

## ORIGINAL ARTICLE

# KNOWLEDGE, ATTITUDES AND PRACTICE BEHAVIOURS OF HEALTHCARE PROFESSIONALS ON ASSOCIATION BETWEEN PERIODONTAL DISEASE AND PRETERM AND/OR LOW BIRTH WEIGHT INFANTS: A MALAYSIAN STUDY

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## ABSTRACT

Our study aimed to assess the knowledge, attitudes and practice behaviours of primary healthcare professionals in government Maternal and Child Healthcare Clinics (MCHC) on the association between oral health and pregnancy outcomes namely pre-term and/or low birth weight (PT/LBW) infants and to identify the barriers of utilisation of oral healthcare services by pregnant mothers. Questionnaires were distributed to government healthcare professionals working at all seven government MCHC in the Manjung District, Malaysia. 136 out of 158 questionnaires were returned completed yielding a 92% response rate. The questionnaire covers respondents characteristics, attitude and practice behaviours related to oral health and barriers faced when referring pregnant mothers to the dental clinic. 65% of respondents noticed dental/ gum problems in the pregnant mothers that they encountered. The two most frequent response for outcome of delivery linked to gum/ dental problems were premature delivery (49%) responses and low birth weight (27%). Although 95% of the respondents believed that regular dental check-ups is compulsory for pregnant mothers, only 69% regularly refer pregnant mothers for dental check-ups. There was a significance between healthcare professionals that receive continuing dental education and their referrals of antenatal mothers for dental check-ups.

**KEYWORDS:** Preterm, Low Birth Weight, Periodontitis, Attitude, Knowledge

## INTRODUCTION

Periodontal diseases are diseases related to the structure that surround and support the teeth. It is a group of oral inflammatory diseases that are influenced by host response factors. The two main types of periodontal disease are gingivitis and periodontitis. Gingivitis is characterised by inflammation that only affects the gingivae while periodontitis involves the apical migration of periodontal ligament as well as connective tissue and alveolar bone destruction.

The World Health Organisation defined preterm as babies born alive before 37 weeks of pregnancy are completed while low birth weight is a weight at birth of less than 2,500 grams (5.5 pounds)<sup>1</sup>. Preterm birth rates are increasing in almost all countries. Prematurity is the leading cause of newborn deaths (babies in the first 4 weeks of life) and is now the second leading cause of death after pneumonia in children under the age of five<sup>2</sup>.

On the same note, low birth weight contributes 60% to 80% of all neonatal deaths. The global prevalence of low birth weight is 15.5%, which amounts to about 20 million low birth weight infants born each year, 96.5% of them in developing countries<sup>1</sup>. Associated maternal factors for low birth weight include genetic, socio-demographic and obstetric factors, nutritional status, morbidity, toxic exposures and antenatal care<sup>3</sup>.

Collins first examined the effects of endotoxins of oral origin on the fetal-placental unit in 1994<sup>4</sup>. They found that injecting pregnant golden hamsters with lipopolysaccharide from *Escherichia coli* and *Porphyromonas gingivalis* causes significant decrease in fetal weight. This is followed by Offenbacher *et al*, 1996<sup>5</sup> who tested this hypothesis on a case-control study of 93 mothers. The authors determined that mothers with periodontal infection had more than seven times the risk of delivering a preterm and / or low birth weight (PT/LBW) infant. Periodontal disease producing inflammatory cell mediators TNF $\alpha$  and PGE<sub>2</sub> locally in the oral cavity can serve as a source of fetotoxic cytokines. This increase in inflammatory cytokines may contribute to preterm rupture of the membranes and uterine contractions, which can lead to miscarriage or preterm birth<sup>7</sup>.

Following from this, multiple studies have been published relating oral health to pre-term and/or low birth weight (PT/LBW) infants. In 2003, a systemic review<sup>8</sup> initially identified 1,688 of these studies. Of those, only 6 case-control, 3 cross-sectional and longitudinal, and 3 intervention studies met their inclusion and exclusion criteria. They concluded that preliminary evidence to date suggests that periodontal intervention may reduce adverse pregnancy outcomes. Menon, 2008<sup>9</sup> found that systemic reviews and meta-analyses show that periodontal care *per se* does not reliably reduce risks of preterm birth. Nonetheless, the effectiveness of periodontal care may depend

upon when during pregnancy the infection or periodontal disease is detected and treated.

For the Malaysian population, a prospective cohort study<sup>10</sup> found that the incidence of LBW was 14.2% in women with periodontitis, and 3.3% in women without periodontitis. Hence, it has been estimated that low birth weight attributed to maternal periodontitis in the total population is at 67%. At present in Malaysia, there is little information regarding the knowledge, attitude and practice behaviours of healthcare professionals regarding oral health care specifically the oral health care of pregnant mothers and the association between periodontal disease and preterm and/or low birth weight infants. As mentioned in the 2012 World Health Organisation<sup>2</sup> publication on preterm birth, it has been postulated that the effectiveness of periodontal care may depend on when during pregnancy the periodontal disease is detected and treated. Hence, we feel that all primary healthcare providers should be aware of this association and its implications.

For the District of Manjung, attendance of pregnant mothers for dental check-ups is 60.87% in 2013. This figure is higher compared to most other reports of antenatal attendance for dental care<sup>11-15</sup>. Even so, any figure less than 100% should not be accepted as satisfactory because of the possible repercussions of poor oral health on pregnancy outcomes. In order to constructively use existing resources towards improving oral healthcare for pregnant mothers, it is essential that the level of knowledge and current attitudes of the front liners at the Maternal and Child Healthcare Clinic is known. Barriers in utilisation of oral healthcare services by pregnant mothers should also be identified. Only then can constructive efforts be planned towards improving oral healthcare for pregnant mothers.

This study aimed to a) assess the knowledge, attitudes and practice behaviours of primary healthcare professionals in government clinics in general, and on the association between oral health and pregnancy outcomes namely pre-term and/or low birth weight infants and b) to find out the barriers to utilisation of oral healthcare services by pregnant mothers from the perspective of the healthcare professionals.

## METHODOLOGY

This study is an cross-sectional study that uses a questionnaire as the main method for data collection. The sampling is a universal sampling that includes all healthcare professionals working in the MCHC in the district of Manjung in Malaysia. The questionnaire was first drafted and piloted at the Sitiawan Health Clinic. Modifications were made before using it on the study population as described below.

## Study Population

The healthcare professions investigated are all the medical officers, medical assistants, staff nurses, community nurses and medical attendants working in the Maternal and Child Healthcare Clinics in the Manjung District in Malaysia. The Manjung District has seven main health clinics located in predominantly semirural local areas<sup>16</sup>. Antenatal checkups under the current Ministry of Health Malaysia require the mothers to attend at least once every month to see either one of the aforementioned healthcare providers.

A list of all healthcare professionals that mans all seven government clinics and its surrounding sub-clinics in the Manjung District was requested from their respective supervisors as the study sample. The inclusion criteria is that the staff must be working at a MCHC clinic in the Manjung District. The questionnaire was then sent out to all of the aforementioned healthcare professionals with the assistance from the Sister-in-Charge at the clinics.

The clinics and the amount of questionnaires distributed to them are Sitiawan Maternal and Child Healthcare Clinic (N=55), Ayer Tawar Maternal and Child Healthcare Clinic (N=21), Lekir Maternal and Child Healthcare Clinic (N=19), Pantai Remis Maternal and Child Healthcare Clinic (N=18), Changkat Keruing Maternal and Child Healthcare Clinic (N=14), Pangkor Maternal and Child Healthcare Clinic (N=14) and Beruas Maternal and Child Healthcare Clinic (N=17). The amount of questionnaire distributed correlates with the amount of healthcare professionals working in the respective clinics.

## Questionnaire Design and Ethical Considerations

The questionnaire is a modified version of the questionnaire designed by Wilder et al, 2007<sup>17</sup>. Since we have simplified it significantly to suit the targeted respondents, the questionnaire was revalidated by testing it in a pilot group for comprehensiveness, reliability and clarity before using it in this study. The questionnaire is structured, self-administered and designed to cover four broad areas of interest: 1. Respondents background and professional characteristics. 2. Attitude and practice behaviours related to oral health. 3. Knowledge of association between PT/LBW and periodontal diseases. 4. Barriers faced when referring pregnant mothers to the dental clinic.

Approval from the Malaysian Medical Research Ethics Committee (MREC) was obtained with the NMRR number 13-836-16660. Patient information sheet was attached with the questionnaire and written informed consent was obtained from the respondents prior to completion of the questionnaire.

**Statistical Analysis**

The data collected from the questionnaire was analysed using Statistical Package for Social Sciences (SPSS Inc, Chicago, USA). Descriptive statistics was used to describe the data obtained including the frequency and percentages. The chi-squared test was used to analyse for patterns and significance and the value of  $p < 0.05$  was taken as a significant difference<sup>18</sup>.

**Service Data**

We also obtained service data for the seven clinics involved via the standard form used by the Ministry of Health Malaysia i.e. PG207. This is to allow comparison of the knowledge and practice behaviour as acquired by the questionnaire with real-time data of referrals and attendances at both the MCHCs and the dental clinics involved.

**RESULTS**

**Demographics**

A total of 136 from 158 questionnaires were returned, achieving a response rate of 92%. An overwhelming majority of the respondents were females at 96%. Most (61%) were aged 31 - 40 years old and worked either as a staff nurse (25%) or a community nurse (53%). Almost all had some form of formal education (99%) and slightly more than half (57%) never attended any continuing education programmes in the form of dental health programmes.

**Attitude and Practice Behaviours**

Table 1 describes the attitude and practice behaviours of the respondents. A majority of the respondents had regular contact with pregnant mothers. Only 65% noticed any dental/ gum problems in the pregnant mothers that they encountered. Although 95% of the respondents believed that regular dental check-ups is compulsory for pregnant mothers, only 69% regularly refer the pregnant mothers for dental check-ups.

**Table 1: Attitude and Practice Behaviours of the Respondents (N= 136)**

	Yes (%)	No (%)	Not Sure (%)
Regularly contact with pregnant mothers during your practice of medicine	117(86%)	19(14%)	0(0%)
Noticed any dental/ gum problems in the pregnant mothers encountered	89(65%)	46(34%)	1(1%)
Feel regular dental check-ups is compulsory for pregnant mothers	129(95%)	6(4%)	1(1%)
Regularly refer pregnant mothers for dental check-ups	94(69%)	40(29%)	2(2%)

There is a positive correlation between subjects that answered regular dental check-up is compulsory from pregnant women and their regular referral of pregnant mothers for dental check-ups (Yates  $\chi^2(1, N = 136) = 4.084, p = .04$ ).

Comparisons of healthcare professionals that regularly refer pregnant mothers for dental

check-ups with their previous attendance to any dental health programmes were made and the results are presented in Table 2. We found a statistically significant association between subjects who had previous attendance to any dental health programmes and their regular referral of pregnant mothers for dental check-ups.

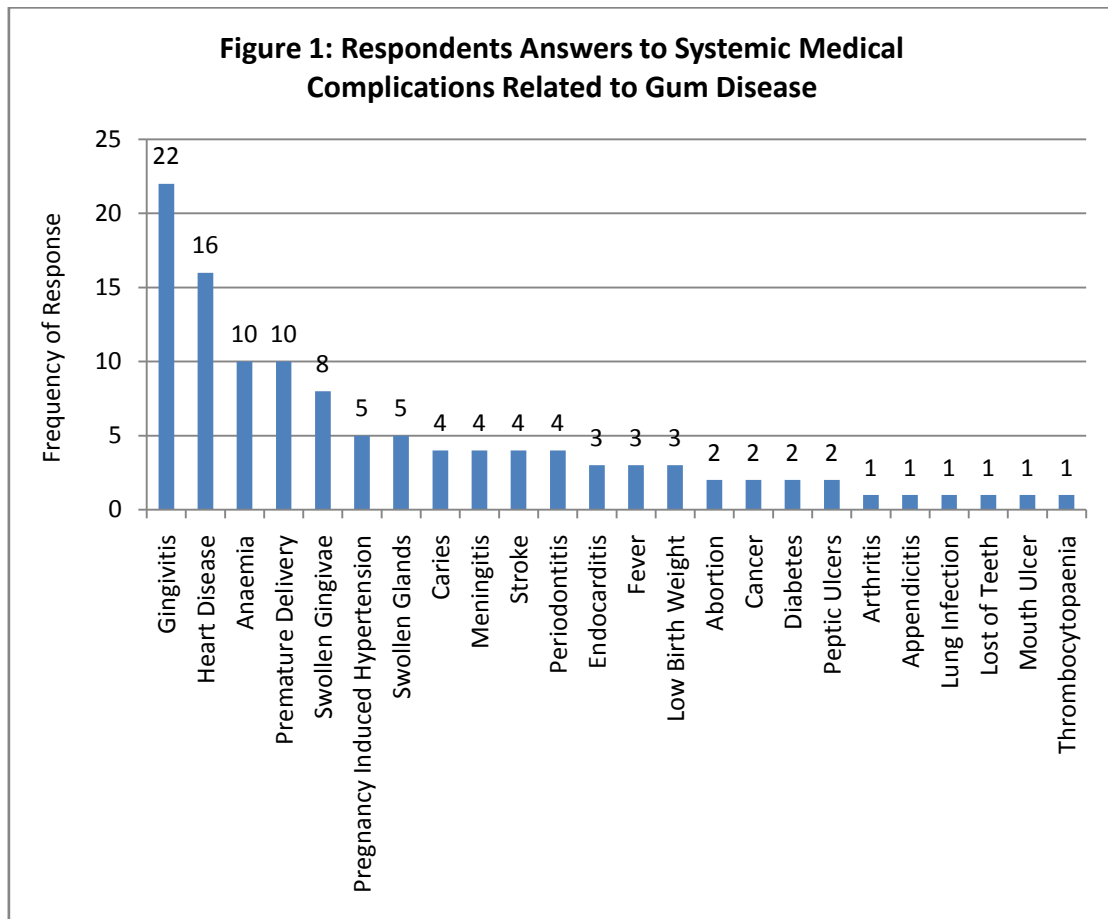
**Table 2: Comparisons of healthcare professionals that regularly refer pregnant mothers for dental check-ups with previous attendance to dental health programmes. (N= 136)**

Profile Variables	Regularly refer pregnant mothers for dental check-ups		$\chi^2$ (df)	p value
	Yes (n=95)	No (n=41)		
<u>Previous Attendance to Dental Health Programmes</u>				
Yes	43 (81.1%)	10 (18.9%)	8.771 (2)	0.012
No	47 (60.3%)	31 (39.7%)		
Not Sure	5 (100%)	0 (0%)		

**Knowledge in Relations to Dental Diseases and Systemic Medical Complications**

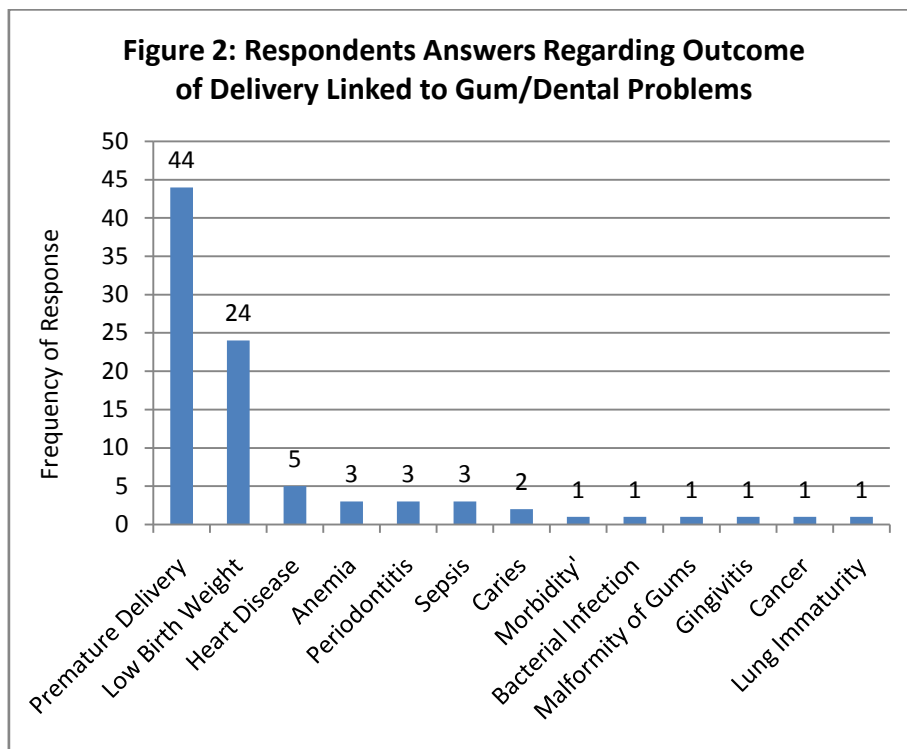
Respondents were asked to name any systemic medical complications related to gum disease that they know of and the results are depicted in Figure 1. Out of the 115 responses, 22 (19%)

named gingivitis while 16 (14%) named heart disease as a complication related to gum disease. Other frequent responses include anaemia (9%), premature delivery (9%) and swollen gingiva (7%).



Respondents were also asked to name any outcome of delivery linked to gum/ dental problems that they know of and the results are presented in Figure 2. The two most frequent

answers out of the 90 responses were premature delivery at 44 (49%) responses and low birth weight at 24 (27%) responses.



Knowledge of association between periodontal disease and outcomes of delivery is presented in Table 3. When asked whether they are aware of any relationship between gum disease and any systemic medical complications, a high percentage claimed that they were aware 68%.

113 respondents (83%) knew that there is relationship between gum/ dental problems and the outcome of delivery in pregnant mothers. Most were also aware that pregnant mothers experience a higher rate of gum disease (83%).

**Table 3: Knowledge of Association Between Periodontal Disease and Outcomes of Delivery (N= 136)**

	Yes (%)	No (%)	Not Sure (%)
Awareness of relationship between gum disease and any systemic medical complications	192 (68%)	44 (32%)	0 (0%)
Awareness of relationship between gum/ dental problems with the outcome of delivery in pregnant mothers	113 (83%)	23 (17%)	0 (0%)
Awareness that pregnant mothers experience a higher rate of gum disease	113 (83%)	22 (16%)	1 (1%)

**Barriers Faced During Referral**

We collected the qualitative responses to the question on the problems encountered that limits the number of referrals of pregnant mothers for a dental check-up. The main limitation from the perspective of the healthcare professionals that responded was identified as ‘time constraints’ (34%) and ‘patient refusing to be referred’ (26%). Other frequent answers given by the respondents includes the healthcare professionals themselves are ‘not aware of the need to refer’ (23%) and ‘difficulty to access dental care’ (20%).

We further investigated the percentage of respondents that claimed time constraints limits the number of referrals to the dental clinic compared to the amount of patients attending the respective MCHC. There was a significant relationship found between annual new attendance to the MCHC and the percentage of respondents claiming time constraints from the individual clinics at Yates  $\chi^2(1, N = 136) = 114.02, p = .00$ . As expected, staff working at clinics with more patients cited time restrictions as a barrier for referring patients for oral health check-ups.

**DISCUSSION**

This study aimed to assess the knowledge and attitudes of primary healthcare professionals in government clinics on the association between oral health and pregnancy outcomes namely preterm and / or low birth weight infants. Additionally, we also wanted to find out the practice behaviours of healthcare professionals in the MCHCs generally and to identify barriers to utilisation of oral healthcare services by pregnant mothers from the perspective of the healthcare professionals.

The questionnaires were distributed by hand, self-administrated and recollected with the help of the supervisors in the respective clinics. Hence, we could not control the circumstances

in which the questionnaire was answered. Interpretation of the data obtained in this study must be done with caution because of the bias created from the self-administered questionnaires. An investigator-administered questionnaire or an interview would ensure more accurate answers and prevent duplication or discussion among the respondents.

The Manjung District is a typical district in Malaysia with a combination of MCHC, some in rural areas and others in semi rural and urban areas. The study sample is sufficient to draw conclusions for the healthcare professionals in this district but extrapolating the results to represent other healthcare professionals in the country must be done with care. Nevertheless we are planning to widen the scope of the investigation to include other districts in the country to obtain a more accurate representation of the knowledge and practice behaviours of healthcare professionals in the MCHCs in Malaysia.

In terms of knowledge, a high percentage of respondents claimed to be aware of the relationship between gum/ dental problems and the outcome of delivery in pregnant mothers but erroneously named the outcome of delivery associated as caries, cancer and sepsis, to name a few. Systemic medical complications related to dental/ gum problems also included incorrect answers like thrombocytopenia, lung infections and meningitis. Less than half of the respondents correctly named pre-term infants (44%) and low birth weight infants (29%) as an outcome of delivery linked to periodontal disease. These responses suggests that a considerable proportion of the front liners in our MCHCs are ignorant of the medical evidence behind the recommendation to refer pregnant mothers for dental check-ups even though they are expected to incorporate the oral health referral system into their practice.

Other studies investigating the knowledge of healthcare providers on associations between oral diseases and pregnancy outcomes gives varying conclusions. Wilder *et al*, 2007<sup>17</sup> established that although obstetricians are aware of the potential role of periodontal disease as a pregnancy risk factor, there is limited incorporation of this knowledge into clinical practice. Al-Habashneh *et al*, 2008<sup>19</sup> on the other hand found that general practitioners were less informed about oral health practices on pregnant women. Another study among Brazilian public health professionals<sup>20</sup> concluded that the healthcare professionals who have worked exclusively in the public service or had attended post-graduation programs (residency or specialization) reported more favourable attitudes towards the oral health aspects of pregnancy. A review in 2012<sup>21</sup> found that one-half of the general practitioners were aware that poor oral health could affect pregnancy outcomes.

Most of our respondents feel that regular dental check-up should be made compulsory for pregnant mothers and they routinely refer pregnant mothers to dental clinics. This finding is notably higher than other studies elsewhere investigating attitudes and practice behaviours of healthcare professionals. This is very encouraging because although a majority of the respondents are generally not well-informed regarding pregnancy outcomes linked to oral health, they still feel that oral health is essential in antenatal care.

Oral/ dental health education programmes are conducted annually for the MCHC staff in Manjung. In view of the positive association between subjects who previously attended any programmes regarding oral health and their regular referral of pregnant mothers for dental check-ups, the importance of continuous professional development specifically in oral health education and training by all staff should be highlighted. This is in line with the recommendation by the Malaysian Ministry of Health<sup>22</sup> that emphasised better cooperation and communication between the antenatal healthcare providers and the oral healthcare providers.

The barriers reportedly faced during referral of the pregnant mothers to the dental clinics i.e. time constraints, lack of awareness on the importance of oral health during pregnancy and difficulty to access dental care is concurrent with another study<sup>23</sup> conducted in Hospital Universiti Sains Malaysia in Kelantan, Malaysia. Although the authors identified the barriers based on a questionnaire targeting antenatal mothers and our study investigated healthcare professionals, the findings were similar. This suggests that both the patients and healthcare professionals in the MCHCs encounter identical

barriers in utilisation of oral healthcare for pregnant mothers.

Time constraints faced by the healthcare professionals at the MCHC was found to be a major factor that limits the number of referrals to the dental clinic. The staff at the MCHCs with a higher patient attendance were more prone to attribute time limitations as a barrier to referral. Consequently, other strategies to allow access to oral healthcare by pregnant mothers from busier clinics could be employed rather than depending on the referral system alone. Some studies<sup>11,23</sup> have shown that mothers who received oral health education before their pregnancy and have heard about the possible connection between oral health and pregnancy were significantly more likely to report dental visit during pregnancy. Hence, future strategies can focus on oral health education imparted directly to pregnant mothers rather than heavily relying on the healthcare professionals to refer these patients.

## CONCLUSION

A significant amount of healthcare professionals investigated have limited knowledge on the implications of poor oral health on pregnant mothers and only a small proportion of healthcare professionals involved were aware of the association between periodontal disease and pre-term/ or low birth weight infants. However, most feel that dental check-ups during pregnancy is essential and many do refer pregnant mothers for oral health screening.

The barriers faced during referral of the pregnant mothers to the dental clinics are time constraints especially at clinics with more patient load, lack of knowledge on the importance of oral health during pregnancy and difficulty in accessing dental care. Rather than depending solely on the referral system to channel pregnant mothers to the dental clinic, other means should be explored and employed.

Oral/ dental health continuing education programmes have a significant impact on the knowledge of the healthcare professionals. The knowledge is then positively translated into their practice behaviours. Hence, future efforts should be geared towards education and training of the healthcare professionals on the aforementioned association and on oral health for pregnant mothers in general. This in turn will enable the front liners in the MCHC to educate the pregnant mothers on the importance of oral health during pregnancy and encourage prompt referrals to dental clinics.

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