employment as a nurse was associated with advising patients for dental visits.

KEY WORDS:
Prenatal care; antenatal care; nurse; referral and consultation; dental care

INTRODUCTION

Pregnancy leads to complex physical and physiological alterations that include surges in the production of oestrogen and progesterone hormones. These hormones are vital for a healthy pregnancy and in preparing mothers for labour and breastfeeding, but they can have detrimental effects on the gingival tissues of the mouth. These effects include alterations in gingival vasculature that increase the permeability of gingival blood vessels, increased susceptibility to periodontopathogens such as *Fusobacterium nucleatum, Porphyromonas gingivalis, Prevotella intermedia* and *Aggregatibacter actinomycetemcomitans* and reduced local immune responses that can cause exaggerated gingival tissue responses to dental plaque toxin and make the gingiva more susceptible to inflammation.[1]

The resulting gingival inflammation -- pregnancy gingivitis -- has a prevalence of 30.0-86.2% and is the most common oral disease in pregnancy.[2, 3] If left untreated, a more severe inflammation and infection may result, and these could also affect periodontal ligaments and alveolar bones and lead to permanent damage to the tooth-supporting structures and eventual tooth loss. Additionally, microbial pathogens and inflammatory mediators from the gingiva may enter the maternal systemic circulation and cross the placental barrier, where they enhance intrauterine production of PGE2 and TNF-α to levels that may initiate uterine contraction and subsequent premature labour.[4] Although the causal relationship between maternal periodontitis and adverse pregnancy outcomes, such as preterm birth and low birth weight, has not been definitely established, numerous studies and reviews support this association.[5-9]

Pregnant women are also more likely to suffer from dental caries than non-pregnant women.[3] This may be because lifestyle changes during pregnancy, particularly the frequent consumption of sugary foods and drinks to alleviate cravings and to ward off nausea and the decreased attention to oral hygiene. Poor oral health can negatively affect quality of life,[10] and research has shown that pregnant women have poorer oral health than non-pregnant women.[11]

In spite of these common oral health problems and their impacts on pregnant women, studies of diverse populations have indicated that pregnant women have low utilization of oral health care services. These reported rates are 27.3% in Thessaloniki, Greece,[12] 32% in Wellington, New Zealand,[13] 49% in Iowa, United States,[14] 52% in Kuwait City, Kuwait,[15] 58.3% in the United Arab Emirates,[16] and 61% in Birmingham, United Kingdom.[17] Medical health care providers, particularly doctors and nurses, are considered the first line in the provision of antenatal health care. Besides monitoring the health of the women and their developing foetuses, they are also responsible for educating women on other relevant health matters. Doctors and nurses have close and regular contact with pregnant women, so are well

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positioned to educate the women on oral health care, and to advise and refer those in need of oral care to dentists.[4, 18]

In 2004, the Ministry of Health Malaysia produced a guideline that regulates the implementation of oral health care for antenatal mothers. According to this guideline, all pregnant women attending Maternal and Child Health Clinics for antenatal care should be referred to dental clinics for oral health examination and education.[19] However, to our best knowledge, the actual implementation of referral practices by medical colleagues as specified in this guideline have not yet been investigated. This study assessed the practices of medical nurses regarding advice and referral of pregnant women for dental visits.

MATERIALS AND METHODS

This cross-sectional study examined medical nurses who provide antenatal health care services at Ministry of Health facilities in the district of Kota Bharu, Kelantan, Malaysia. The Ministry of Health is the main provider of health services in Malaysia and is the government's major agency for health issues. Health care services for pregnant women and their babies are provided by the ministry through a network of primary health care facilities, consisting of health clinics and community clinics.[20] At these clinics, pregnant women are attended to mainly by nurses. Consultation with a doctor occurs at least once during a follow-up visit for overall medical screening and examination, and later only if necessary.

At the time of this study, there were 12 health clinics and 31 community clinics in the district of Kota Bharu. There were no specific inclusion and exclusion criteria because the job descriptions and responsibilities of all nurses working in antenatal health care are similar regardless of their rank, and all of them are expected to make referrals to dentists. Hence, all 246 nurses working at these 43 antenatal care facilities in the district were invited to participate. Ethical approval for this study was provided by the Universiti Sains Malaysia Human Research Ethics Committee (USMKK/PPP/JEPeM[245.4.(3.4)]) and the Ministry of Health Malaysia Medical Research and Ethics Committee (KKM/NIHSEC/08/0804/P12-179).

The nurses were given a structured questionnaire consisting of three items to assess how often they: 1) advise patients to see dentists during pregnancy, 2) refer patients to dentists for dental check-ups, and 3) advise patients to delay dental visits until after pregnancy. The possible answers to each question were: "very frequent", "frequent", "infrequent", "very infrequent", and "never". The questionnaire was pre-tested on a convenience sample of 50 medical nurses who provide antenatal care in the district of Tumpat, which is a considerable distance from the study site of Kota Bharu. In this pre-test, most respondents reported that they understood the questions rather easily. Only a few issues concerning the questionnaire format and layout were raised, and appropriate modifications were made.

Prior to data collection, a list of all health clinics and community clinics in the Kota Bharu district and the number of nurses working at each clinic were obtained. Based on this information, the questionnaires were packed into sealed envelopes that were labelled with the clinic names. With the help of the district matron, the envelopes were dispatched to the staff nurses who were in charge of the clinics. The charge nurses later helped to distribute the questionnaires to all nurses who were under their supervision. A cover letter that explained the study and a consent form was attached to each questionnaire. Nurses who agreed to participate were asked to sign the informed consent form and complete the questionnaire. The charge nurses then helped to gather the completed documents before the main researcher collected them after two weeks. The main researcher also made two follow up visits at two weeks intervals after the first collection to increase the response rate.

Data processing and analysis used IBM SPSS Statistics Version 22. The descriptive statistics of the variables were frequency, percentage, mean and standard deviation (SD). Factors associated with the nurses' advice for dental visits and referral of pregnant women to dentists were determined at the univariable and multivariable levels using simple logistic regression analysis and multiple logistic regression analysis respectively for calculations of odds ratio (OR), adjusted OR, and 95% confidence interval (CI). For these analyses, the responses to the frequency providing dental advice and referral to a dentist were re-grouped into two categories, in which "frequent" included the responses of "very frequent" and "frequent" and "infrequent/never" included the responses of "infrequent", "very infrequent", and "never".

In multiple logistic regression analysis, variables were selected using a forward selection likelihood ratio (LR) stepwise method. Following variable selection, the importance of each variable was verified. All possible two-way interactions and multicollinearity problems were checked. The overall model was assessed using the Hosmer-Lemeshow goodness-of-fit test. A classification table for sensitivity, specificity, and area under the receiver operating characteristic (ROC) curve was also calculated to determine the model's predictive power. Influential outliers were identified by calculating Cook's distance (Di), and a data point with Di above 1.0 was considered an influential outlier.

RESULTS

We distributed 246 questionnaires and 202 were returned, corresponding to a response rate of 82.1%. All respondents were female, as there are currently no male nurses involved in antenatal health care in Malaysia. Table I shows the characteristics of these 202 nurses. The age range was 28 to 58 years-old with a mean age of 37.7 years (SD 7.34). The duration of employment as a nurse was 5 to 36 years with a mean of 12.8 years (SD 6.89), and the duration of employment in antenatal care was 1 to 34 years with a mean of 8.3 years (SD 6.41). Most nurses had dental visits within the past year (68.8%). The reasons for these visits were extraction (42.1%), scaling (39.1%), restorations (38.6%), routine examination (28.7%), and construction of dentures (6.4%).

More than 90% of the nurses very frequently or frequently advised their pregnant patients to visit dentists and referred them for dental examinations during their pregnancies

Table I: Characteristics of nurses (n=202)

Variable	Frequency (%)
Age group (years)	
≤35	108 (53.5)
>35	94 (46.5)
Ethnic group	
Malay	197 (97.5)
Others	5 (2.5)
Length of time working as a nurse (years)	
≤10	107 (53.0)
>10	95 (47.0)
Length of time providing antenatal care (years)	
≤10	157 (77.7)
>10	45 (22.3)
Last dental visit (years)	
≤1	139 (68.8)
1-2	35 (17.3)
>2	28 (13.9)

Table II: Frequency that nurses advised patients to see dentists, referred patients to dentists, and advised patients to delay dental visits (n=202)

Variable	Frequency (%)				
	Very frequent	Frequent	Infrequent	Very infrequent	Never
I advise patients to see dentists during pregnancy	50 (24.8)	132 (65.3)	17 (8.4)	3 (1.5)	3 (1.5)
I refer patients to dentists for dental check-ups	52 (25.7)	131 (64.9)	15 (7.4)	2 (1.0)	2 (1.0)
I advise patients to delay dental visits until after pregnancy	2 (1.0)	17 (8.4)	34 (16.8)	11 (5.5)	138 (68.3)

Table III: Simple logistic regression analysis of factors associated with nurses advising dental visits for their patients (n=202)

Variable	Crude OR	95% CI	χ^2 (df)[a]	P value[a]
Age group (years)				
≤35	2.32	0.88, 6.07	3.06 (1)	0.080
>35	1.00			
Length of time working as a nurse (years)				
≤10	3.83	1.33, 10.97	7.19 (1)	0.007
>10	1.00			
Length of time providing antenatal care (years)				
≤10	2.61	1.00, 6.86	3.56 (1)	0.059
>10	1.00			
Last dental visit (years)				
≤1	2.43	0.96, 6.19	3.42 (1)	0.064
>1	1.00			

[a] Likelihood Ratio (LR) test

Table IV: Multiple logistics regression analysis of factors associated with nurses advising dental visits for their patients (n=202)

Variable	Adjusted OR	95% CI	χ^2 (df)[a]	P value[a]
Length of time working as a nurse (years)				
≤10	3.98	1.37, 11.54	7.47 (1)	0.006
>10	1.00			
Last dental visit (years)				
≤1	2.58	0.99, 6.70	3.70 (1)	0.054
>1	1.00			

[a] Likelihood Ratio (LR) test

Table V: Simple logistic regression analysis of factors associated with nurses referring their patients to dentists (n=202)

Variable	Crude OR	95% CI	χ2 (df)[a]	P valuea
Age group (year)				
≤35	1.66	0.64, 4.31	1.09 (1)	0.297
>35	1.00			
Length of time working as a nurse (year)				
≤10	1.62	0.62, 4.22	0.99 (1)	0.319
>10	1.00			
Length of time providing antenatal care (year)				
≤10	1.28	0.43, 3.76	0.19 (1)	0.662
>10	1.00			
Last dental visit (year)[b]				
≤1	3.46	1.32, 9.10	6.42 (1)	0.011
>1	1.00			

[a] Likelihood Ratio (LR) test
[b] Multiple logistic regression analysis indicated that dental visit within the past year was the only factor associated with nurses' referring patients for dental visits (OR=3.46, 95% CI=1.32-9.10)

(Table II). On the other hand, some nurses (9.4%) very frequently or frequently advised their pregnant patients to defer dental visits until after parturition.

Table III shows the results of a simple logistic regression analysis of factors associated with the nurses' advising dental visits for their patients. There were no significant associations between the nurses' advice for dental visits and age, duration of providing antenatal care, and time since their own most recent dental visits. However, individuals who worked as nurses for 10 years or fewer were more likely to advise their pregnant patients to see dentists than those who have worked as nurses for more than 10 years (OR=3.83, 95% CI=1.33-10.97).

Multivariable analysis indicated that employment as a nurse for 10 years or fewer remained significantly associated with advising patients to see a dentist (OR=3.98, 95% CI=1.37-11.54) (Table IV). A nurse's dental visit within the past year was marginally associated with advising patients to see a dentist (OR= 2.58, 95% CI 0.15 to 1.01). Possible two-way interactions between factors were not significant, and there was no multicollinearity. Examination of the contribution of outliers indicated that none of them were influential. The results of the Hosmer-Lemeshow test (p=0.195, df=2) suggested that the model provided a good fit. Analysis of the overall classification indicated that the model correctly predicted whether 90.1% of the nurses correctly advised the women to see dentists. The area under the ROC curve was 0.704, indicating the model had good predictive power.

Table V shows the results of simple logistic regression analysis of factors associated with nurses' referring patients for dental visits. The time since a nurse's last personal dental visit was the only factor significantly associated with referral of patients to dentists (OR=3.46, 95% CI=1.32-9.10). Age, duration of employment as a nurse, and duration of providing antenatal care had no influence on their referral practice. Multivariable analysis indicated that the time since a nurse's last personal dental visit remained the only factor significantly associated with referral of patients to dentists (OR=3.46, 95% CI=1.32-9.10). The model correctly predicted that 90.6% of the nurses referred the women to dentists. The area under the ROC curve was 0.647, supporting the model's ability to identify the nurses' referral practices.

DISCUSSION

More than 90% of the nurses in this study frequently advised and referred their pregnant patients to see dentists. Based on these data, we might expect that a high percentage of pregnant women seek dental care. However, statistics from the health management information system indicated that only about one-third of mothers in Malaysia attended dental clinics during their pregnancies, although this rate has been steadily increasing over time (18.4% in 2000, 29.1% in 2010, and 34.4% in 2012).[19, 21, 22] In Kelantan, only 32.1% of mothers received primary oral health care during pregnancy in 2012.[22] A previous study at a teaching hospital in Kelantan also reported that only 29% of pregnant women sought dental care.[23] The persistently low dental attendance among pregnant women raises questions about the effectiveness of the current referral practices, as it is obvious that most pregnant women did not seek dental care even after receiving advice and referral from antenatal nurses.

The guideline on oral health care for antenatal mothers by the Ministry of Health Malaysia did not outline any specific referral system.[19] Verbal referral is currently the most common method, although there is a general acceptance that communications should be in the form of written letters.[24] We recommend a review of the current referral methods, and that standard referral procedures are established to increase the uptake of oral health care services by pregnant women. Establishment of a good medical-dental collaboration that maintains open lines of communication between referring doctors and nurses with dentists are also needed to improve the oral health care of pregnant women.
The low attendance of pregnant women at dental clinics may also be partially explained by our finding that almost one-third of the nurses told their patients to delay dental visits until after delivery. In particular, some nurses gave this advice frequently (9.4%) and others (22.3%) gave this advice infrequently. This finding indicates that many nurses in this

study have misconceptions about oral health care during pregnancy. Misconceptions or myths about human health and medical care are common in the general public and among health care providers. Despite the growing acceptance of evidence-based medicine in medical education and medical practice since its introduction in the 1990s, medical misinformation remains and some health care providers, including doctors and nurses, may pass these messages to their patients, thereby perpetuating medical misinformation.[25]

A study of 197 physicians in northern Jordan showed that more than half of them believed that periodontal treatment is not safe for pregnant women and that calcium will be drawn from mothers' teeth by the developing baby.[26] The doctors also believed in the statement 'a tooth for a baby' which asserts that for every child a woman has, she is bound to lose a tooth.[26] This study also showed that a doctor's misinformation on this topic was negatively associated with the likelihood he/she would advise pregnant patients for dental visits.[26] The erroneous belief held by some of the nurses in the present study that dental visits can be delayed until after pregnancy must be corrected. In view of the association between maternal periodontitis and adverse pregnancy outcomes, nurses' should be prevented from providing misinformation on oral health care to pregnant women due to the serious consequences.

In our study, individuals who worked as nurses for 10 years or fewer were more likely to advise their pregnant patients to see dentists than those who were nurses for more than 10 years. On the contrary, a study by Rocha *et al.*[27] of 875 obstetricians in Brazil showed that more experienced nurses were more likely to recommend their patients for dental examinations. Our findings may be attributed to the time the nurses' were exposed to the Ministry of Health guideline on antenatal oral health care, which was released in 2004. Nurses who were employed more than 10 years were trained prior to this guideline. Hence, training programs for nurses in the field are needed to provide important information regarding advising their pregnant patients to seek oral health care.

Nurses in this study who had their own dental visits within the past year were more likely to advise and refer their pregnant patients to dentists. Rocha *et al.*[27] reported similar results for obstetricians in Brazil, and we agree with their conclusion that that dental referrals by nurses might be a reflection of their own positive health-seeking behaviours. In consideration of the current findings, we encourage employers of health care providers to formulate a comprehensive oral health care policy that promotes oral health and well-being of health care workers, particularly those directly involved in patient care. Strategies to promote regular dental visits by health care providers, including nurses, medical doctors, and obstetricians, can have important benefits. Nevertheless, taking cognizance of barriers that may prevent health care professionals from utilizing health care services, such as embarrassment, fear, confidentiality issues, and quality of care issues,[28, 29] efforts are needed to overcome these barriers and should be implemented in tandem with the proposed activities.

Previous studies have highlighted the important roles of medical health care providers in preventive oral health care and risk-based dental referrals.[30, 31] The present study examined nurses working at Ministry of Health premises and is among the few studies to investigate the practices of nurses regarding dental advice and referral of antenatal mothers. The Ministry of Health offers comprehensive maternal and child health care for all women in Malaysia, and nurses are key players in the ministry's antenatal health care teams, which are based at health clinics and community clinics. The results of this study may not be applicable to nurses who provide antenatal health care at other facilities, including private clinics and hospitals and other government departments, because doctors play more important roles in antenatal care at these centres, and nurses play only supportive roles. With the very rapid growth of private clinics and hospitals in urban and rural areas of Malaysia, more mothers with disposable income are seeking antenatal care at these private facilities. Thus, we suggest for further studies to investigate the dental referral practices of doctors involved in antenatal health care at private facilities. Additionally, the awareness and attitudes of these doctors regarding antenatal oral health care should be assessed.

One of the limitations of our study is that we used a self-administered questionnaire rather than direct observation of the nurses' practices. We also made no attempt to verify the self-reported data by asking patients after consultation if they recall the nurses recommending dental visit. The reliability of self-reported measures depends on the respondents' motivation, honesty, memory, and ability to respond. Thus, our results should be interpreted with caution as there is a possibility that the nurses may be biased toward providing more favourable or "correct" responses. In the present study, we performed detailed statistical analysis of factors associated with the nurses' advice and referral practices. However, our recommendations for improvements would only be applicable to a small minority of nurses, because most nurses already frequently advised and referred their patients to dentists. Regardless, given the important link between maternal periodontitis and adverse pregnancy outcomes, it is imperative that all nurses refer pregnant women to dentists as recommended.

CONCLUSION

Most nurses in this study frequently advised and referred their pregnant patients to seek dental care. Factors associated with advising patients to seek dental care were employment as a nurse for 10 years and fewer and the nurses' personal dental visits within the past year. The nurses' personal dental visit within the past year was also associated with their referral practices. Little is known about oral health care seeking behaviour of nurses and other health care providers, including oral health care team members. Strategies that promote regular dental visits by health care providers are highly recommended. The results presented here have important implications for antenatal health care services, in view of the potential roles of nurses as oral health advocates for pregnant women. More emphasis should be placed on strategies to update the knowledge of nurses regarding the importance of oral health care during pregnancy through

continuing medical education programs. These nurses must know and understand the links between oral health and pregnancy outcomes, and the importance of referrals to dentists. With appropriate knowledge, nurses will be able to identify common oral health problems based on signs and symptoms, and to advise and refer their pregnant patients accordingly.

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