# INCREASING THE PERCENTAGE OF ANTENATAL MOTHERS WITH ORALLY FIT STATUS IN TENGKERA DENTAL CLINIC, MELAKA TENGAH DISTRICT

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## Abstract

Preventive, diagnostic and restorative dental treatments are safe to perform throughout pregnancy and are proven effective in improving and maintaining oral health. Despite being one of Malaysia's target groups for oral healthcare, the percentage of antenatal mothers achieving orally fit status remains low. A verification study was carried out from August 2018 to January 2019 to establish the baseline percentage of orally fit antenatal mothers and explore its possible contributing factors using structured questionnaires. This study aimed to increase the percentage of orally fit antenatal mothers in Tengkera Dental Clinic from 26.6% to at least 45% within two years. The contributing factors identified included a lack of committed dental practitioners, a lack of knowledge among dental officers, time constraints in completing all required treatments within the given time and a poor follow-up system. The remedial measures implemented from February 2019 until January 2021 incorporated continuous dental education (CDE) sessions, the formation of a dedicated team to ensure systematic follow-up, a referral letter system to address patients' logistic issues or their clinic preferences in getting treatment done and a WhatsApp BlueStacks application to ease and reinforce the follow-up process. Due to the COVID-19 pandemic amid this study, work processes were modified, and specific appointment slots were made to encourage dental appointment attendance while adhering to the new norms. This study shown an increase in the percentage of antenatal mother with orally fit status from 26.6% to 46.4% in Cycle 1, which gradually increased to 47.9% in Cycle 2 and 57.5% in Cycle 3, exceeding the standard set at 45%. These comprehensive multimodal interventional measures effectively increased the dental attendance of antenatal mothers and fostered the development of a local procedural guideline in Tengkera Dental Clinic to ensure continuous good oral health care services among antenatal mothers.

**KEYWORDS**: Antenatal mother, Orally fit, Dental attendance, Quality improvement study.

## Problem

Good oral health is fundamental to the overall health and quality of life of pregnant women. Oral health care during pregnancy is often avoided and misunderstood as harmful by physicians, dentists and patients, despite evidence-based practice guidelines suggesting otherwise (1). Preventive, diagnostic and restorative dental treatments are safe throughout pregnancy and are proven effective in improving and maintaining oral health (2). Failure to maintain good oral health could result in periodontal diseases, increasing the risks of pre-eclampsia, preterm birth and low-birth-weight infants (1).

In Malaysia, multiple efforts were made to increase the dental attendance of antenatal mothers through referrals from the Maternal and Child Health (MCH) Clinics as part of the antenatal programme. This ensured that mothers who are considered agents of change would receive the essential oral health awareness and treatment to render them orally fit. Under this programme, oral treatments for antenatal mothers who are one of the target groups for oral healthcare, are rendered free in all public health clinics (3). However, the uptake of oral health care services among antenatal mothers remains unsatisfactory. According to the data published in 2018 by the Ministry of Health (MOH) Malaysia, only 47% of antenatal mothers who attended MCH Clinics had utilised oral health care services (4).

Tengkera Dental Clinic is a public dental clinic located within Tengkera Health Clinic premises, near the city centre in the Melaka Tengah district. According to a report published in 2018, it covers a population of 583 antenatal mothers (4). It consists of one dental restorative specialist, ten primary care dental officers, three dental nurses and six dental assistants. Four of the five dental treatment rooms available in Tengkera Dental Clinic are allocated for primary care, while one room is utilised by the dental specialist for specialised/ complicated treatments. Upon completing medical screening and follow-up in the MCH Clinic, patients will be directed to the dental team for dental check-ups and referrals for those requiring dental treatment. The primary care dental officers handle procedures such as dental restoration, scaling, simple extraction and simple root canal treatment. Certain complex cases are referred to the relevant procedure-based dental specialists. Although various efforts were implemented to improve the oral fitness of antenatal mothers, many were still presenting with oral diseases.

No national data was available on the prevalence of pregnant mothers with orally fit status. Preliminary data collected from August 2018 to January 2019 showed that only 23.7% of pregnant mothers were found to be orally fit in the state of Melaka, with 20.9% in the Melaka Tengah district. Based on the data, out of the nine public dental clinics in the Melaka Tengah district, Tengkera Dental Clinic had a prevalence of 26.6% of orally fit pregnant mothers, still below the initially set standard of 30% by the local authority. Furthermore, the Melaka State Dental Health Division revised the target to at least 45% in early 2019, which applied to all districts within Melaka.

## Background

According to the expert consensus statement from Washington, it was concluded that dental care is both safe and effective throughout pregnancy, and women should continue receiving oral treatment during their pregnancy (5). It was also reported that antenatal mothers and all women, even those with healthy periodontium, whether before, during or after pregnancy, are recommended for routine dental assessments, as maintenance of good oral health is crucial (6).

A survey involving 781 pregnant women was carried out in Hong Kong, and only about one-third of the respondents perceived their oral health to be good. Self-reported dental visits were merely 16%, despite the presence of oral problems (7). Various studies from different countries have also reported a similar finding of low utilisation of dental care during pregnancy, which ranged from 27% to 53% (6,8-11).

According to previous studies,

the common contributing factors to low oral health care service utilisation among antenatal mothers included being unaware of the presence of oral health problems, long waiting time to get dental treatments, financial barriers, fear of dental procedures, and negative attitudes towards both the oral health care services available in general as well as dental care utilisation during pregnancy (12-15). Additionally, both dentists and antenatal mothers were found to be unsure of the safety of dental treatment during pregnancy, leading to their reluctance to provide and receive dental care (7,8,12-15).

Globally, numerous efforts have been introduced to promote oral health care to mothers and their children. To achieve desired outcomes from such health promotion, they should be carried out effectively at different levels across the socio-ecological system. This includes the intrapersonal level (attitude, beliefs, self-efficacy), interpersonal level (social norms, patient-provider communication), organisational level (prenatal and oral health clinics), community level (social and physical environmental barriers to prenatal oral health information and services) and societal level (health care access and reimbursement policies) (16).

At intrapersonal and interpersonal levels, several preventive measures, including fluoride varnish applications, mouth rinses with 0.12% chlorhexidine gluconate and professional oral hygiene, have been introduced and have significantly reduced dental caries by 56.58% and plaque score from 1.48 to 0.94 (17). At the organisational, community and societal levels, system-wide policy changes were introduced to improve inter-professional collaboration, such as explicit recommendations for prenatal oral health care from medical providers, effective mediation by social workers and implementation of recommended universal practice guidelines for community dental providers. Also, mobile applications and social media were used as innovative entry points, which improved the utilisation of prenatal oral health care (18).

In Florida, health promotion targeting the interpersonal and organisational levels was conducted among all pregnant mothers, including those in the postpartum period, through oral health discussions on the safety of dental procedures. Pregnant mothers were advised that early treatment of oral diseases is essential as delaying the treatment may lead to a more complex problem. Besides, obstetricians may also refer patients for oral health care with written recommendations or through calls (19). These strategies significantly improved the dental attendance of antenatal mothers, from 39% in 2009 to 55.2% in 2015 (20).

## Measurement

This study measured the percentage of orally fit antenatal mothers based on the screening by dental officers in Tengkera Dental Clinic. An antenatal mother refers to a woman who carries a developing embryo or foetus within her body, usually about 40 weeks or over nine months, as measured from the last menstrual period up to delivery (21). All antenatal mothers attending clinic appointments at Tengkera Health Clinic, who consented to dental assessments, were recruited for this study. According to the Oral Health Division, MOH Malaysia, a person is defined to be orally fit when all necessary dental treatments are completed (22). Although the definition of the term “orally fit” was adopted from the MOH guidelines of Key Performance Indicators for school children, the same definition can also be applied in the context of assessing the oral fitness of antenatal mothers. The process of dental screening and assessing for dental fitness encompasses examining each tooth and the oral soft tissue and recording the findings accordingly.

Data from the Health Management Information System (HMIS) was used to calculate the percentage of antenatal mothers who were orally fit. The formula used to calculate the indicator used for this study is as follows:

$$\text{Percentage of antenatal mothers with orally fit status} = \frac{\text{Number of antenatal mothers who are orally fit}}{\text{Total number of antenatal mothers screened by dental officers}} \times 100\%$$

The indicator, i.e., the percentage of antenatal mothers with orally fit status, and its calculation formula were adopted from the measurement method proposed by the Oral Health Division, MOH Malaysia, which provided a clear representation of the study outcome (3,4). The standard for this study was to achieve 45% of antenatal mothers with orally fit status, following the standard of the Key Performance Indicator set by the Melaka State Dental Health Division.

The data collected from the HMIS during the verification study from August 2018 to January 2019 revealed that only 26.6% of antenatal mothers in Tengkera Health Clinic were orally fit. Following the verification study, the implementation of strategies for change started from February 2019 to January 2021, with the re-evaluations to assess the effectiveness of the strategies implemented being conducted concurrently and reported every 6 months (in total 4 times) till January 2021.

## Initial Assessment of the Problem

The existing process of care related to operational procedures was reviewed and outlined. The process of care was divided into three phases: pre-dental assessment, during the dental assessment and post-dental assessment, with critical steps identified in each of these phases (refer to Figure 1).

Upon reviewing these critical steps, the problem was analysed to understand the possible contributing factors to the low percentage of antenatal mothers with orally fit status. The contributing factors identified were (i) a lack of committed dental practitioners, (ii) a lack of knowledge among dental officers, (iii) time constraints in completing all required treatment within the given time and (iv) a poor follow-up system.

A closed-ended online self-administered survey via Google Form was distributed among the dental practitioners in Melaka (n=97) to determine the magnitude of the identified contributing factors. The questionnaire consisted of four domains representing the four identified contributing factors, with a total of eight multiple-choice questions: three under factor (i), two under factor (ii), one under factor (iii) and two under factor (iv).

Regarding the factor of a lack of committed dental practitioners, 53.6% of the respondents were unclear about the national oral health Key Performance Indicator related to antenatal mothers, and 30.9% were unaware of the current percentage of antenatal mothers with orally fit status at their clinics. A total of 50.5% of dental practitioners self-perceived themselves as lacking soft skills to counsel antenatal mothers. For the factor of a lack of knowledge among dental officers, being unsure of the safety of dental treatment on antenatal mothers was rated as the highest at 92.8%, while 10.3% of the respondents reported that they were uncertain of the safety of dental screening during pregnancy, which indirectly affected their confidence when managing such cases. For the domain of time management, 45.5% of the respondents agreed that the complexity of treatment contributed to the time constraints in completing all required dental treatments within the given time. 61.9% of the respondents felt that the current follow-up system was inefficient and that there was also no proper referral system.

## Strategy

Several strategies were identified to address the contributing factors to the low percentage of antenatal mothers with orally fit status in Tengkera Dental Clinic. These strategies were implemented over three cycles, from February 2019 to January 2021.

Plan-Do-Study-Act (PDSA) Cycle 1: First, a one-hour Continuous Dental Education (CDE) session was organised for the dental officers in Tengkera Dental Clinic. Before the CDE session was conducted, a pre-

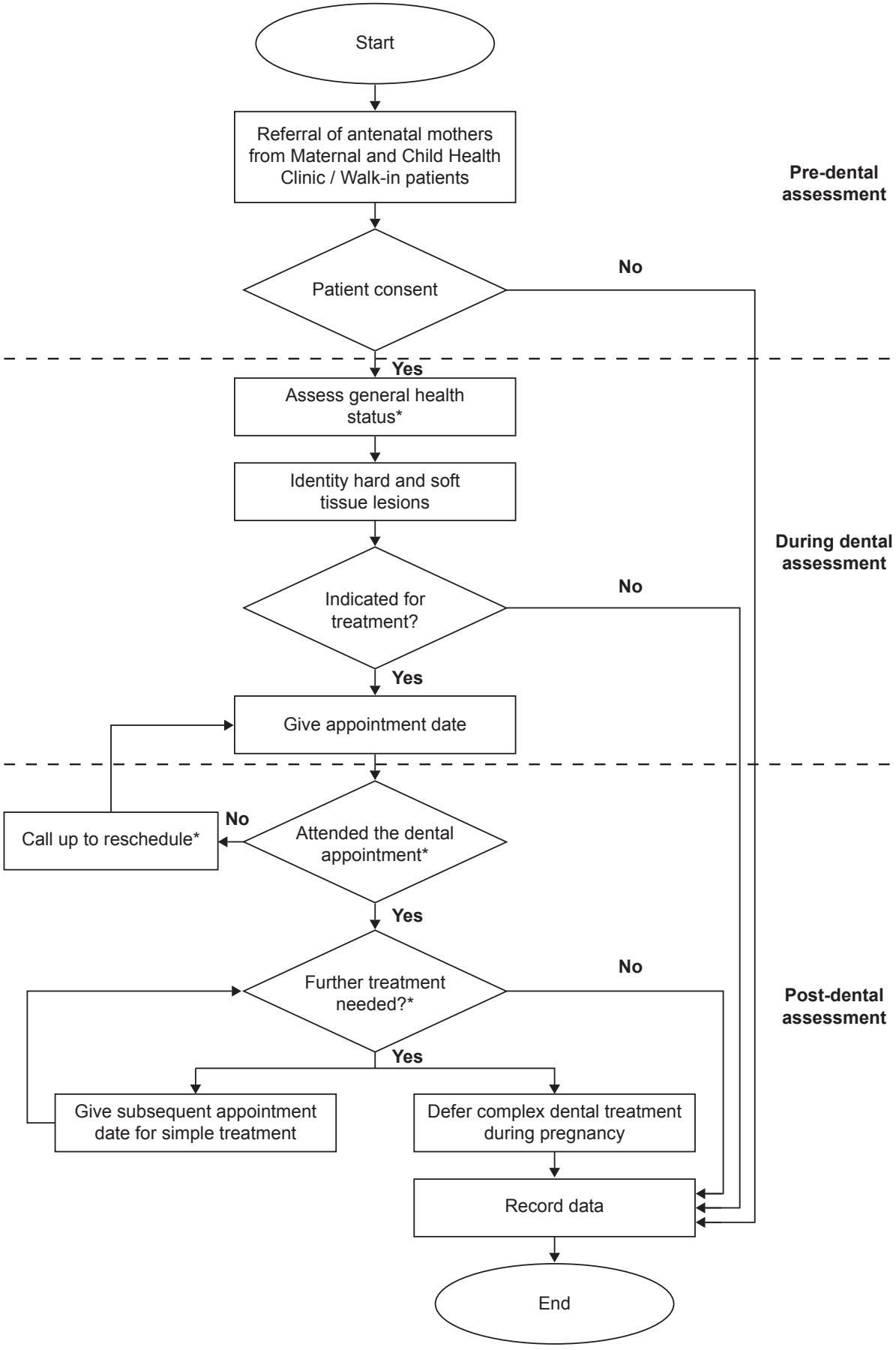



**Figure 1:** Process of care of operational procedures for oral health assessment and management (* indicates critical steps)

assessment with multiple-choice questions was conducted to evaluate the dental officers' baseline knowledge on (i) Part 1: the target standard for antenatal mothers with orally fit status, (ii) Part 2: the latest percentage of antenatal mothers with orally fit status in Tengkera Dental Clinic, (iii) Part 3, 4 and 5: the safety to perform dental screening and treatment for antenatal mothers, as well as the perceived confidence level in persuading antenatal mothers to go for dental treatment. Each part of the assessment was evaluated separately, with dental officers being graded "good" for each correct answer chosen in Parts 1 and 2 and the answer "Yes" in Parts 3, 4 and 5. They were graded "poor" for the wrong answer selected in Parts 1 and 2 and the answer "No" or "Not sure" in Parts 3, 4 and 5.

During the CDE session, information on the latest proposed standard for antenatal mothers with orally fit status, the current percentage of antenatal mothers with orally fit status in the clinic (both yearly and monthly data), as well as the latest update on the dental management guidelines for antenatal mothers were shared as reminders to the dental officers. CDE sessions were conducted every six months. The same assessment was performed after each CDE session as a post-assessment to evaluate their understanding of the session.

A subsequent monthly update on the percentage of antenatal mothers with orally fit status in the clinic was posted in a WhatsApp group created for dental officers as a reinforcement. The CDE sessions and WhatsApp group were created to counteract the knowledge gap among the dental officers, keeping them updated with current evidence and strengthening their commitment in managing antenatal mothers.

Secondly, a follow-up system was implemented to establish a systematic process and to encourage dental appointment attendance. Using this system, every dental officer assigned to the MCH department was required to screen antenatal mothers. The particulars of the screened antenatal mothers were recorded in a digital database and divided among the ten dental officers in Tengkera Dental Clinic. The assigned dental officer was responsible for calling the antenatal mothers under their care to arrange for their required dental treatment.

Besides the follow-up system, a referral letter system was also developed to address logistical issues. For patients who had another preferred clinic, a referral letter that included a dental referral form and a reply form was given to the patient. The patient was required to return the reply form to the dental officer on duty during her monthly check-ups at the MCH Clinic, which contained the details of the particular tooth that was treated and the dental clinic in which the treatment was performed. To keep track of the status of the referral letters issued, the dates of issuance of the referral letters and the dates on the returned reply forms were recorded in the same Excel database. However, a low return rate of the reply form was noted in this study.

In addition, a WhatsApp BlueStacks application, which is an Android emulator, was used in this study to ease and reinforce the follow-up process. This enabled the use of the application on a desktop computer without having to use a smartphone. Hence, it facilitated interaction with patients and further improved the effectiveness of dental appointment reminders. This application was also used to circulate promotional tools, such as videos or poster infographics. Nonetheless, a phone call reminder was still provided for antenatal mothers without access to the Internet, smartphone or computer.

PDSA Cycle 2: In Cycle 2, another intervention was introduced to adapt to service restrictions following the Coronavirus disease 2019 (COVID-19) outbreak in February 2020 to ensure the continuation of dental services to pregnant mothers. The dental appointment attendance of antenatal mothers to the clinic decreased during the COVID-19 pandemic as they were apprehensive of the infection risk. After a comprehensive discussion, it was decided that specific appointment slots would be allocated for pregnant mothers

with treatment needs, which was set for every Friday morning. The dental officers were strongly encouraged to complete all the treatments needed within that single allocated slot to prevent repeated clinic visits. However, if multiple types of treatments for one person (e.g., tooth restoration, tooth extraction and scaling) or a single type of treatment that involved multiple teeth (i.e., restoration of more than five teeth) were indicated, a subsequent appointment was arranged. The remaining pending treatment (if any) was updated in the database and followed up by the dental officer-in-charge.

PDSA Cycle 3: The interventions carried out in Cycle 1 and Cycle 2 continued to be monitored, evaluated and measured in Cycle 3 to ascertain sustainability. No further interventions were introduced during this cycle.

## Results

The remedial actions implemented from February 2019 to January 2021 showed an increased percentage of antenatal mothers with orally fit status in Tengkera Dental Clinic from the baseline of 26.6% to 46.4% in Cycle 1, gradually increasing to 47.9% in Cycle 2 to a further 57.5% in Cycle 3 (refer to Figure 2). All three cycles had surpassed the set standard of 45%.

In this study, data was obtained from the HMIS system which is specifically designed and used as a routine transaction tool for patients who attended health facilities in Melaka; hence, there was no missing data.

Through the implementation of CDE, a significant increment was seen in the level of self-perceived confidence in persuading antenatal mothers to go for dental treatment (refer to Table 1), leading to improvement in assessing the general health status of the antenatal mothers, as reflected in Table 2. This was important because the step of assessing the general health status was the first step of contact with the antenatal mothers. Additionally, the dental officers were observed to have increased knowledge of the standard set for orally fit antenatal mothers and the monthly percentage of antenatal mothers with orally fit status in Tengkera Dental Clinic.

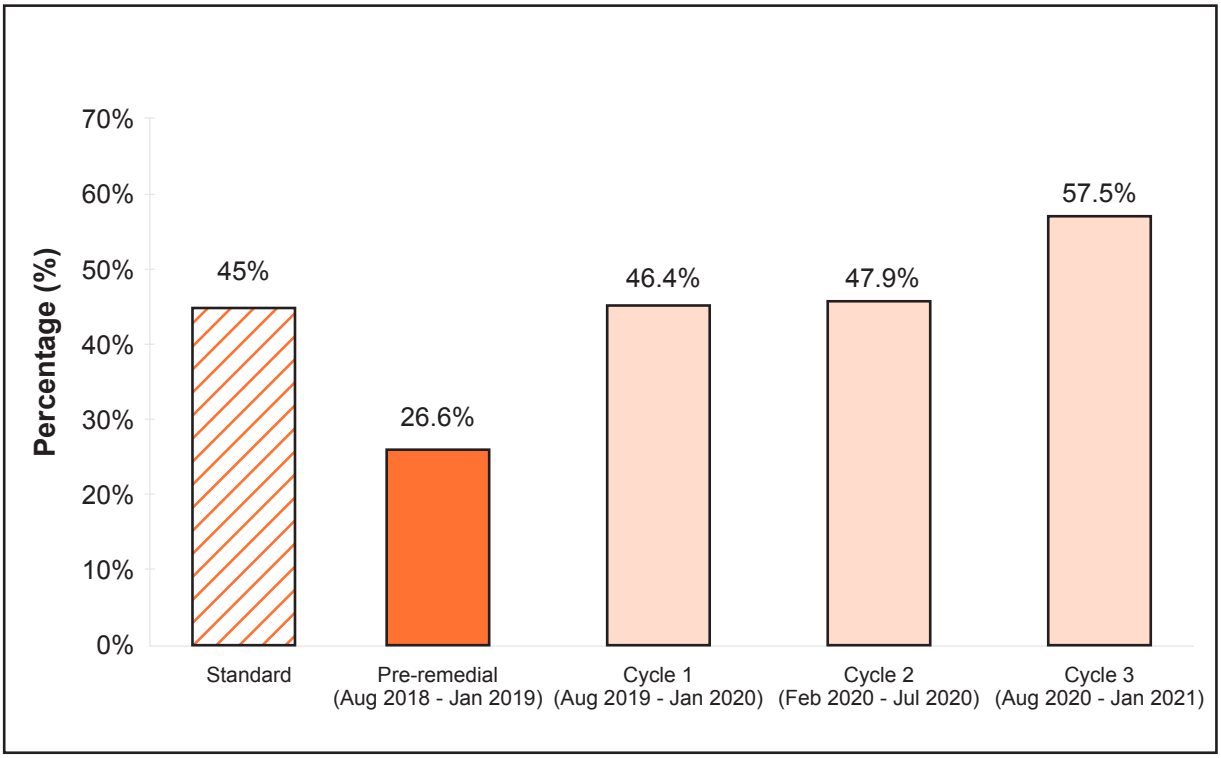



**Figure 2:** Percentage of antenatal mothers with orally fit status in Tengkera Dental Clinic

**Table 1:** Dental officer assessments in Tengkera Dental Clinic

| Criteria | | Pre-CDE | | Post-CDE Cycle 1 | | Post-CDE Cycle 2 | | Post-CDE Cycle 3 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Good | Poor | Good | Poor | Good | Poor | Good | Poor |
| Knowledge of the target standard of antenatal mothers with orally fit status | | 60% | 40% | 100% | 0% | 100% | 0% | 100% | 0% |
| Awareness of the current monthly percentage of antenatal mothers with orally fit status in the clinic | | 50% | 50% | 100% | 0% | 100% | 0% | 100% | 0% |
| Level of self-perceived confidence in persuading antenatal mothers to go for dental treatment | | 40% | 60% | 90% | 10% | 90% | 10% | 100% | 0% |
| Knowledge on | Safety to perform dental screening during pregnancy | 90% | 10% | 100% | 0% | 100% | 0% | 100% | 0% |
| | Safety to perform dental treatment during pregnancy | 80% | 20% | 90% | 10% | 100% | 0% | 100% | 0% |

**Table 2:** Model of Good Care on dental treatment among antenatal mothers in Tengkera Dental Clinic

| Critical step | Criteria | Standard | Pre-remedial (Aug 2018 - Jan 2019) | Cycle 1 (Aug 2019 – Jan 2020) | Cycle 2 (Jan - Jul 2020 | Cycle 3 (Aug 2020 - Jan 2021) |
|---|---|---|---|---|---|---|
| Assess general health status | • Assess the medical history and the willingness of the patient to commit to dental treatment<br>• Encourage patients for dental treatment, especially during the early stage of oral diseases, to prevent complex dental treatment (if any)<br>• Provide oral health education concurrently | 100% | 20.7% | 76.3% | 78.5% | 60.7% |
| Attended the dental appointment | • Call patients as a reminder a day before the appointment<br>• Patients turn up for their appointment | 100% | 9.8% | 47.6% | 62% | 69.2% |
| Call up to reschedule | • Call patients to reschedule if they failed to attend their appointment to ensure a continuous follow-up process | 100% | 18.2% | 28.7% | 52.4% | 73.6% |
| Further treatment needed | • Complete all the required treatments in a single visit<br>• Arrange another appointment date for the patient if all the treatment needed cannot be attended to in a single visit and further simple treatment is needed (filling, scaling) | 0% (Due to the COVID-19 case surge, dental officers were required to attempt to complete all the treatment needs in a single setting to avoid repeated dental visits, hence, a standard of 0% for patients needing further treatment.) | 15% | 7.1% | 4.8% | 1.8% |

As shown in Table 2, only 20.7% of antenatal mothers agreed to be assessed and received oral health education in the pre-remedial phase. After the implementation of remedial actions, the percentage increased to 76.3% in Cycle 1 and 78.5% in Cycle 2. However, the percentage decreased to 60.7% in Cycle 3 due to the unexpected challenge of the COVID-19 pandemic which caused fewer antenatal mothers to present to the dental clinic for the first time for their initial dental screening.

Nevertheless, there was a sustainable improvement in the dental appointment attendance of antenatal mothers who agreed to be given appointments after their initial screening, during which they were identified to require dental treatment. It had improved from a mere 9.8% in the pre-remedial phase to 47.6% in Cycle 1, to 62% in Cycle 2 and finally up to 69.2% in Cycle 3. This improvement was the fruit of the effort from the dental officers in reminding and rescheduling appointments, in addition to the efficient reinforcement of follow-up appointments with the usage of the WhatsApp BlueStacks application.

With the surge of COVID-19 cases, specific appointment slots were arranged for antenatal mothers. Repeated clinic visits were avoided by completing all dental treatments required in a single visit, whenever possible, to reduce the risk of exposure to COVID-19. Moreover, the dental officers with good knowledge and soft skills enabled the timely detection of dental diseases and treatment at an earlier stage, hence, reducing the need for complex treatments such as minor oral surgery and root canal treatments thereby reducing the percentage of the deferment of complex dental treatments.

## Lessons and Limitations

It was evident from this study that a proper management system and standardisation of dental treatment procedures for antenatal mothers were crucial to render them orally fit. The assembly of a dedicated team with unwavering commitment from the dental fraternity encouraged strong communication, which was the foundation for the success in exceeding the target set for this study.

However, this study did face several limitations. For instance, complex dental treatments that needed to be deferred, such as minor oral surgery, root canal treatment or any treatments involving X-rays, were among the challenges encountered. These complex procedures often require prolonged treatment durations, may need a prescription of drugs with potential teratogenicity and may involve the use of X-rays, which patients are usually hesitant to do despite safety precautions. Other than that, certain complicated dental treatments could not be carried out, for example, those that were beyond the capabilities of the primer clinic and required a dental specialist.

The study findings suggested that most interventions implemented were effective, except for the referral letter system. The setback of the referral system was the low return rate of the reply form, possibly due to the lack of time and logistic difficulties in returning the reply form. However, this strategy may be improvised in the future by establishing a proper digital platform or email system.

An unanticipated challenge faced amid this study was the COVID-19 pandemic. The pandemic caused reluctance among some antenatal mothers to attend dental treatment due to the fear of the risk of transmission of the virus as a result of the aerosol and splatter produced during dental drilling, which is commonly contaminated with bacteria, viruses, fungi and blood. In this regard, dental officers played a crucial role in educating and convincing the antenatal mothers that such Aerosol Generating Procedures would be performed using full Personal Protective Equipment, hence, significantly reducing the risk of transmission.

Antenatal mothers themselves also played a pivotal role in this study. Despite the multiple interventions carried out to address the issues of healthcare workers and the system, there were still some persistent limitations

attributed to the individual cooperation, perspective and attitude of antenatal mothers towards dental care.

## Conclusion and the Next Steps

The success of this study prompted the development and implementation of a local procedural guideline in the routine workflow for dental care among antenatal mothers. The guideline incorporates the interventional strategies adopted in this study, i.e., the CDE program, the improved follow-up system, the referral letter system, the WhatsApp BlueStacks application and the allocation of specific appointment slots for antenatal mothers. A possible indirect advantage of these strategies is that the costs for oral health care, in general, may be reduced as major procedures can be avoided through early recognition and treatment of oral diseases.

In addition to the common contributing factors identified in our literature review, this study revealed additional factors specific to the local setting, i.e., the lack of a proper follow-up system and also a referral system between dental clinics. To counteract the mentioned contributing factors, the systematic follow-up process proposed in our study was a success. However, the referral system implemented showed an unfavourable result. An established digital platform or an email system can be considered and developed in the future to replace the use of physical referral letters to improve the return rate of the referral letter. A paperless process would be more cost-effective and environmentally friendly.

Given the promising results, it would be beneficial for the knowledge gained and strategies implemented in this study to be shared and adopted among the dental clinics in the state. We recommend assigning a dental officer as the coordinator in each public dental clinic to ensure the sustainability, standardisation of the implementation as well as conduct regular performance audits of the study project. Nevertheless, the success in replicating this study will depend on the allocation of dental treatment rooms and dental officers in respective clinics. We also suggest that the Melaka State Dental Health Department periodically reassess and revise the standard for antenatal mothers with orally fit status.

In the future, we suggest a similar study to be carried out with a focus on the efficiency of the enforcement of guidelines proposed by the MOH Malaysia, which states that all pregnant women attending MCH Clinics for antenatal care should be referred to a dental clinic for oral health examination and education (3). Proper enforcement will encourage the cooperation and compliance of antenatal mothers towards dental care.

## Acknowledgements

The authors would like to express gratitude to the Director-General of Health Malaysia for his permission to publish this article. Our sincere thanks to Dr. Nurul Ashikin Binti Husin and Dr. Quake Puay Tin for their patient guidance, enthusiastic encouragement and constructive critiques throughout this study. Last but not least, to those who had indirectly contributed to this research, their assistance and involvement are immensely appreciated.

## Conflict of interest

The authors declare that there was no conflict of interest

## Funding

This study received no specific grants from any funding agencies from the public, commercial or non-profit sectors.

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