IMPROVING THE PERCENTAGE OF COMPLETE FLUORIDE VARNISH APPLICATION AMONG TODDLERS: A QUALITY IMPROVEMENT STUDY AT RAUB DENTAL CLINIC, PAHANG

Nur Raihana Abd Razak[1], Farrah Iffadzillah Md Zeni[2]

[1]Klinik Pergigian Karak, Pejabat Kesihatan Pergigian Daerah Bentong, Pahang

[2]Pejabat Kesihatan Pergigian Daerah Raub, Pahang

Corresponding Author: Nur Raihana Abd Razak
Email: nurraihana93@gmail.com

Abstract

Fluoride varnish application (FVA) is applied to prevent dental caries among toddlers. An incomplete FVA may pose a higher risk of early childhood caries, causing severe pain and leading to weight loss and malnutrition. However, the percentage of complete FVA in the Raub Dental Clinic was low. The indicator used was the percentage of complete FVA among toddlers, with a standard of ≥30%. A complete FVA is defined as receiving four FVAs within two years. A quality improvement study was conducted from February 2020 to December 2023. Study instruments include a self-administered questionnaire for dental operators and parents, a dental observation form, and a review of the dental treatment card. The pre-remedial study showed that 12% of toddlers received complete FVA. The causes included inefficient recall system (57%), uncooperative children (57%), lack of parental awareness (55%) and support (44%), poor anticipatory guidance (48%), lack of commitment from operators in treating toddlers (46%), and unreachable parents' contact numbers (33%). Strategies implemented include a tailored toddler's follow-up book, custom FVA stickers, and a recall system through the WhatsApp Business application. Checklists, dental puppets, and reinforced education for operators were used to improve anticipatory guidance (AG). Parental education sessions and *Hari Anakku* were conducted regularly to enhance parental awareness. The active promotion was delivered via the clinic's Facebook page, flyers, and video sharing. Behavioural management techniques were reinforced for toddlers with post-treatment rewards. The percentage of complete FVA among toddlers increased from 12% to 19% in Cycle 1, then improved to 24% in Cycle 2, 33% in Cycle 3, and 43% in Cycle 4, exceeding the standard set at 30%. We successfully enhanced our recall system, the operator's commitment to the FVA programme, and parental awareness. We aim to continually sustain our strategies to ensure the provision of continuous good oral health care services to toddlers.

KEYWORDS: Fluoride varnish application; Early childhood caries; Caries prevention; Toddlers; Quality improvement study

Problem

Fluoride varnish application (FVA) is a community-based caries prevention programme for toddlers, introduced in 2009 under the initiative "*Program Anak Angkat Pergigian Toddler: Manjaku Ceria, Keluargaku Bahagia*". This initiative was piloted in 2011 under the Oral Health Programme in Sabah, Kelantan, and Terengganu (1). FVA is a professionally applied topical fluoride recommended for controlling and preventing dental caries in toddlers (2). It complements other fluoride sources, such as fluoridated water and toothpaste (3). A study has shown that FVA can help prevent or arrest caries formation on enamel surfaces in both primary and permanent teeth, especially in toddlers with early childhood caries (ECC) (4). The American Dental Association recommends applying fluoride varnishes every six months for moderate-to-high-risk populations (5), including toddlers in non-fluoridated communities or those from low socioeconomic backgrounds (6). For effective caries prevention, at least four applications every six months are necessary (2). A verification study carried out in 2019 at Raub Dental Clinic showed that only 12% (n=61/508) of toddlers received the complete applications of fluoride varnishes within two years. The District Specific Approach (DSA) 2020 standard in Pahang targets ≥30% of toddlers receiving four FVA. Thus, this problem must be addressed to ensure toddlers receive the complete course of FVA for them to gain the anticaries benefits on both primary and permanent teeth later.

Raub Dental Clinic is the main dental clinic of seven primary dental clinics in the Raub District, under the Pahang State Oral Health Division. It is equipped with five Dental Chair Cum Units (DCCUs) designated for primary dental care services. During the study period, the clinic had 21 primary care dental officers and 16 dental therapists. It provides dental services to various target groups, including toddlers, preschoolers, primary and secondary school students, antenatal mothers, adults, children with special needs, and senior citizens. The dental officers and therapists are responsible for procedures such as dental examination and treatments, FVA, and providing anticipatory guidance to parents for toddlers. According to an annual report published in 2020, Raub District had a toddler population of 1,928, with Raub Dental Clinic covering approximately 50% of the population (7). Water fluoridation in Pahang was discontinued in July 2012 following the privatisation of public water treatment services (8). In response, the FVA programme was strengthened to ensure each toddler received four applications every six months over a two-year period.

The Ministry of Health Malaysia defines toddlers as children aged four and below. According to Pahang's DSA 2020, toddlers should receive four FVA, given every six months, to complete the full course (9). After each application, anticipatory guidance (AG) is given to parents, a process of providing practical and health information to help them understand and know what to expect during the child's development (10). Parents play a critical role in their toddlers' oral hygiene as their knowledge, attitude, and awareness significantly influence oral healthcare outcomes. Fear of the dental environment and lack of cooperation from toddlers can further complicate FVA completion. Meanwhile, a team of dental operators which consists of dental officers and therapists are also crucial in the efforts towards improvement of toddlers' oral health. However, inconvenient schedule arrangements among dental operators and a poor follow-up system were among the factors that contributed to the problem of a high percentage of incomplete FVA among toddlers in the Raub Dental Clinic.

This quality improvement study was conducted to better understand the current problem, by identifying the possible contributing factors, and implementing remedial actions to increase the percentage of complete FVA among toddlers in Raub Dental Clinic from 12% to a standard set at ≥30%.

Background

Dental caries in primary teeth is a serious oral health concern in children. It is one of the most common non-communicable diseases in children worldwide and often remains untreated (12), with up to 510

million cases reported in 2019 (13). Two or more applications of fluoride varnish per year have been shown to be effective in preventing caries, particularly in high-risk populations such as toddlers in Raub (14). A study by Buckingham et al. in the United Kingdom reported that 29.9% (n=176) of children aged three to seven years did not receive two fluoride varnish applications per year (11).

Barriers to dental care include a poorly distributed dental workforce as well as diverse patient-related factors (15). A study by Manski et al. found that only 25% of dental hygienists use fluoride varnish as a caries control measure when treating ECC (16). During dental examinations, managing toddlers' behaviour is essential, as dental anxiety and fear of dental treatment have long been recognised as major challenges in paediatric patient management (17). A study by Almehmadi et al. reported that 66.2% (n=264) of parents had never heard about fluoride varnish, and among those who knew, only 32.6% (n=130) understood the effect of its application in enhancing tooth resistance to caries (18). In addition, only 19.5% (n=78) of parents knew that FVA required a visit every six months (18). However, a pilot study conducted in Malaysia reported that 82.3% of parents acknowledged the importance of primary teeth in the child's overall health and development. Despite this awareness, 31.3% of parents believed that there was no need for follow-up dental visits once their child's complaints were addressed, and 10.4% admitted to using force to bring their child to the dental clinic (19).

Several behavioural management techniques are employed in paediatric dentistry. One of the common methods is the tell-show-do technique, which involves verbally explaining the procedure and then demonstrating its visual, auditory, and tactile aspects before performing it. Another technique is modelling, which is a process of acquiring behaviour, where children learn from observing others, such as older siblings undergoing dental treatment (17). Observing a peer successfully complete dental treatment can effectively reduce a child's dental anxiety and fear (17).

A study in Manitoba, Canada, reported that hands-on activities, visual aids, and personal interactions such as puppet shows, 'lifting the lip' activities, as well as video and poster presentations were effective in communicating oral health information to parents and families (20). Moreover, exposing children to the dental environment at an early age may help them adapt and improve their behaviour and tolerance during future dental visits (19). Parents and family members, as the primary sources of child-rearing and health-related knowledge, play an essential role in shaping long-term oral health behaviours in children (21).

Measurement

This quality improvement study was conducted by three dental officers, eight dental therapists, and two dental surgery assistants at Raub Dental Clinic. It was carried out over four cycles from February 2020 to December 2023, using a convenience sampling method. The general objective of this project was to increase the percentage of toddlers receiving complete FVA at Raub Dental Clinic. The specific objectives included identifying contributing factors associated with a high percentage of incomplete FVA among toddlers, implementing remedial actions that address these contributing factors and evaluating the effectiveness of the remedial actions taken.

The indicator used in this project was the percentage of toddlers with complete FVA. The calculation formula for the indicator:

$$\textit{Percentage of toddlers with complete FVA} = \frac{\textit{Total number of toddlers with complete FVA}}{\textit{Total number of toddlers who need FVA}} \times 100$$

The target standard was to achieve ≥30% completion, based on the District-Specific Approach set by Pahang State Dental Health Division. Data were collected from the Fluoride Varnish Form (FV3) for the years 2019 to 2023. A verification study conducted from January to December 2019 revealed that only 12% of toddlers had completed the full FVA course. The inclusion criteria included toddlers registered under

Raub Dental Clinic who received subsequent FVA at six-month intervals. Exclusion criteria were toddlers with asthma, ulcerative gingivitis/stomatitis, other known allergies, toddlers with special needs, and those who received care at other facilities such as *Klinik Desa* or *Taska*. The number of toddlers involved in each cycle was: Cycle 1 with 199 toddlers; Cycle 2 with 553 toddlers; Cycle 3 with 128 toddlers and Cycle 4, with 133 toddlers.

Initial Assessment of the Problem

The existing process of care related to operational procedures was reviewed and outlined (Figure 1). The process of care was divided into three phases: pre-dental assessment, during the dental assessment and post-dental assessment. Three critical steps were identified and listed in the Model of Good Care (Table 1).

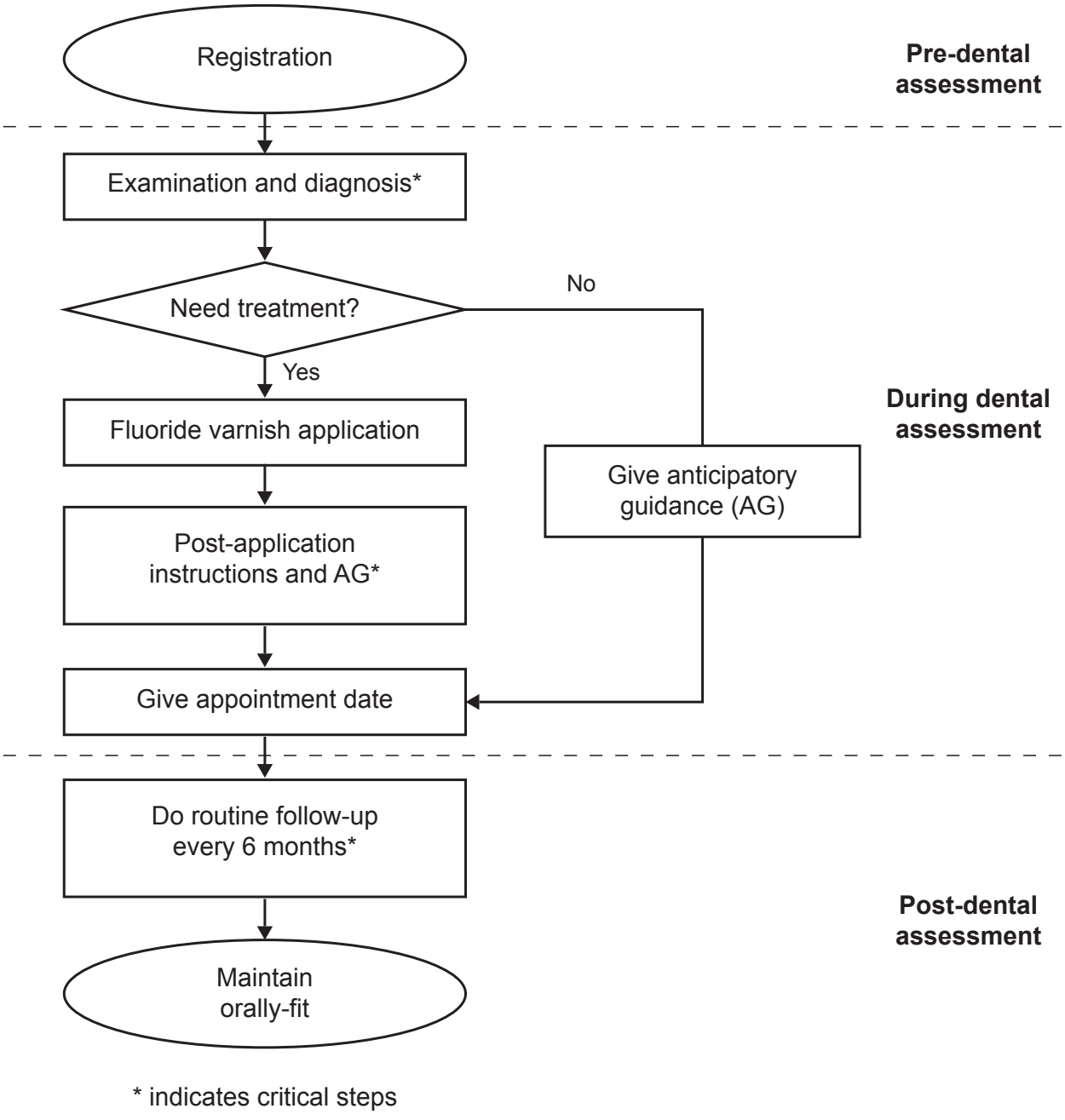


Figure 1: Process of care of operational procedures for oral health assessment and management

Upon reviewing these critical steps, the problem was further analysed to identify potential contributing factors to the high percentage of incomplete FVA among toddlers (Figure 2). The contributing factors identified were: (i) a lack of commitment among dental operators in treating toddlers, (ii) a poor follow-up system, and (iii) a lack of parental awareness regarding the importance of FVA.

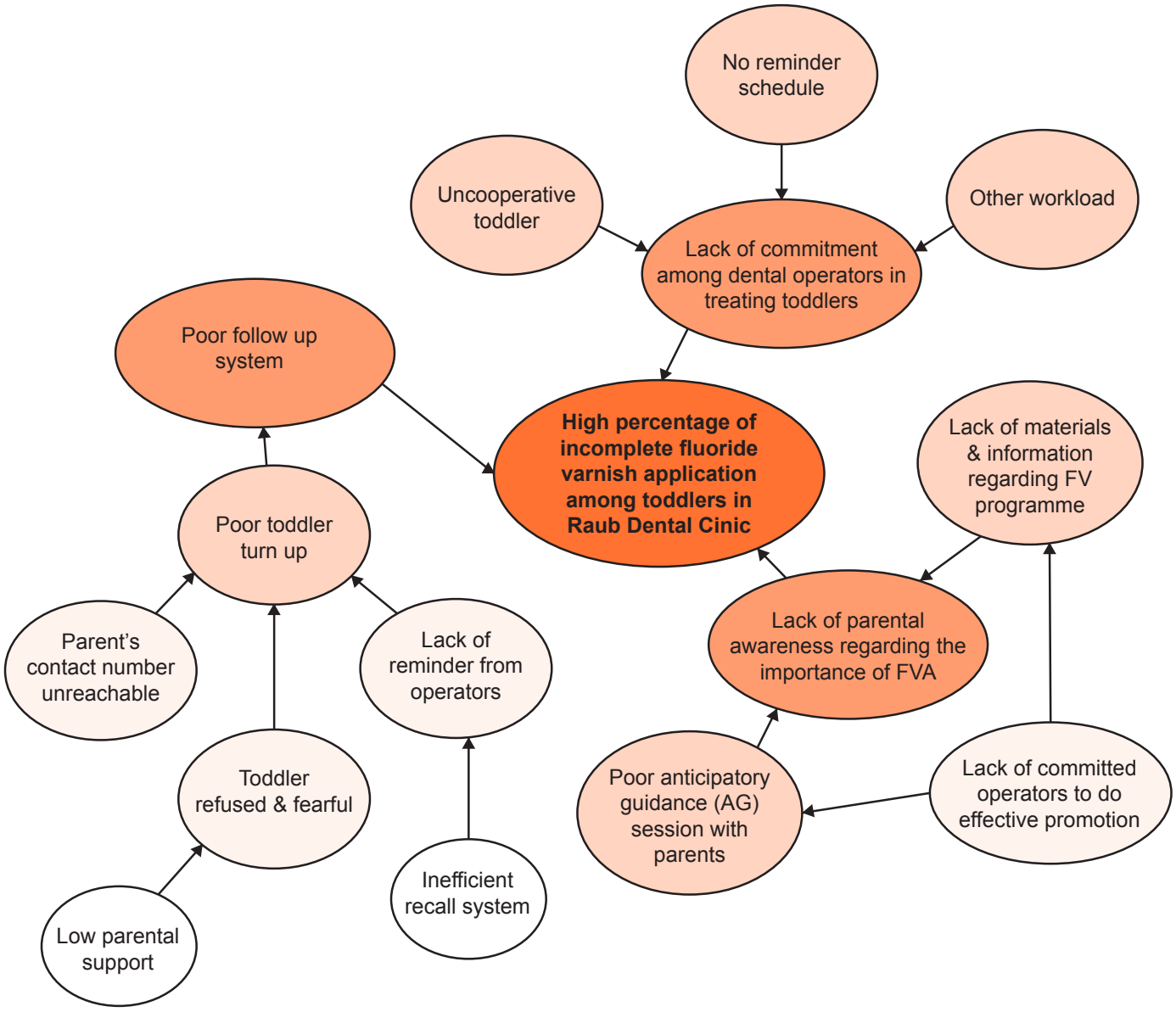


Figure 2: Problem analysis chart

To assess the magnitude of these factors, a self-administered questionnaire (Appendix 1) was distributed via Google Form to 14 dental operators at the Raub Dental Clinic. The questionnaire included three domains representing the three identified main contributing factors, comprising a total of 13 yes-or-no questions: four questions on operator commitment, four questions on the follow-up system, and five questions on parental awareness.

To determine parental awareness regarding oral health, fluoride varnish treatment, attitude, and practices, a structured questionnaire by Singhal et al. (23) was adapted, translated into simple Malay Language and administered to 30 parents (Appendix 2). The questionnaire consisted of 12 yes-or-no questions, which were completed either by face-to-face interviews with dental operators in the treatment room or independently by parents in the waiting area.

For assessing toddlers' cooperation and fear towards dental treatment (n=30), an observation form (Appendix 3) adapted from the Frankl Behaviour Rating Scale (FBRS, 1962) (22) was used. The dental operator determined the toddler's behaviour based on a scale of four behaviour categories, ranging from score 1 (definitely positive), score 2 (positive), score 3 (negative), and score 4 (definitely negative). In this study, a score of 3 was used to identify uncooperative toddlers. Meanwhile, score 4 indicated toddlers who refused or were fearful of dental treatment. The treatment cards were then marked with stickers for easier identification.

In addition, a dental treatment card was reviewed to determine the number of unreachable parental contact numbers during the recall process. Findings from the Questionnaire 1 (Dental Operators): 57% of dental operators had an inefficient recall system, 48% conducted poor AG sessions with parents, 45% lacked a reminder schedule, 30% felt overwhelmed by other workload demands, and 46% admitted neglecting recall scheduling and the use of effective behavioural management techniques due to lack of commitment.

Findings from Questionnaire 2 and Treatment Card Review (Parents): 49% were unaware of the importance of FVA, 44% were unsupportive in managing their child's behaviour, 33% had unreachable contact numbers, of which 85% were no longer in service, 10% were incorrect numbers, and 5% directed to voicemail. Additionally, only 6% reported not receiving reminders about their child's next FVA visit from dental operators.

Findings from the toddlers' observation, 57% were uncooperative, of which 85% attributed this to an unfamiliar clinic environment, and 15% were fearful of dental instruments. Meanwhile, only 13% were classified as refusing or fearful of dental treatment.

Strategy

Several strategies were identified and implemented to address the contributing factors to the high percentage of incomplete FVA among toddlers at Raub Dental Clinic. These strategies were executed over four cycles, from May 2020 to December 2023.

a) First Cycle

During the first cycle of remedial measures, a tailored toddler follow-up book was introduced (Appendix 4). This system allowed each operator to systematically recall toddlers by listing the operator's name, toddler's details, parent's contact number, date of each FVA visit, and remarks for missed appointments. Operators could then actively remind parents via phone calls and personal WhatsApp messages. Additionally, an FVA appointment card was given to parents as a written reminder of their child's next FVA visit.

In the second intervention, AG sessions were enhanced by fully utilising the AG checklist from the toddler's record book (*Rekod Kesihatan Bayi & Kanak-kanak*). Demonstrations of oral hygiene techniques using a teeth model and flipchart was conducted to emphasise the importance of FVA. Thirdly, two sessions of continuing dental education (CDE) were conducted for dental operators to ensure comprehensive knowledge and understanding of FVA protocols. The fourth strategy involved dedicated appointment slots for toddlers receiving FVA every afternoon from Monday to Thursday. This scheduling ensured that each operator could provide FVA visits without any limitations.

The fifth strategy leveraged the clinic's Facebook page to promote FVA more effectively. Monthly posts included four FVA-related posters and two posts about parental sharing sessions. Flyers were also distributed to raise parental awareness about FVA and a dedicated team of dental therapists was established to form a smaller, more focused group that could be closely monitored and supported. By working together as a unified team, they were able to share the workload more effectively, thereby increasing the efficiency of the new recall system.

The sixth strategy, chairside education using flipcharts, flyers, and teeth models was introduced to improve parental awareness and knowledge. In addition, multiple sharing sessions were organised with parents, both individually and in groups. As a result, parents were able to gain more knowledge and practice a good oral hygiene routine for their children.

Table 1: Improvements of the critical steps in Model of Good Care (MOGC)

Critical Steps	Criteria	Standard	Pre-remedial	Cycle 1	Cycle 2	Cycle 3	Cycle 4
Examination and diagnosis	Carried out with good behavioural management techniques for toddlers. [Refer to American Academy of Pediatric Dentistry: Behavior guidance for the pediatric dental patient (24)]	100%	57%	90%	93%	97%	100%
Post-application instructions and AG	Using AG checklist and emphasise the importance of FVA. [Refer to *Rekod Kesihatan Bayi & Kanak-kanak* (25) and Guidelines of Early Childhood Oral Healthcare (10)]	100%	50%	78%	88%	93%	97%
	Chairside education with parents	100%	35%	75%	88%	95%	98%
	Post-treatment rewards for toddlers	100%	58%	80%	95%	98%	100%
Do routine follow-up	Provide both verbal and written reminders via appointment card for the next FVA visit.	100%	70%	80%	90%	100%	100%
	Operator records toddler's visit in their own recall book.	100%	49%	78%	100%	100%	100%
	Provide a reminder to parents a few days prior to their child's upcoming visit via phone.	100%	51%	68%	95%	98%	100%

The seventh strategy involved recording two contact numbers for each parent in the dental treatment card. Contact information was updated and reconfirmed at each visit to improve effectiveness of the recall system. The eighth strategy focused on reinforcing the tell-show-do technique to familiarise toddlers with the dental environment. This technique involved verbal explanations of procedures using age-appropriate phrases/language. Toddlers were rewarded with items such as toothbrushes and toothpaste to encourage good behaviour for future visits.

b) Second Cycle

Additional strategies were initiated in cycle 2 to further improve the process. The ninth strategy involved upgrading the recall system by shifting communication from operator's personal WhatsApp accounts to the WhatsApp Business application using the clinic's phone number. This change was implemented by installing the application on the operator's smartphone, ensured a more official and professional communication approach.

The tenth strategy introduced custom FVA stickers (Appendix 5), which were

placed on the toddler's front books. This initiative was developed in collaboration with the Maternal and Child Health Clinic (MCHC) Raub. This sticker served two purposes: providing parents with a written reminder of upcoming FVA visit dates, and tracking tools for operators of the actual dates of toddler's FVA visits.

The eleventh strategy strengthened AG sessions by reinforcing CDE training among operators, focusing on techniques to manage uncooperative toddlers, particularly through the application of knee-to-knee position. This technique, commonly used for young toddlers, provide a comfortable actively involved parents during dental procedures. Additionally, dental puppets were also used to attract toddlers' attention and encourage cooperation.

The twelfth strategy involved video sharing via the WhatsApp Business application to raise parental awareness. Videos and e-flyers were compiled and made accessible through a QR code and a Google Drive link, allowing easy access for both operators and parents.

The thirteenth strategy was the introduction of *Hari Anakku*, a weekly event held every Thursday. Activities included video presentations, talks, and demonstrations for parents. This solidified the efforts aimed at increasing parental awareness and involvement. Finally, inflatable cartoon balloons were introduced as post-treatment rewards, helping toddlers feel more relaxed and improved their cooperation during their FVA sessions.

c) Third and fourth cycle

The interventions carried out in Cycle 1 and Cycle 2 were monitored, measured and evaluated throughout Cycle 3 and 4 to ascertain sustainability. No further interventions were introduced during these cycles.

Results

The remedial actions implemented from May 2020 to December 2023 showed an improvement in the percentage of toddlers completing FVA at the Raub Dental Clinic. The completion rate increased from a baseline of 12% to 19% in Cycle 1, 24% in Cycle 2, 33% in Cycle 3, and ultimately reached 43% in Cycle 4 (Figure 3). The final two cycles successfully met the DSA standard of ≥30%.

Improvements were also observed across all criteria in the Model of Good Care (Table 1) after four cycles of intervention. The post-remedial results showed that 100% of oral examinations were performed using appropriate behavioural management techniques, specifically the tell-show-do method combined with the knee-to-knee position. Both anticipatory guidance for parents and chairside education also improved to 93% and 95%, respectively, through the use of dental aids. The recall system was further strengthened, achieving 100% compliance in providing follow-up reminders and recording toddler's visit in the recall book.

Following the fourth remedial cycles, a notable reduction in Achievable Benefit Not Achieved (ABNA) was attained, decreasing from 18% to -13%. Furthermore, the proportion of toddlers with new carious lesions dropped from 19% to 3% among those who completed their FVA (Figure 4).

Lessons and Limitations

This study highlighted several key lessons. A well-structured follow-up system proved vital in ensuring toddlers received a complete FVA. The formation of a dedicated dental therapist team, combined with enhanced communication tools like custom FVA stickers and the WhatsApp Business application, significantly improved toddler attendance, parental engagement and dental operators' commitment. These strategies not only increased the percentage of complete FVA but also contributed to a reduction in caries rates, demonstrating strong potential for sustained, measurable impact.

However, the study encountered several limitations. Firstly, resource constraints were evident. While the use of FVA stickers was effective, the cost (RM97 per 1,000 pieces) may pose sustainability challenges, particularly in clinics with limited budgets. Secondly, although the transition to WhatsApp Business eventually improved communication and reduced operators' burden, the initial reliance on operator's personal numbers added to their workload during the early phases. Additionally,

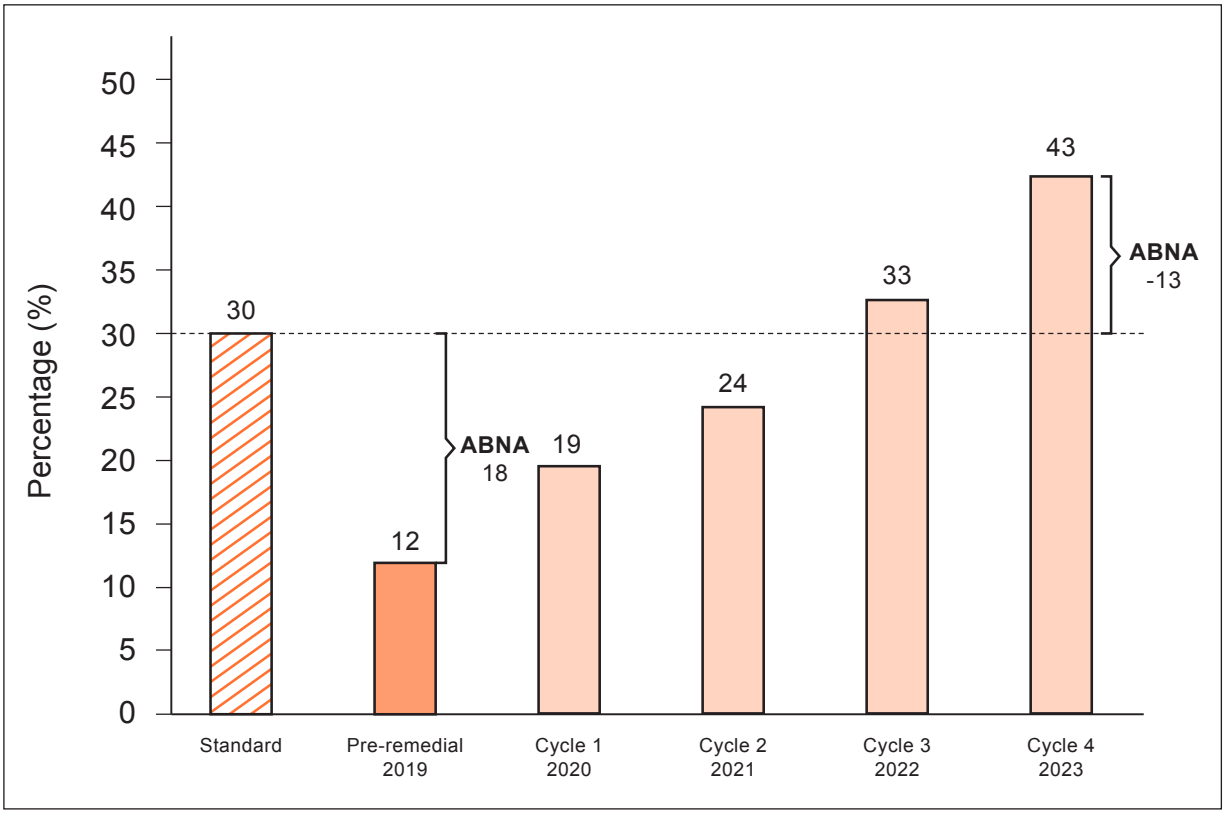


Figure 3: Percentage of completed FVA among toddlers at the Raub Dental Clinic

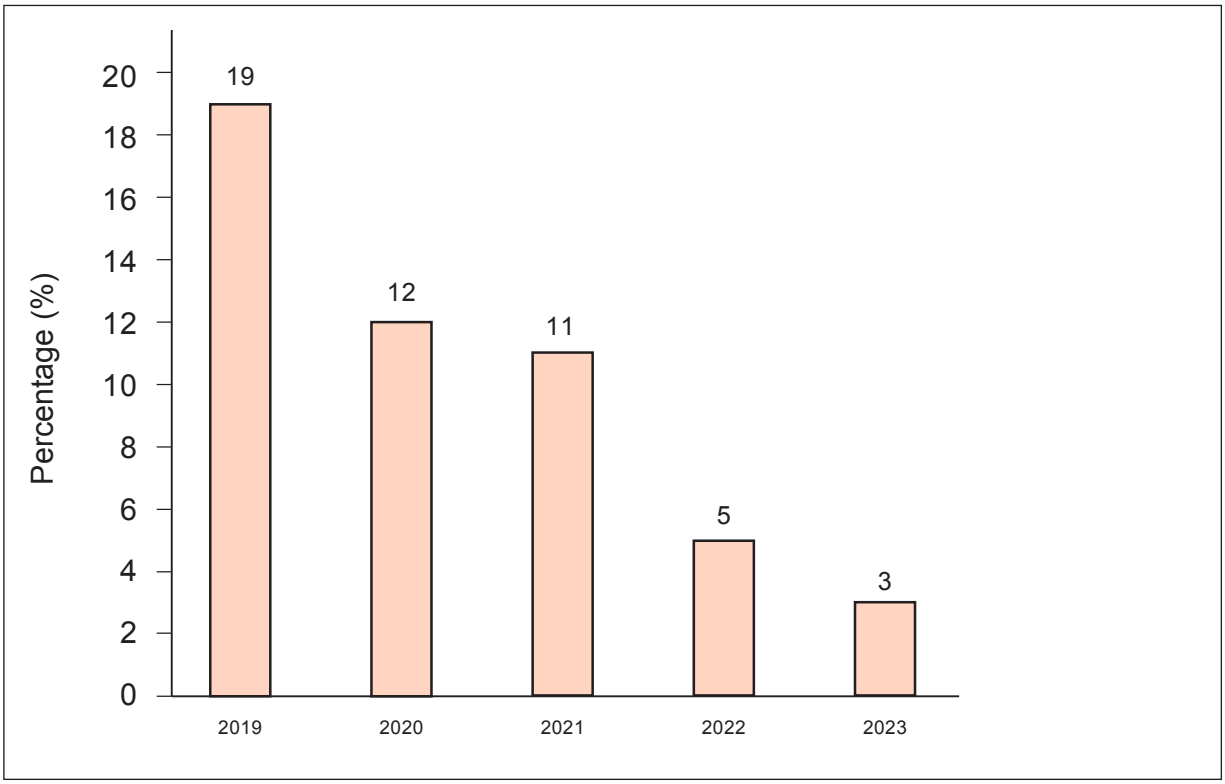


Figure 4: Percentage of new carious lesions among toddlers with completed FVA

the small sample sizes in Cycle 3 (128 toddlers) and Cycle 4 (133 toddlers) limit the strength of the findings and may affect their replicability beyond Raub District. The study's scope was confined to a single clinic using convenience sampling, which further limits the generalisability of the results.

Although the interventions showed promising outcomes, additional improvement cycles and long-term monitoring are necessary to evaluate their sustainability and broader applicability. If this study were to be repeated, it is recommended to adopt the WhatsApp Business application earlier, establish a centralised supply of stickers to manage costs more efficiently, or consider low-cost alternatives for written reminders - such as using clinic stamps or photocopied appointment card templates. Lastly, implementing a structured, digital appointment reminder system integrated with patient records could further enhance follow-up and communication.

Conclusion and the Next Steps

This study successfully identified the factors contributing to the high percentage of incomplete FVA among toddlers. Targeted interventions were also implemented to address these problems. Continuous monitoring of remedial measures is necessary to ensure the clinic surpassed the DSA standard of ≥30%. Given the positive outcomes of this study, all interventions have been replicated across all government dental clinics in the Raub district to enhance the FVA programme. Since 2023, two of the key interventions: (1) Customised FVA reminder stickers, and (2) FVA WhatsApp Business application for recalls have been scaled up for implementation across all districts in Pahang to improve the follow-up system for toddlers. Moving forward, it is hope that these remedial measures can be considered for national level implementation to further enhance the effectiveness of toddler oral healthcare services in Malaysia.

References

1. Oral Health Programme. Guidelines Clinical Prevention Programme for Caries (CPPC). Ministry of Health Malaysia;2020.

2. Oral Health Programme. Manual Fluoride Varnish Programme for Toddlers. Ministry of Health Malaysia;2019.

3. Weyant RI, Tracy SL, Anselmo T, Beltrán-Aguilar ED, Donly KJ, Frese WA, et al. Topical Fluoride for Caries Prevention: Executive Summary of The Updated Clinical Recommendations and Supporting Systematic Review. J Am Dent Assoc;2013:144(11):1279–91.

4. Marinho VCC, Worthington H., Walsh T, Clarkson JE. Fluoride Varnishes for Preventing Dental Caries in Children and Adolescents. Cochrane Database of Syst Rev. 2013(7). https://doi.org/10.1002/14651858.CD002279.pub2

5. American Dental Association Council on Scientific Affairs. Professionally Applied Topical Fluoride : Evidence-Based Clinical Recommendations. Journal of the American Dental Association. 2006;137(8):1151–9. https://doi.org/10.14219/jada.archive.2006.0356

6. Autio-Gold J. Recommendations for Fluoride Varnish Use in Caries Management. Dent Today. 2008;27(1):64-58.

7. Pejabat Kesihatan Pergigian Daerah Raub. Laporan Tahunan. 2020.

8. Karim FA, Yuzadi Z, Yusof M, Azlida N, Nor M. Prevalence of Dental Fluorosis and Its Associated Factors After Cessation of Water Fluoridation. Malaysian Journal of Medicine and Health Sciences. 2021;17(1):68-76.

9. Pahang State Dental Health Division. District Specific Approach Report. 2020.

10. Oral Health Programme. Guidelines Early Childhood Oral Healthcare 2008. Ministry of Health Malaysia;2008.

11. Buckingham, S., John, J. Recruitment and participation in pre-school and school-based fluoride varnish pilots – the South Central experience. Br Dent J 215, E8 (2013). https://doi.org/10.1038/sj.bdj.2013.834

12. Lee ZL, Gan WY, Lim PY, Hasan R, Lim SY. Associations of Nutritional Status, Sugar and Second-Hand Smoke Exposure with Dental Caries among 3-to-6-Year old Malaysian Pre-Schoolers: A Cross-Sectional Study. BMC Oral Health. 2020 Jun 3;20(1):164. https://doi.org/10.1186/s12903-020-01152-0

13. World Health Organization. Global Oral Health Status Report:Towards Universal Health Coverage for Oral Health by 2030. who.int/publications. Updated November 18, 2022. Accessed January 25, 2024.

14. American Dental Association Council on Scientific Affairs. Professionally Applied Topical Fluoride: Evidence-Based Clinical Recommendations. J Am Dent Assoc. 2006 Aug;137(8):1151–1159. https://doi.org/10.14219/jada.archive.2006.0356

15. Swigonski NL, Yoder KM, Maupome G, Ofner S. Dental Providers' Attitudes Regarding the Application of Fluoride Varnish by Pediatric Health Care Providers. J Public Health Dent. 2009 Fall;69(4):242-247. https://doi.org/10.1111/j.1752-7325.2009.00129.x

16. Manski MC, Parker ; M Elaine. Early Childhood Caries: Knowledge, Attitudes, and Practice Behaviors of Maryland Dental Hygienists. J Dent Hyg. 2010 Fall;84(4):190-195.

17. Tyagi R, Sharma A. Behavior Assessment of Children in Dental Settings: A Retrospective Study. Int J Clin Pediatr Dent. 2011;4(1):35–9. https://doi.org/10.5005/jp-journals-10005-1078

18. Almehmadi AH, Bannan A, Ahmad A, Alqadi R, Alhindi A. Parental Knowledge and Awareness of Fluoride Varnish Application on Their Children - A Cross-Sectional Study. Int J Gen Med. 2022 September;15:7435-7442. https://doi.org/10.2147/IJGM.S378194

19. Hussein AS, Abu-Hassan MI, Schroth RJ, Ghanim AM. Parent's Perception on the Importance of their Children's First Dental Visit (A cross-sectional Pilot Study in Malaysia). Journal of Oral and Dental Research. 2013;1(1):23-28.

20. Regional Health Authority W, Health M, Schroth RJ, Wilson A, Prowse S, Edwards JM, et al. Looking Back to Move Forward: Understanding Service Provider, Parent, and Caregiver Views on Early Childhood Oral Health Promotion in Manitoba, Canada. Can J Dent Hyg. 2014;48(3):99-108.

21. Singhal K, Prasanth MA, Singh V, Choudhary R. Knowledge, Attitude and Practice of Parents About Child Oral Health in Jodhpur City: A Questionnaire Survey. Int J Dent Med Res. 2015 March-April;1(6):34-41.

22. Riba H, Al-Jundi A, Al-Zahrani S, Al-Buqmi N. A Review of Behavior Evaluation Scales in Pediatric Dentistry and Suggested Modification to the Frankl Scale. EC Dental Science. 2017;16(6):269-275.

23. Khanduri N, Singhal N, Mitra M, Rohatgi S. Knowledge, Attitude, and Practices of Parents Toward Their Children's Oral Health: A Questionnaire Survey in Bhairahawa (Nepal). International Journal of Pedodontic Rehabilitation. 2018;3(2):59-61.

24. American Academy of Pediatric Dentistry. Behaviour Guidance for the Pediatric Dental Patients. The Reference Manual of Pediatric Dentistry. Chicago, III : American Academy of Pediatric Dentistry; 2024:358-78.

25. Family Health Development Division. Rekod Kesihatan Bayi dan Kanak-kanak (0-6 tahun) Pindaan 03/2021. Ministry of Health Malaysia;2021.

Acknowledgements

The authors would like to thank the Director General of Health, Malaysia, for granting permission to publish this paper. Special thanks are extended to the Deputy State Dental Director of Pahang, the Raub District Dental Officer, all Dental Officers-in-charge, dental therapists, and the staff of Raub Dental Clinic for their support and cooperation throughout the study. We are also deeply grateful to our mentors from the QA Workshop, Mrs Farawahida Kasmira binti Fakaruddin and Dr Bunyamin bin Abdullah, for their support, guidance, and technical advice.

Conflict of Interest

The authors declare that there was no conflict of interest.

Funding

This study received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Appendix 1: Questionnaire 1 (Operators)

QUESTIONNAIRE FOR QA PROJECT RAUB DENTAL CLINIC 2020

Title : Towards High Percentage of Complete Fluoride Varnish Application (FVA) Among Toddlers in Klinik Pergigian Raub

Date :

	Questions	Answer	
1.	Do you do knee-to-knee position during intra-oral examination for toddler younger than one year old?	Yes	No
2	Do you perform tell-show-do technique prior intra-oral examination to toddler?	Yes	No
3	Do you inform each parent that fluoride varnish require 4 times application at 6 months interval in order for effective caries prevention?	Yes	No
4	Do you give appointment date for upcoming fluoride varnish visit to the parents via verbal dan written?	Yes	No
5	Do you call parents to inform their child's next visit few days prior their appointment date?	Yes	No
6	I ticked and ensure all the information in AG checklist in toddler's book was delivered to each patient	Yes	No
7	Fluoride varnish information is given to parents without any dental aids (eg : dental model, flipcharts)	Yes	No
8	Fluoride varnish application and oral hygiene instructions can be done around 10 minutes	Yes	No
9	It is difficult to give full commitment for follow up due to each other work tasks	Yes	No
10	Fluoride varnish information can be given sufficiently through verbal	Yes	No
11	I have my own toddler follow up book/list	Yes	No
12	Fluoride varnish information was given in treatment room only	Yes	No
13	Rewards are given in order to gain toddler's cooperation	Yes	No

Appendix 2: Questionnaire 2 (Parents)

No.	Questions	Circle your answer	
1	Have you ever heard about fluoride varnish application?	Yes	No
2	Fluoride varnish should be applied once a year.	Yes	No
3	Fluoride varnish can weaken teeth.	Yes	No
4	Fluoride varnish should be applied to children of age 5 and 6 years old only.	Yes	No
5	Do your child scared on going to the dentist?	Yes	No
6	Do nurses/doctors informed you regarding next appointment's date?	Yes	No
7	Do you only come to dental clinic when your child complaining of toothache?	Yes	No
8	Do you clean child's teeth after every meal?	Yes	No
9	Do you bring your child for routine dental check-up every 6 months?	Yes	No
10	My child always cries during dental visit.	Yes	No
11	Information regarding fluoride varnish is easy to understand & very interesting.	Yes	No
12	I know that frequent night time bottle feeding can cause tooth decay.	Yes	No

Appendix 3: Frankl Behaviour Rating Scale 1962 (Observation form)

TODDLER'S SHEET

No	Toddlers's name	Last 4 IC No.	Frankl Score			
			--	-	+	++
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Appendix 4: Toddler's follow up template for recall system

TODDLER'S FOLLOW-UP
(For toddlers receiving FVA at 6-monthly)

Operator's name : _____

No.	Toddler's Name	Date of Birth	Phone Number	Date of FVA visit				Remark
				FVA 1	FVA 2	FVA 3	FVA 4	

Appendix 5: Custom FVA stickers

