

TOWARDS REDUCING THE PERCENTAGE OF INTRAORAL FILM RETAKES IN KLINIK PERGIGIAN ROMPIN

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1.0 SELECTION OF OPPORTUNITIES FOR IMPROVEMENT

1.1 Introduction

Dental radiograph is a useful tool to aid in examination and diagnosis of dental-related problems, such as detecting caries, visualizing cracks or fracture of the tooth anatomy and screening of bony pathology. It utilizes an intraoral film of various sizes, with or without the use of film holders and radiation exposure to form an image.



Good contrast, sharp image and able to visualize all structure.



Presence of distortion, missing structure and blurry. **Require retake**

Image 1: Good radiograph

Image 2: Poor radiograph

However, radiograph quality is dependent on operator skill and patient related factors. In Klinik Pergigian Rompin (KPR), the percentage of film retakes is at 15% high, based on *Mesyuarat Kajian Semula Pengurusan (MKSP)* report in 2022.

1.2 Problem Prioritization

Areas of improvement	S	M	A	R	T	Total
Low percentage of primary school students with caries free teeth in KP Bandar Tun Razak	21	22	12	15	11	80
Low percentage of secondary students maintaining orally fit status in KP Bandar Tun Razak	22	21	15	18	13	88
Low percentage of toddlers with orally fit status in KP Bandar Tun Razak	18	15	11	12	14	69
Low percentage of toddlers screened using 'lift the lip' technique in KP Muadzam Shah.	17	22	15	12	14	79
High percentage of intraoral film retakes in KP Rompin	19	22	24	18	17	100

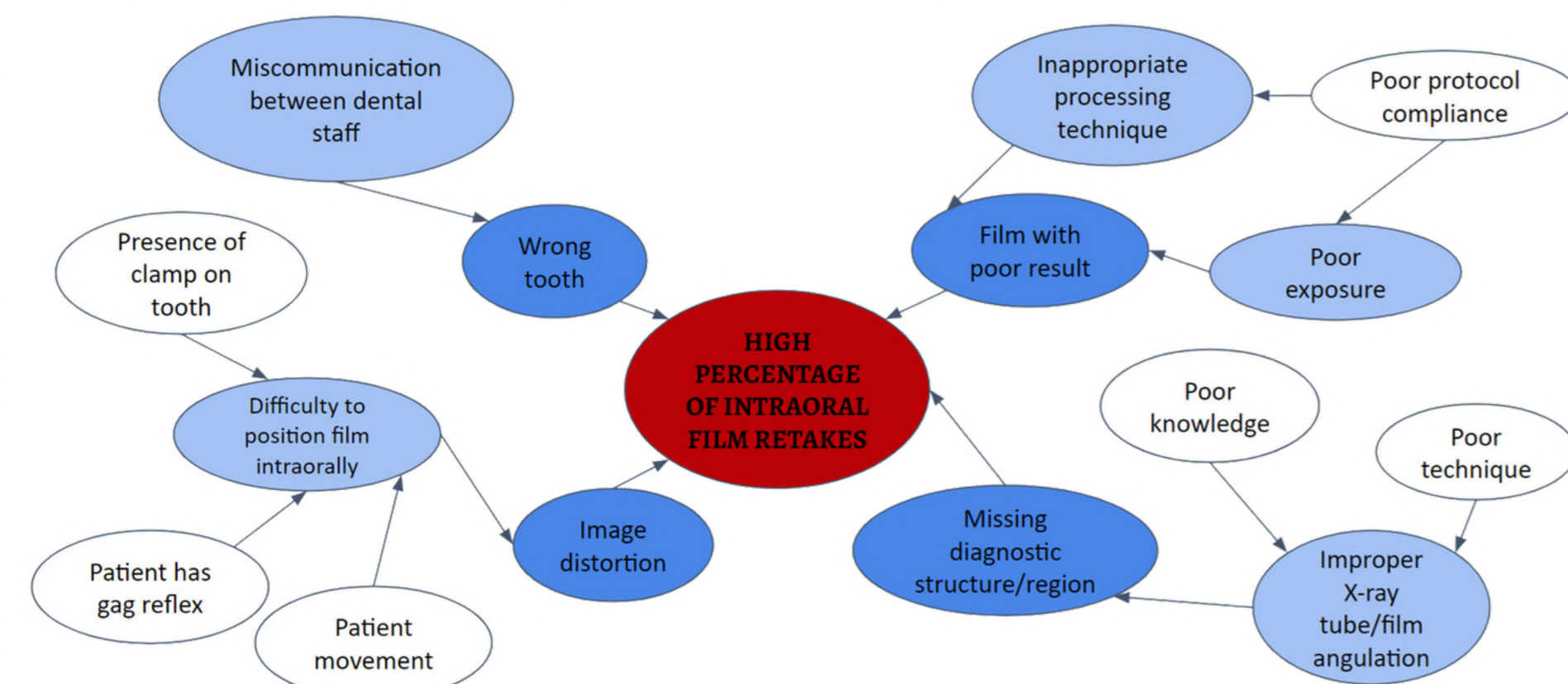
Rating scale : 1 to 3 (lowest to highest) 8 Members

1.3 Reasons for Selection

- SERIOUSNESS** Repeated radiation exposure can increase risk of developing head and neck tumour.^{1,2} Poor radiograph has low diagnostic value³ which can impede proper treatment planning, hence requiring retakes. This leads to needless wastage of time and resources.⁴
- MEASURABLE** X-ray registration form (BKPPHG-BK 6 Pin. 1) and self-administered questionnaire.
- APPROPRIATE** Various remedial strategies can be implemented to lower percentage of intraoral film retakes in KP Rompin.
- RELEVANCE** Compliance to ALARA concept by reducing excessive radiation exposure to patient. Improve quality of care and reduce treatment time and cost.
- TIMELINESS** Study can be completed in one year.

2.0 KEY MEASURES FOR IMPROVEMENT

2.1 Problem Analysis Chart



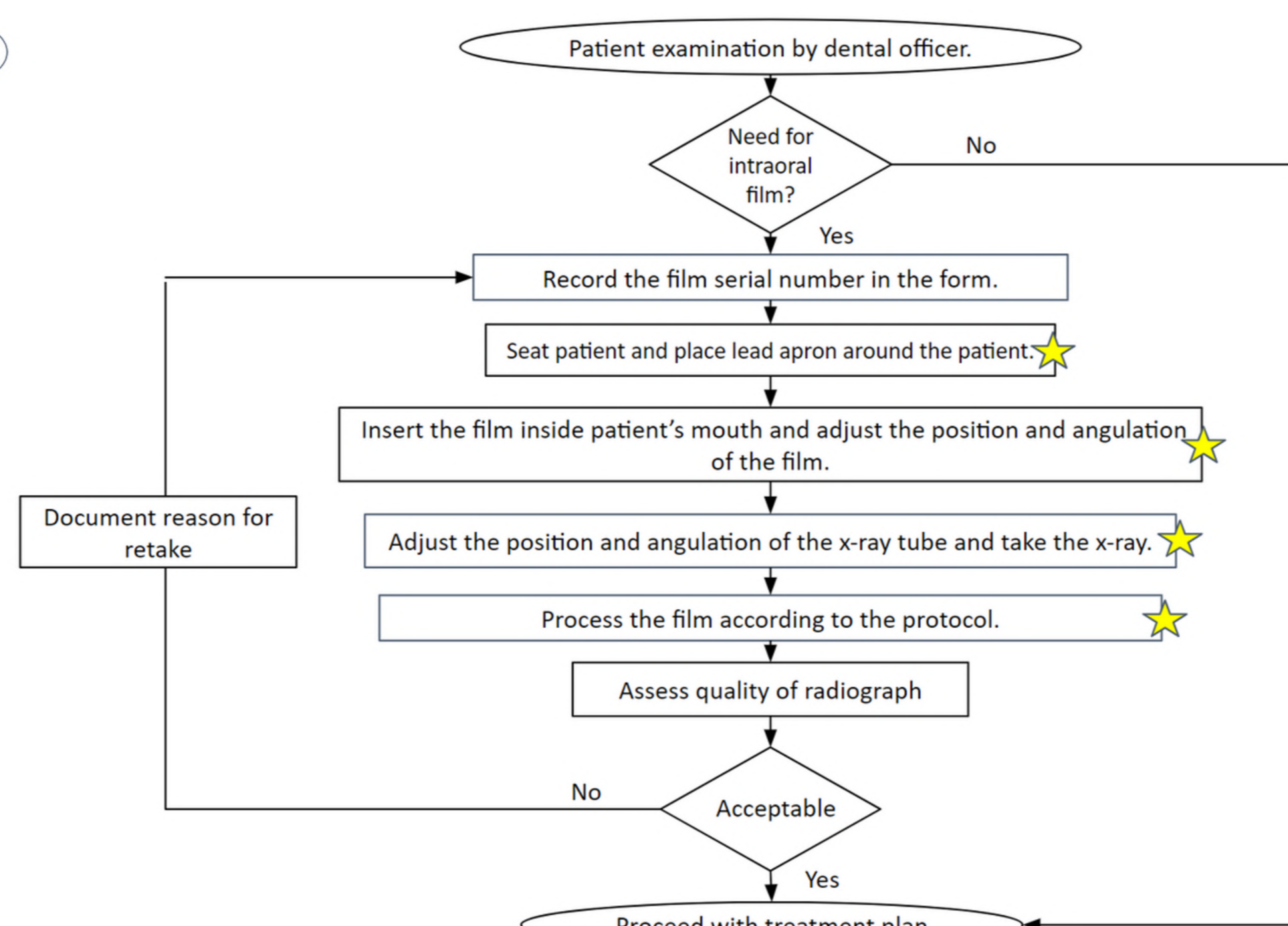
2.2 Problem Statement

- Poor radiographs give little diagnostic value in comparison to good radiographs, which necessitate retakes up to 15%.
- Repeated x-ray retakes increases radiation exposure to patient which could lead to adverse health effects such as tumour development. This can also lead to wastage of time, resources and poor quality of care.
- Possible factors could be wrong tooth, film with poor result, image distortion and missed diagnostic structure.
- This study aims to reduce the percentage of intraoral film retakes in KPR.

2.3 Study Objectives

- General objective**
- To reduce percentage of intraoral film retakes in KPR.
- Specific objectives**
- To verify the high percentage of intraoral film retakes in KPR
 - To identify possible causes of intraoral film retakes
 - To formulate and implement proper remedial measures
 - To evaluate effectiveness of remedial measures

2.4 Process of Care



2.5 Indicator and Standard

- Indicator** Percentage of intraoral film retakes in KPR
- Standard** Manual Pelaksanaan Program Jaminan Kualiti QAP dalam Perkhidmatan Radiologi 2021 and Quality Control Recommendations for Diagnostic Radiography (Pub. 2001)
- Formula**
$$= \frac{\text{number of intraoral film retakes}}{\text{total number of intraoral films taken}} \times 100$$

2.6 Model of Good Care

No	Procedure	Criteria	Standard	Verification study	Cycle 1	Cycle 2
1	Seat pt and place lead apron around the pt	Seat the pt with their back straight to the chair and at correct head angulation. Place lead apron with thyroid collar properly covers pt's torso and neck region.	100%	75%	100%	100%
2	Insert the film inside patient's mouth and adjust the position and angulation of the film.	Ensure the film is placed as close to the tooth of interest as possible.	100%	85%	95%	100%
3	Adjust the position and angulation of the x-ray tube and take the x-ray.	The angulation should follow the positioning device if using film holder, or follow bisecting angle technique if using manual technique. Avoid double exposure.	100%	80%	90%	95%
4	Process the film according to the protocol.	Use 3-4ml of developing solution and insert it at the corner of film cover. Ensure the film is completely covered with developing solution by digital pressure. Wash and dry the film according to manufacturer's instruction.	100%	100%	100%	100%

3.0 PROCESS OF GATHERING INFORMATION

3.1 Methodology

Study design	Interventional study
Sampling technique	Purposive sampling
Study sample	<ul style="list-style-type: none"> Dental officers (n=10) and DSA (n=10) in KPR Intraoral films taken in KPR
Study duration	Verification phase: May-Sept 2023 Remedial phase: [Cycle 1] Oct-Nov 2023 [Cycle 2] Jan-Feb 2024
Data collection tools	<ul style="list-style-type: none"> X-ray registration form Self-administered questionnaire
Inclusion criteria	Intraoral films taken in KP Rompin
Exclusion criteria	Intraoral films taken by referral from other dental clinics

4.0 ANALYSIS & INTERPRETATION

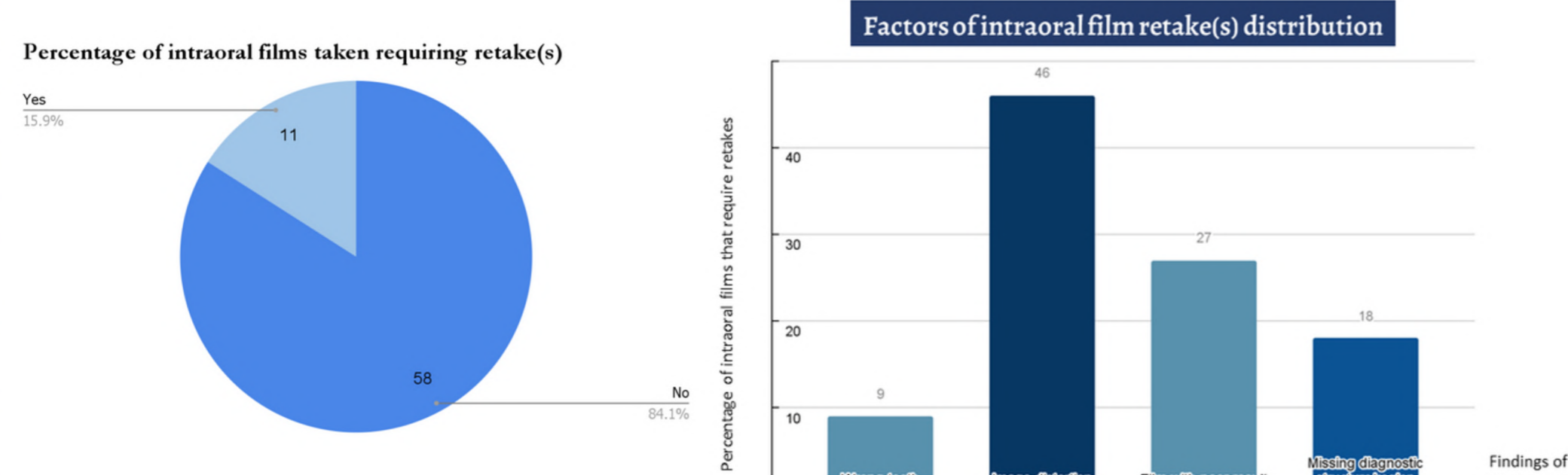


Figure 1: Pie chart analysis on percentage of film retakes

Figure 2: Bar chart analysis on percentage of factor of intraoral film retakes distribution

Film retakes are influenced by factors related to patient movement and operator skill

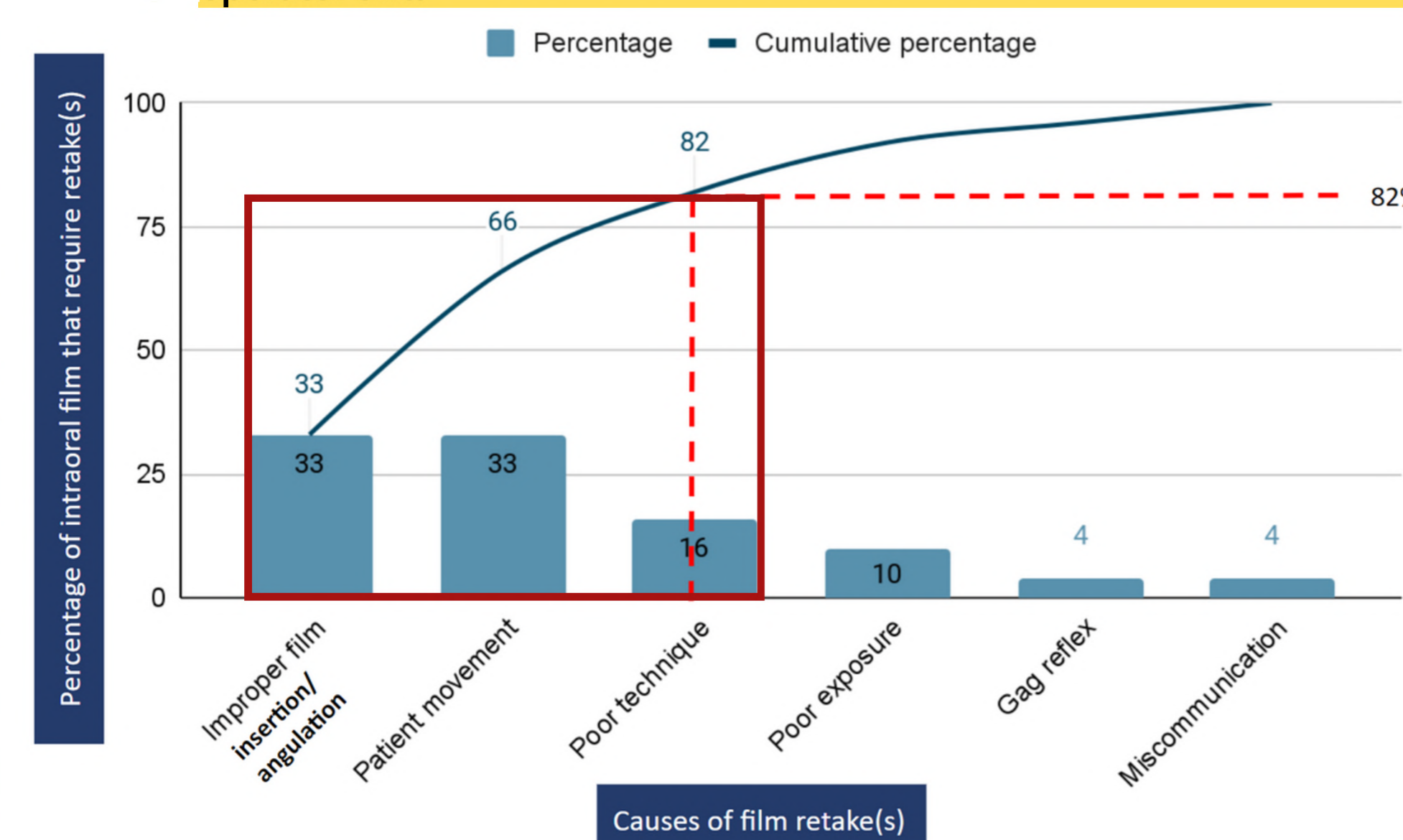


Figure 3: Pareto analysis on factors of intraoral film retakes

5.0 STRATEGIES FOR CHANGE

- Strategy 1:** Display of information on x-ray taking guideline and the correct selection of intraoral film holder
- Strategy 2:** Simplified guide for management of difficult patients when taking dental radiographs
- Strategy 3:** Continuous dental education (CDE) to operators
- Strategy 4:** Visual & verbal reminder to minimize patient movement
- Strategy 5:** Demonstration of modified radiograph technique using cotton roll for patients with certain risk factors
- Strategy 6:** Collaboration with PKPD Raub to utilise Accuray (innovated film holder)

6.0 EFFECTS OF CHANGE

6.1 Achievable-benefit-not-achieved (ABNA)

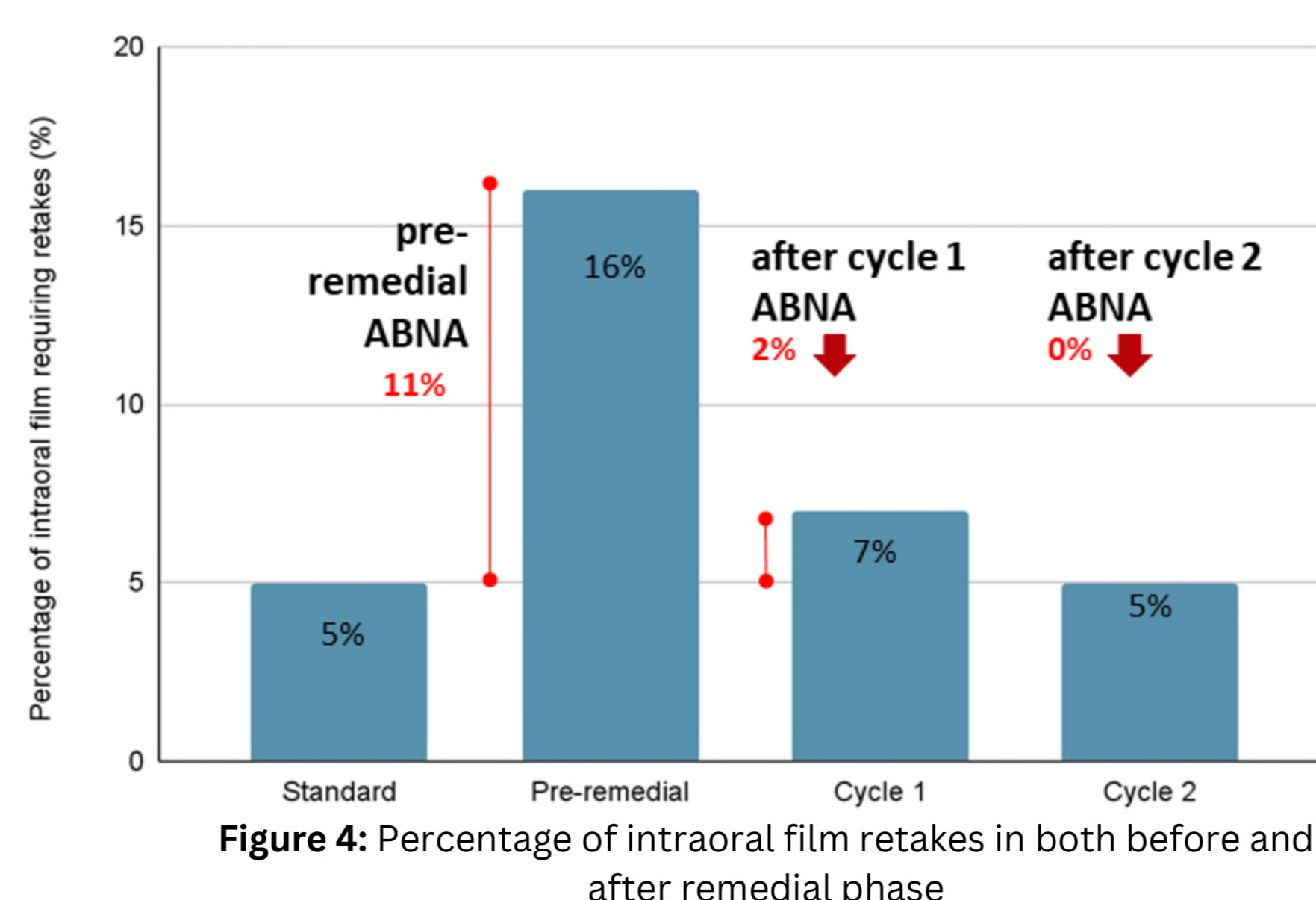


Figure 4: Percentage of intraoral film retakes in both before and after remedial phase

6.2 Value Added Impact

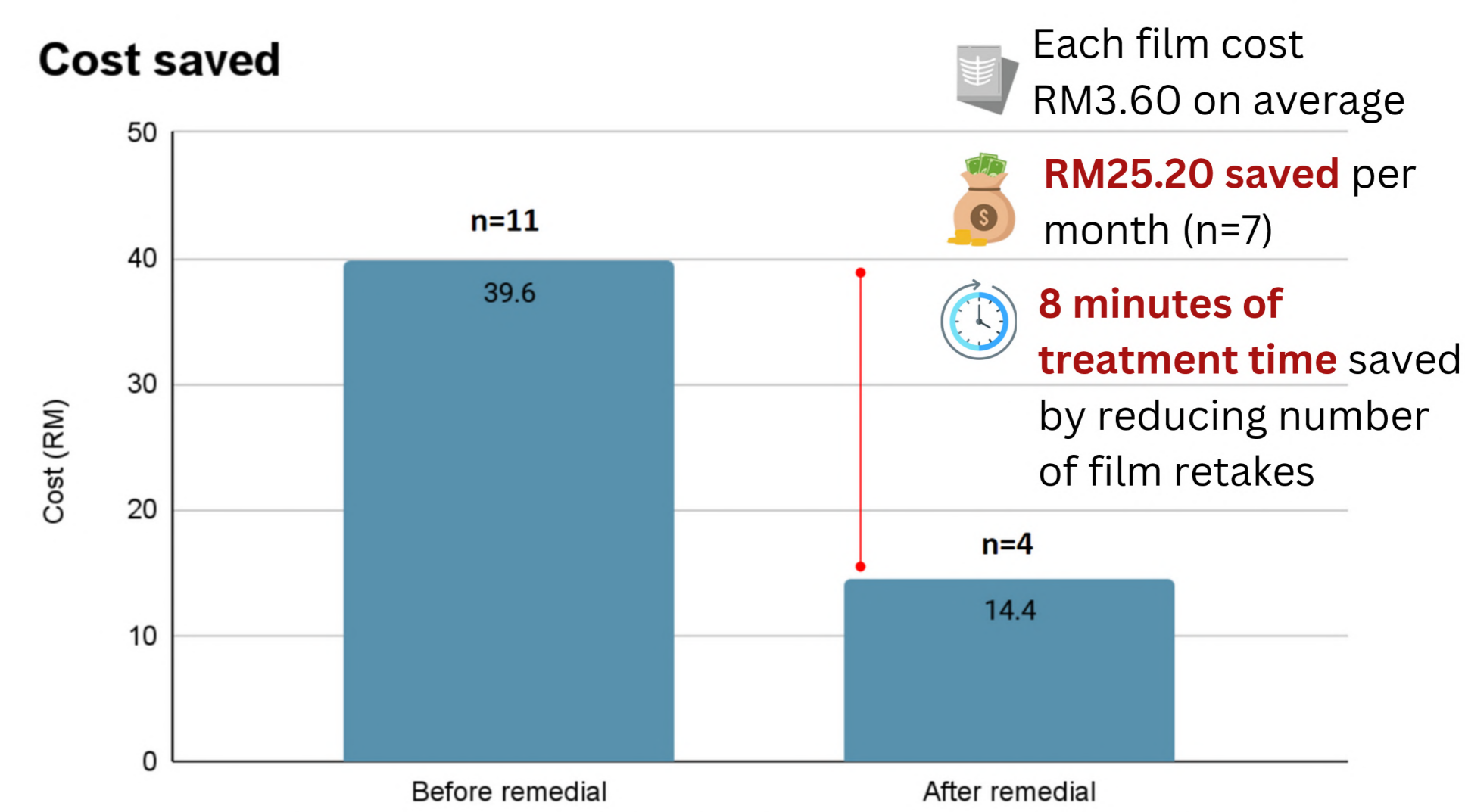


Figure 5: Average reduction in cost (RM) after remedial phase

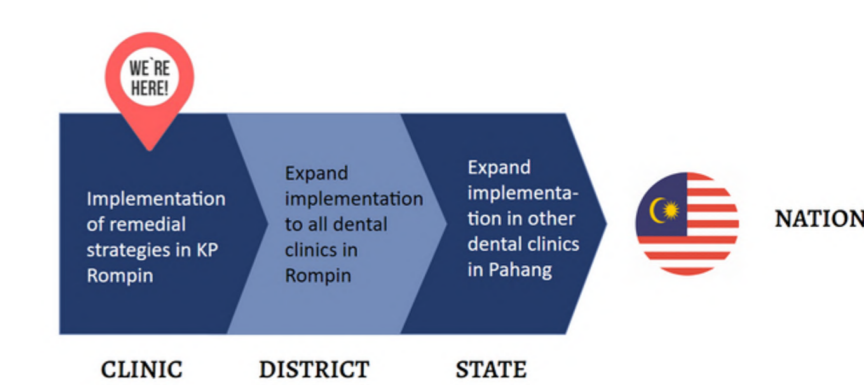
7.0 THE NEXT STRATEGY

7.1 Conclusion and Lessons Learnt

- After remedial phase, the percentage of intraoral film retakes of 16% has been reduced to 5%.
- The main factors are attributed to wrong tooth, film with poor result, film with missing diagnostic structure and film with image distortion.
- Strategies implemented include displaying informative guidelines inside x-ray room, verbal instruction to pt, visual signage, CDEs, using modified x-ray technique and utilisation of Accuray by collaborating with PKPD Raub.
- Remedial strategies which targeted selective factors such as operator skill, knowledge and patient movement were proven effective to lower the percentage of intraoral film retakes.
- We managed to achieve our standard of 5%.

7.2 The Next Step

- Conduct additional CDE and training workshop for new dental staffs
- Expand this study to other dental clinics in Rompin before replicating it at the state and national level.
- Continue our collaboration with PKPD Raub to improve and upgrade Accuray (innovated film holder).



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