



## Evaluation of a midwifery initiated oral health-dental service program to improve oral health and birth outcomes for pregnant women: A Multi Centre Randomised Controlled Trial



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### ABSTRACT

**Background:** Oral health care during pregnancy is important for the health of the mother and child. However, pregnant women have limited knowledge about maternal oral health and seldom seek dental care. Further, due to limited training antenatal care providers like midwives rarely discuss oral health with pregnant women. The Midwifery-Initiated Oral Health Dental Service program was developed to address current gaps in oral promotional interventions during pregnancy.

**Objectives:** To assess the effectiveness of a Midwifery-Initiated Oral Health Dental Service program in improving uptake of dental services, oral health knowledge, quality of oral health, oral health status and birth outcomes of pregnant women.

**Design:** Multi-centre randomised controlled trial.

**Setting:** Three large metropolitan public hospitals in Sydney, Australia.

**Participants:** Pregnant women attending their first antenatal appointment who were at least 18 years old and had a single low risk pregnancy between 12 and 20 weeks gestation.

**Methods:** 638 pregnant women were allocated to three groups using block randomisation (n = 211) control group, intervention group 1 (n = 215), intervention group 2 (n = 212) and followed up till birth. Study investigators and data collectors were blinded to group allocation. Intervention group 1 received a midwifery intervention from trained midwives involving oral health education, screening and referrals to existing dental pathways. Intervention group 2 received the midwifery intervention and a dental intervention involving assessment/treatment from cost free local dental services. The control group received oral health information at recruitment. Primary outcome was uptake of dental services. Secondary outcomes included oral health knowledge, quality of oral health, oral health status and birth outcomes.

**Results:** Substantial improvements in the use of dental services (20.2% Control Group; 28.3% Intervention group 1; 87.2% Intervention group 2; Odds Ratio Intervention group 2 vs Control Group = 29.72, 95% CI 15.02–58.53, p < 0.001), women's oral health knowledge (p = 0.03); quality of oral health (p < 0.001) and oral health outcomes (sulcus bleeding, dental plaque, clinical attachment loss, decayed/filled teeth- p < 0.001) were found in Intervention group 2. No difference in the rate of preterm or low-birth weight was found.

**Conclusions:** The Midwifery-Initiated Oral Health Dental Service program (Intervention group 2) improved the

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uptake of dental services and oral health of pregnant women and is recommended during antenatal care. A cause and effect relationship between this intervention and improved birth outcomes was not supported.

### What is already known about the topic?

- Maintaining oral health during pregnancy is important and all pregnant women are recommended to consult a dentist for a check-up early during pregnancy.
- Despite current recommendations pregnant women seldom seek dental care and oral health is rarely discussed during antenatal care.
- There is a significant lag in evidence based oral health promotion interventions for pregnant women.

### What this paper adds

- This is the first randomised controlled trial to assess improvements in the oral health and birth outcomes of pregnant women using a comprehensive oral health promotion program initiated by midwives.
- Our results show that MIOH-DS program can be successfully implemented into midwifery practice and is effective in improving dental services utilisation, oral hygiene, oral health knowledge and quality of oral health of pregnant women.
- The program includes a nationally endorsed oral health training program, evidence based oral health promotional material and a validated oral health screening tool and thus has the potential to be translated to other antenatal care providers.

## 1. Introduction

Inflammatory gum disease, gingivitis or periodontitis (destruction of the supporting teeth structures), are commonly experienced during pregnancy (35–100%), increasing in severity until the 36th week of gestation (Onigbinde et al., 2014). The associated inflammation has been hypothesized as being linked to adverse birth events such as preterm and low birth weight outcomes (Dasanayake and Naftolin, 2016; Papapanou, 2015). In a recent review of epidemiological evidence and clinical trials of oral health interventions during pregnancy, Dasanayake and Naftolin continue to support the association between periodontitis and pregnancy outcomes, although there is recognition of the numerous challenges to conducting trials of this nature (Dasanayake and Naftolin, 2016). A major conclusion of Dasanayake and Naftolin's review was that there is sufficient evidence to 'maintain proper oral health before, during, and after pregnancy regardless of whether it may or may not reduce preterm birth' (p.76). Therefore, although the effectiveness of periodontal treatment on improving birth outcomes has not been confirmed (Chambrone et al., 2011), it is still recommended that all pregnant women should receive oral health education, assessment and referrals to dental services, to minimise any dental infections during this period (Oral Health Care During Pregnancy Expert Workshop, 2012).

Women's oral health during pregnancy is intricately associated with the health consequences for the infant such as the potential for the transfer of streptococcus mutans from mother to child with subsequent development of dental caries (known as early childhood caries), the single most chronic childhood disease worldwide (Leong et al., 2013). Pregnant women in Australia infrequently consult dentists (30–50%) even when they have a dental problem, with the main barriers being the cost of dental care and lack of oral health awareness (George et al., 2013). The low uptake of dental services during pregnancy is common in other countries as well (< 50%) including those with universal dental schemes (Briggs, 2012) like United Kingdom, Turkey and Spain which provide free access to public dental services (Dinas et al., 2007;

Hullah et al., 2008 Martínez-Beneyto et al., 2011; Ozen et al., 2012). There is an identified need for alternate pathways to be provided to raise awareness in women as to the importance of oral health during pregnancy while encouraging dental service use (Vamos et al., 2015).

Maternal health care providers (general practitioners, obstetricians) and midwives in particular are ideally positioned to deliver key health messages to support a healthy pregnancy, while promoting the optimal health behaviours for the mother and the infant (Ten Hoope-Bender et al., 2014; Renfrew et al., 2014). Although there are national policies promoting the inclusion of oral health checks at the initial antenatal visit within Australia (National Health and Medical Research Council, 2013), UK (National Health Service Health Scotland, 2012) and USA (Oral Health Care During Pregnancy Expert Workshop, 2012), both perinatal care providers and dentists remain concerned about taking up this role (George et al., 2016a; George et al., 2017a). A recent survey of perinatal care providers (George et al., 2016a) and dentists (George et al., 2017a) identified misconceptions about the safety of dental interventions during pregnancy even though treatments like extraction and the use of x-rays are safe during this period. Perinatal care providers were aware of the risks of poor oral health and adverse maternal and infant outcomes, but did not feel they had adequate skills to assess oral health (George et al., 2016a).

To address current gaps in perinatal oral health care we developed a unique intervention- the midwifery initiated oral health-dental service (MIOH-DS) program for midwives to acquire competence in oral health care (Johnson et al., 2015). Midwives were chosen for this study as they are the main care providers for pregnant women in Australia and spend more time with childbearing women than any other health professional as well as being highly acceptable to women (Ten Hoope-Bender et al., 2014). The intervention involved midwives providing oral health education and screening to pregnant women at their first antenatal visit and referring them to appropriate dental services. It included evidence based oral health promotional material (Centre for Oral Health Strategy, 2010) for pregnant women along with an oral health training program (George et al., 2016b) and screening tool (George et al., 2016c) for midwives. The program was piloted across one antenatal clinic and we found increased use of dental services (50%) and improved oral health in the pregnant woman ( $P < 0.05$ ) in the intervention versus the control groups (Johnson et al., 2013). Adverse pregnancy outcomes such as preterm or low birth weight were not examined. We now extend this pilot study to a multicentre trial, to confirm these initial findings of improved dental service use and oral health, and also to test the impact of our intervention on pregnancy outcomes (Johnson et al., 2015).

The aim of this study was to conduct a multicentre trial of the MIOH-DS program and determine its effectiveness in improving the uptake of dental services (primary outcome), oral health knowledge, quality of oral health and oral health status of pregnant women. In addition, any differences in the rates of preterm or low birthweight outcomes will be examined.

## 2. Methods

### 2.1. Study design

A three arm, multicentre, randomised controlled trial (RCT) was designed to evaluate the MIOH-DS program. The trial was undertaken across three large metropolitan public hospitals in Sydney, New South Wales (NSW), Australia and involved two intervention groups and one control group. Detailed information about the trial design is outlined in

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