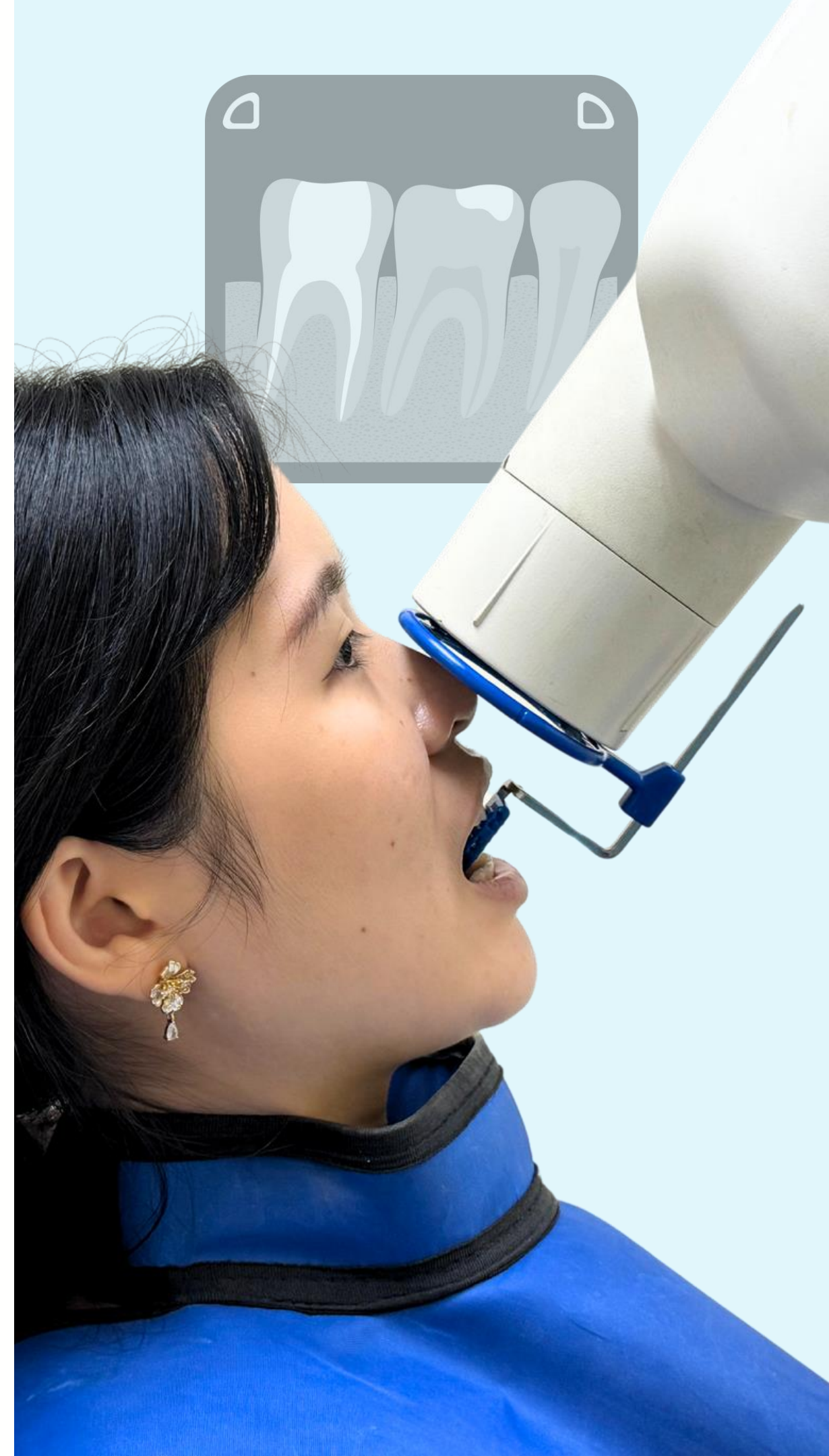


MINISTRY OF HEALTH MALAYSIA  
ORAL HEALTH DIVISION OF MELAKA

# REDUCTION OF INTRA-ORAL PERIAPICAL (IOPA) RADIOGRAPH REJECTION RATE AT TENGKERA DENTAL CLINIC

A QUALITY ASSURANCE PROJECT  
2023/2024



# OUR TEAM

**ADVISOR:** **Dr. Noorul Nadiah binti Noor Zamry**  
District Dental Officer, Melaka Tengah

**FACILITATOR:** **Dr. Quake Puay Tin**  
Dental Officer In-Charge, Tengkeru Dental Clinic

## GROUP MEMBERS:



**1. Dr. Lai Su Min**  
Dental Officer  
UG41



**2. Dr. Mok E-Vien**  
Dental Officer  
UG41



**3. Dr. Than Chong Yi**  
Dental Officer  
UG48

**4. Dr. Trish Gan Ling En**, Dental Officer UG41 (Resigned)

**5. Dr. Chin You Xiu**, Dental Officer UG41 (Resigned)



# PROBLEM IDENTIFICATION

# PROBLEM IDENTIFICATION

1

7.0%

<5%

**High rejection rate of IOPA radiograph at Tengker Dental Clinic**

2

60.0%

100%

**Low turn up rate for appointment among patients at Tengker Dental Clinic**

3

89.6%

>40%

**Low attendance of new antenatal patients for dental check-up at Tengker Dental Clinic**

4

32.5%

>40%

**Low case completion rate among antenatal patients at Tengker Dental Clinic**

5

80.0%

>86%

**Low rate of optimal waiting time (<30 minutes) for outpatient at Tengker Dental Clinic**

Performance in 2022

Target Performance



# PROBLEM PRIORITISATION USING SMART CRITERIA

Group Voting Technique | Rating scale: 1= Low 2= Medium 3= High | No. of group members: 5

No.	Problem	S	M	A	R	T	Total
1	High rejection rate of IOPA radiograph at Tengker Dental Clinic	15	15	14	14	14	72
2	Low turn up rate for appointment among patients at Tengker Dental Clinic	12	14	13	13	13	65
3	Low attendance of new antenatal patients for dental check-up at Tengker Dental Clinic	12	13	12	12	12	62
4	Low case completion rate among antenatal patients at Tengker Dental Clinic	10	12	10	11	10	53
5	Low rate of optimal waiting time (<30 minutes) for outpatient at Tengker Dental Clinic	11	13	12	12	12	60

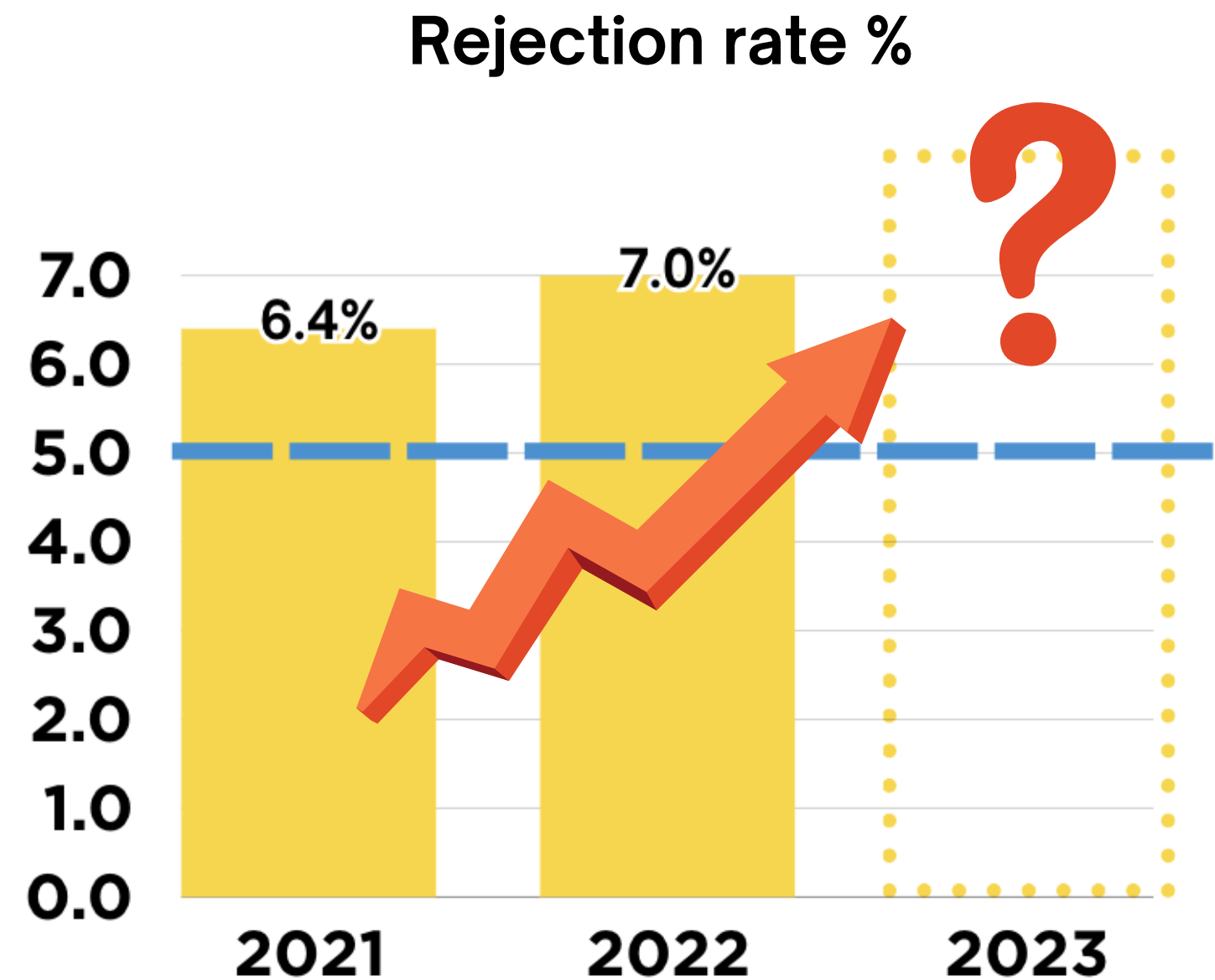
# SMART CRITERIA

<b>Seriousness</b>	<p>When IOPA radiographs are rejected, new radiographs will be taken and this leads to:</p> <ul style="list-style-type: none"><li>• Increased radiation exposure to patients,</li><li>• Increased total treatment time, and</li><li>• Reduced x-ray tube life.</li></ul>
<b>Measurable</b>	<p>Percentage rejection rate of IOPA radiographs from monthly report (BK13)</p>
<b>Appropriateness</b>	<p>By reducing the rejection rate of IOPA radiographs, unnecessary retakes can be avoided, leading to cost savings on film and processing chemicals and enhancing the quality of patient care.</p>
<b>Remediable</b>	<p>A few remedial measures can be carried out at Tengkeru Dental Clinic to reduce the rejection rate of IOPA radiographs.</p>
<b>Timeliness</b>	<p>This study can be done within one year to reduce the rejection rate of IOPA radiographs at Tengkeru Dental Clinic.</p>

# PROBLEM TO BE STUDIED

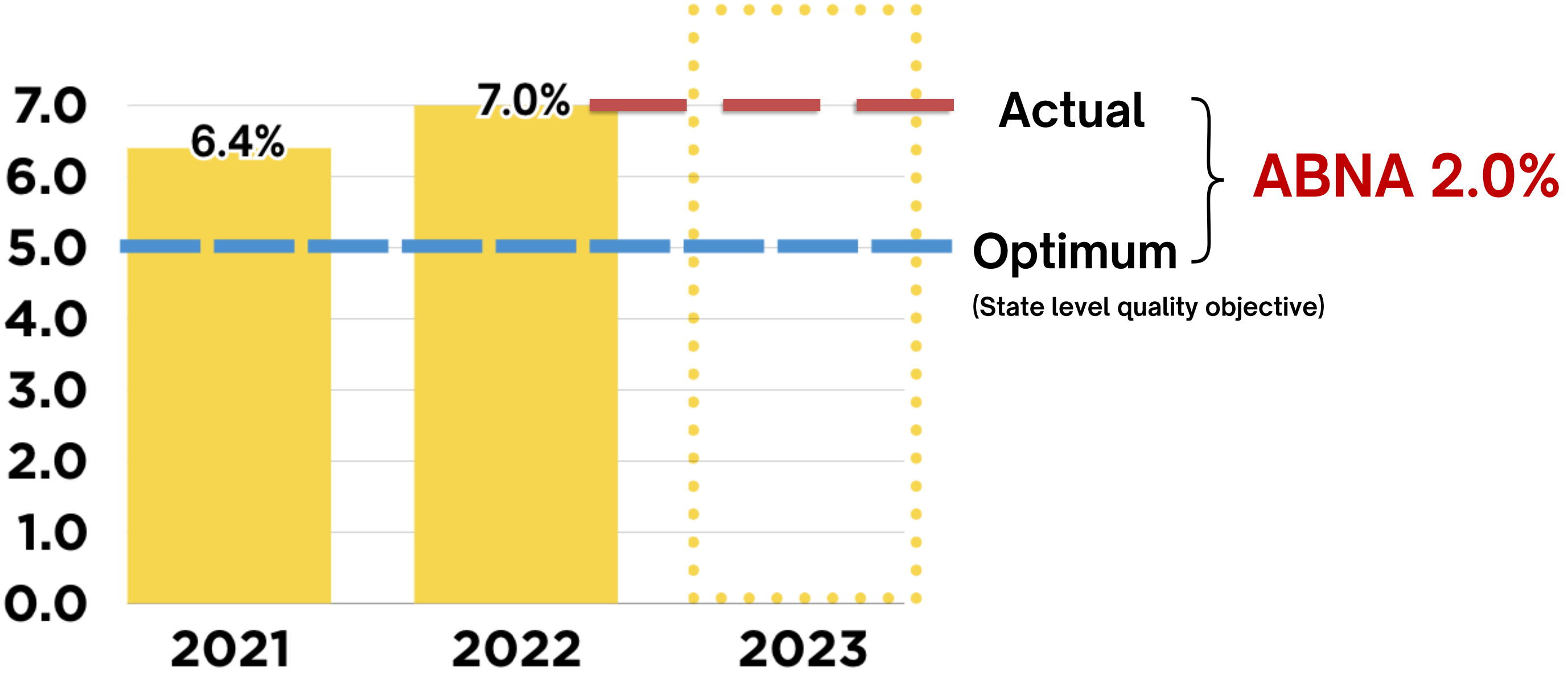
## High rejection rate of IOPA radiograph at Tengkeria Dental Clinic

- Did not meet state level quality objective of less than 5%
- Upward trend from 6.4% (2021) to 7.0% (2022)



# PROBLEM TO BE STUDIED

## Rejection rate %





# PROBLEM ANALYSIS (5W 1H)

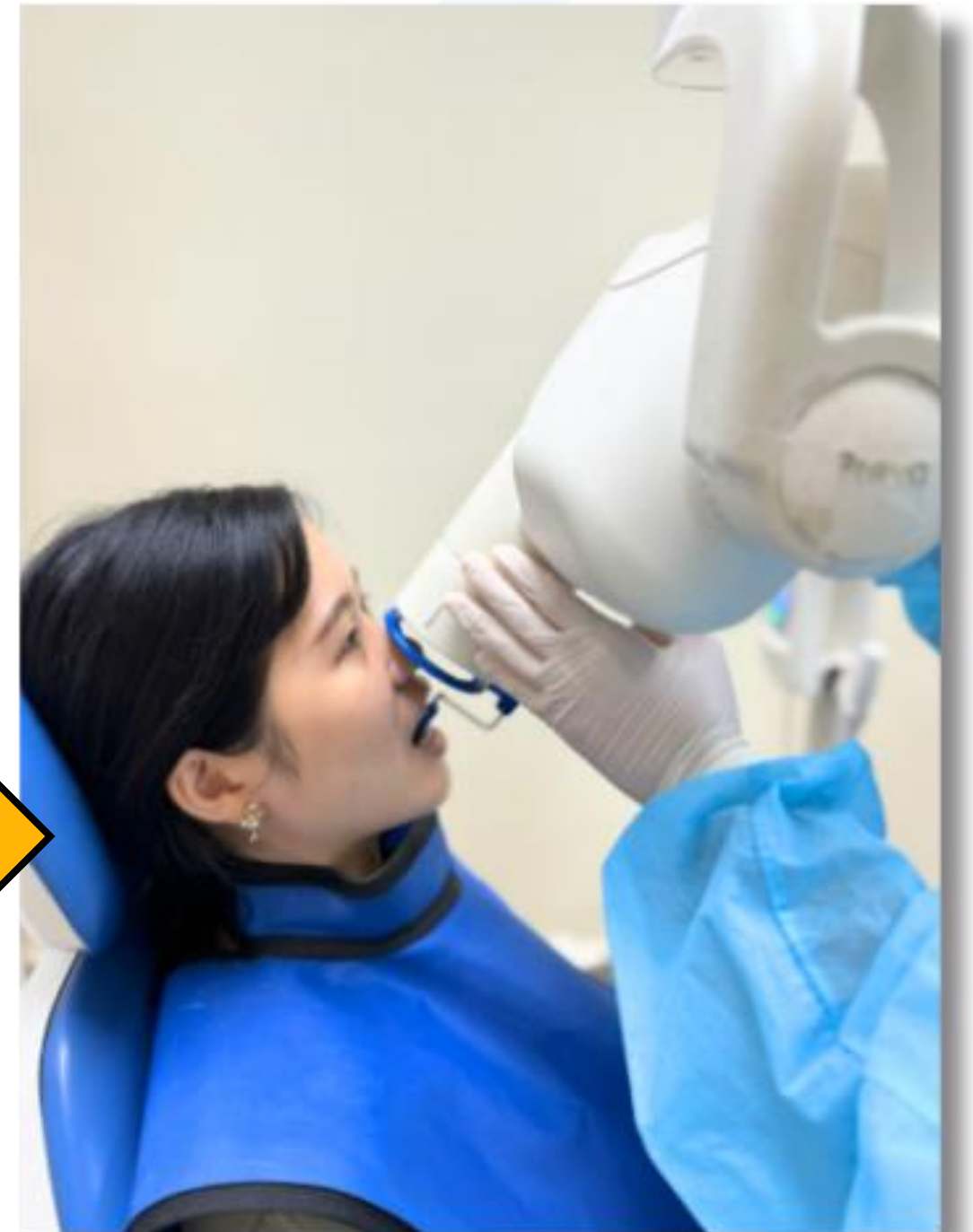
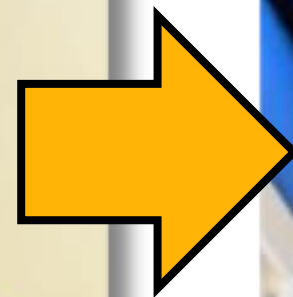
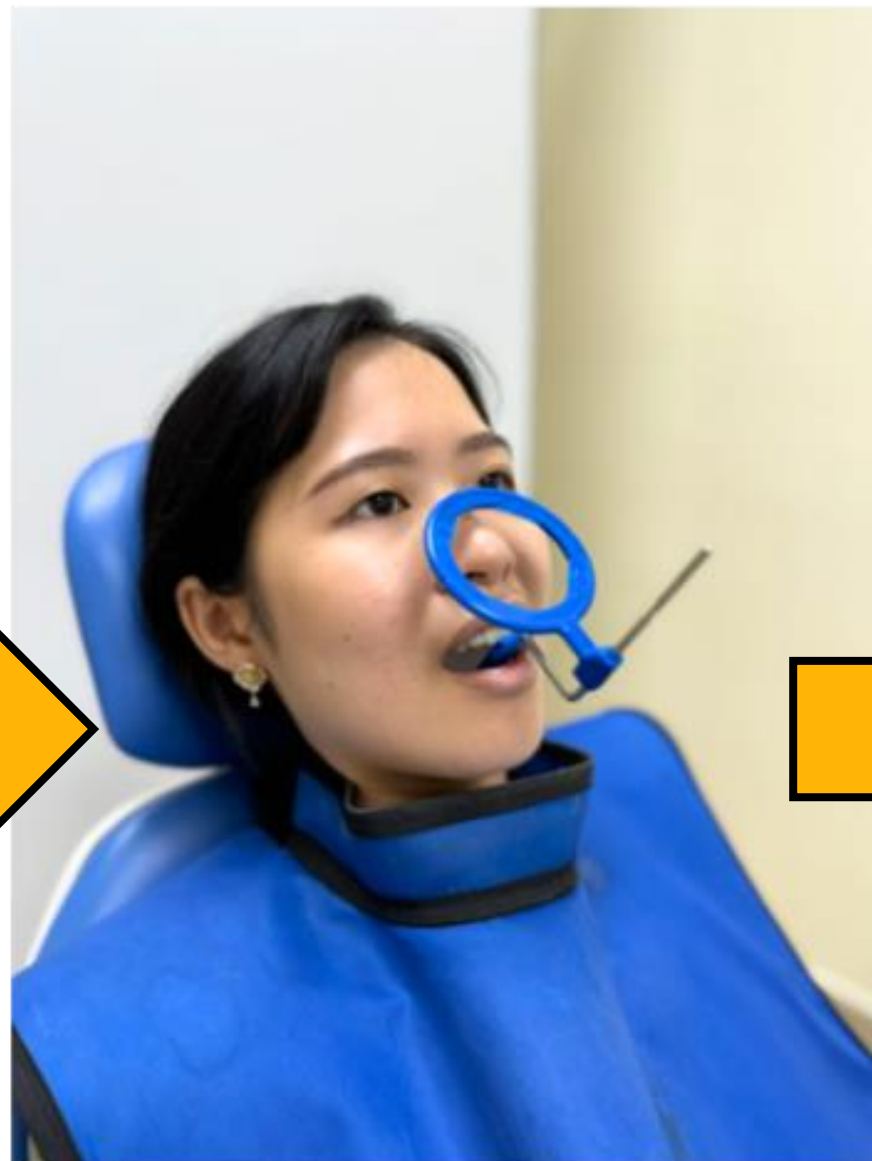
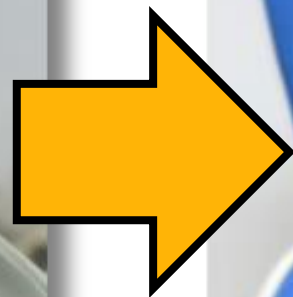
<b>WHAT</b>	High rejection rate of IOPA radiographs at Tengker Dental Clinic in 2021 and 2022 (Did not meet state level quality objective: below 5%)
<b>WHY</b>	<ul style="list-style-type: none"><li>• Lack of knowledge and skills among operators</li><li>• Inappropriate methods for radiograph taking and processing</li><li>• Patient movement during radiation exposure</li></ul>
<b>WHERE</b>	Tengker Dental Clinic
<b>WHO</b>	Dental officers (DOs), Dental Surgery Assistants (DSAs), Patients
<b>WHEN</b>	While taking and processing IOPA radiographs
<b>HOW</b>	A written guideline (AK4) was in place for IOPA radiograph taking and processing but the rejection rate remained high.



# INTRODUCTION

# WHAT ARE DENTAL RADIOGRAPHS?

A valuable **diagnostic** tool, as an **adjunct** to clinical examination in the diagnosis of dental conditions





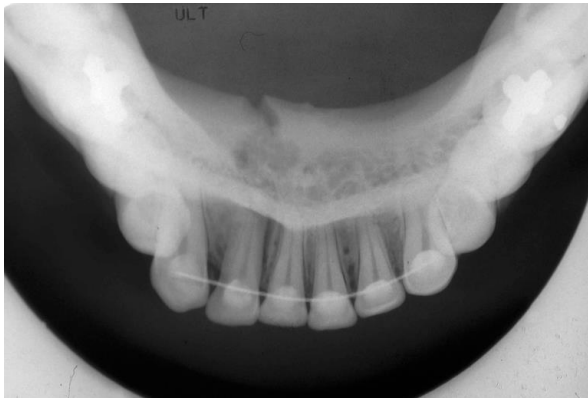
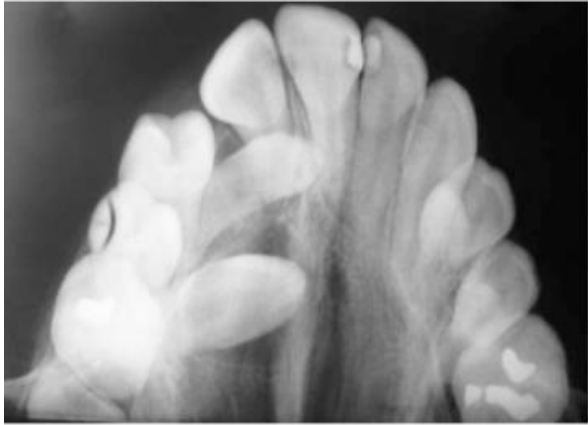
# DENTAL RADIOGRAPHS

Intra-oral

Periapical

Bitewing

Occlusal



Extra-oral

Panoramic

Cephalometric

Sialography

Computer Tomography







Caries

Restorations

Root Morphology

Alveolar Bone Height

Developmental Anomalies

General

Endodontics

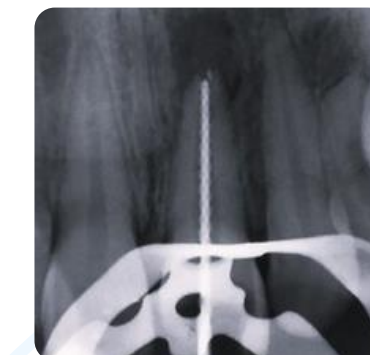
# USES OF IOPA RADIOGRAPHS

Periodontics

Root Canal Morphology

Working Length Determination

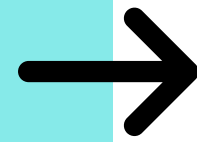
Periapical Lesions



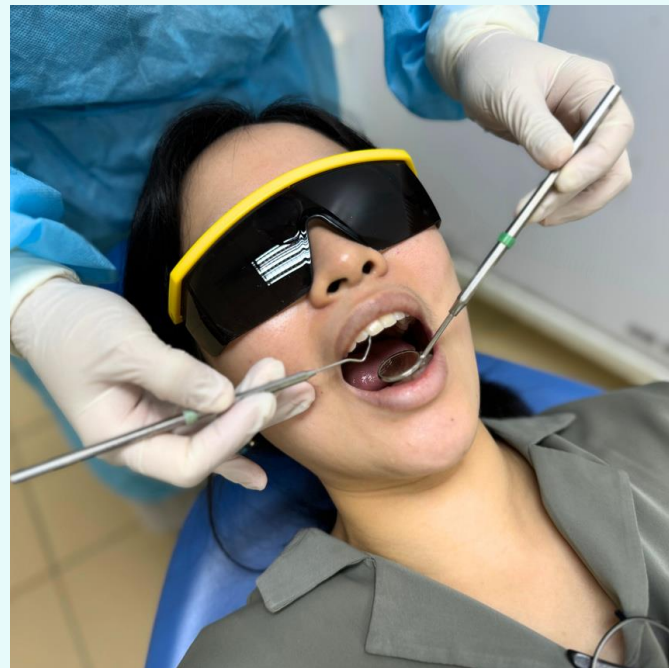
# PROCEDURE OF RADIOGRAPH TAKING

AT TENGGERA DENTAL CLINIC

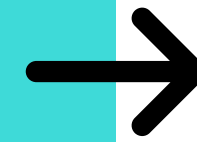
**Dental Officers  
(DOs)**



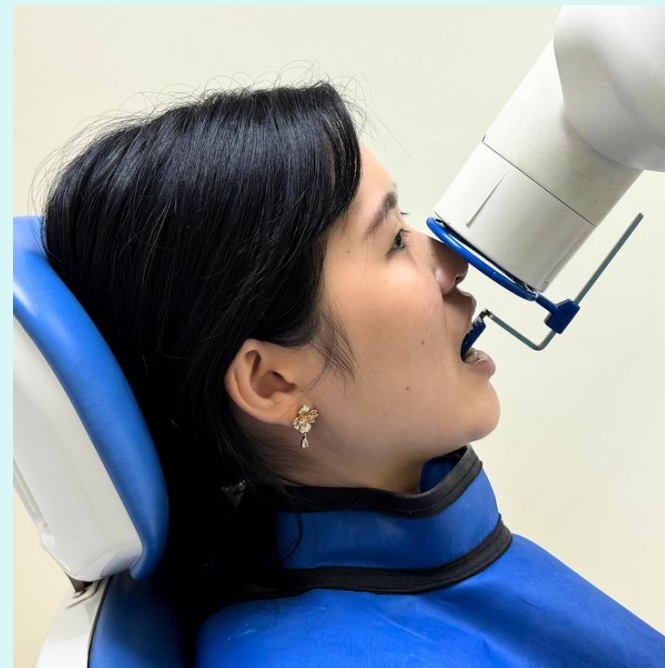
**Prescribe IOPA  
Radiographs**



**Dental Officers  
(DOs)**



**Take IOPA  
Radiographs**



**Dental Surgery  
Assistants (DSAs)**

**Process IOPA  
Radiographs**



# Accepted



- Correct exposure
- Clear anatomical area (2mm of periapical bone)

# Rejected



Cone cut



Blur image



Too dark



Too bright



# LITERATURE REVIEW

## Importance of IOPA Radiographs in Dentistry

IOPA radiograph as **an important tool** for diagnosis of intra-oral pathological conditions and endodontic treatment. (Ali *et al.* 2018)

## Principle of Dental Radiography

The goal of radiographic examination should be to accomplish diagnostic efficacy, while keeping the radiation exposure to the patients and healthcare professionals, **as low as reasonably practicable/achievable (ALARP or ALARA)**. (Yeung *et al.* 2021)



# LITERATURE REVIEW

## Problem Statement

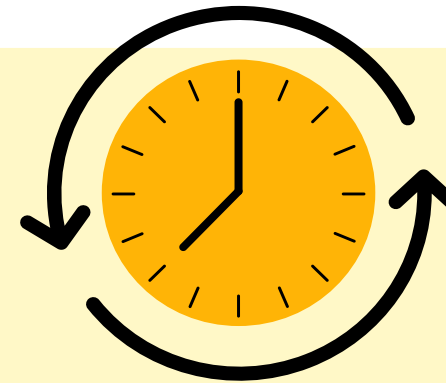
When IOPA radiographs are rejected, new radiographs will be taken and this leads to:



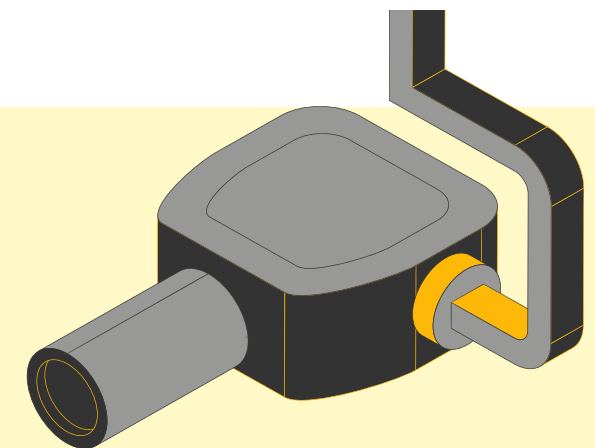
Increased/ unnecessary radiation exposure



Increased cost (films & chemicals)



Increased treatment time



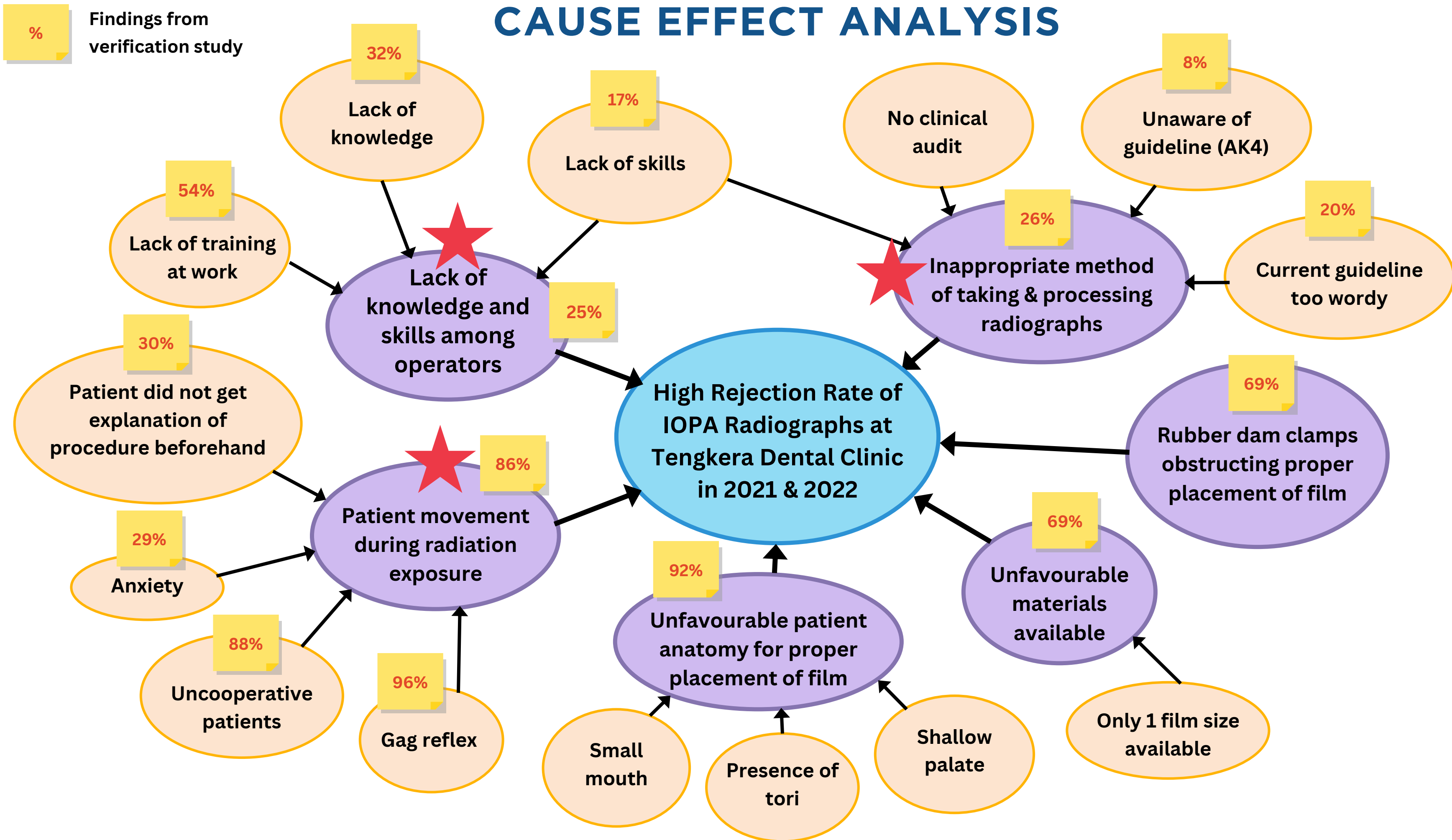
Reduced x-ray tube life

(Zewdu *et al.* 2017)

# PROBLEM STATEMENT

<b>INTRODUCTION</b>	Intra-oral periapical (IOPA) radiographs are a valuable diagnostic tool in dentistry to diagnose dental diseases in adjunct to clinical examination.
<b>PROBLEM</b>	High rejection rate of IOPA radiographs at Klinik Pergigian Tengkerana in 2021 and 2022 (Not meeting state level quality objective of <5%)
<b>EFFECT</b>	When IOPA radiographs are rejected, new radiographs will be taken and this leads to: <ul style="list-style-type: none"><li>• Increased radiation exposure</li><li>• Increased cost (film &amp; processing chemicals)</li><li>• Increased total treatment time</li><li>• Reduced x-ray tube life</li></ul>
<b>PROBLEM CAUSES</b>	Lack of knowledge and skills among operators, inappropriate methods used, patient movement during radiograph taking
<b>AIM OF STUDY</b>	To reduce the rejection rate of IOPA radiographs at Tengkerana Dental Clinic to <5%

# CAUSE EFFECT ANALYSIS



# STUDY OBJECTIVES

## General Objective

To reduce the rejection rate of IOPA radiographs taken at Tengker Dental Clinic.

## Specific Objectives

- To determine the **rejection rate** of IOPA radiographs taken at Tengker Dental Clinic.
- To determine the **factors** causing high rejection rate of IOPA radiographs.
- To recommend and institute **remedial measures** to reduce the rejection rate of IOPA radiographs to under 5%.
- To evaluate the **effectiveness** of the remedial measures taken.





# **KEY MEASURES FOR IMPROVEMENT**

# INDICATOR & STANDARD

**Indicator** Percentage of rejected IOPA radiographs at Tengkeru Dental Clinic

**Formula**

$$\frac{\text{Number of rejected IOPA radiographs}}{\text{Total number of IOPA radiographs taken}} \times 100\%$$

**Standard** Less than 5% of total IOPA radiographs taken at Tengkeru Dental Clinic (in line with state level quality objective and monitored by SIRIM)

# INCLUSION & EXCLUSION CRITERIA

## Inclusion criteria

All IOPA radiographs taken conventionally at Tengkeru Dental Clinic

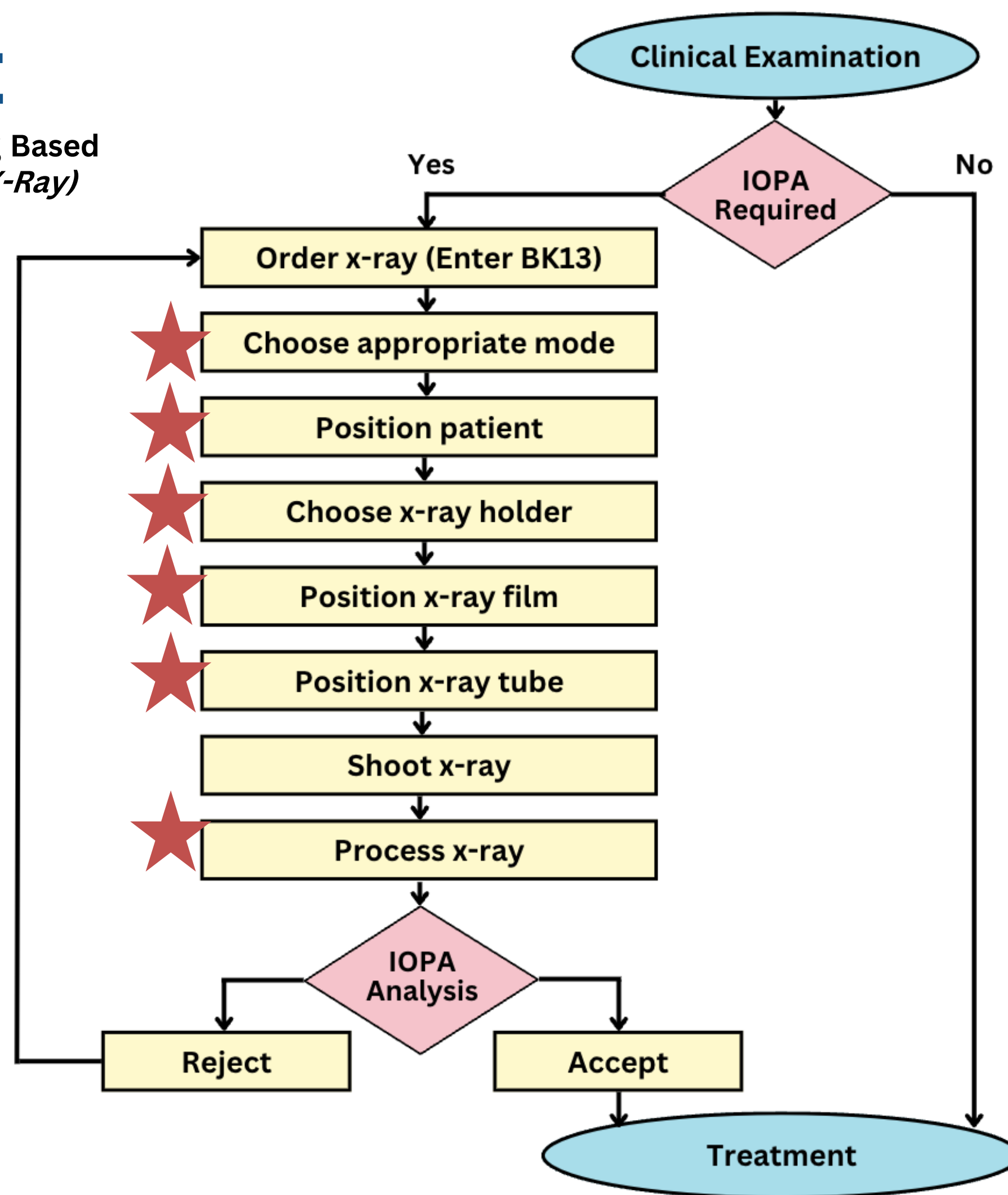
## Exclusion criteria

Nil

# PROCESS OF CARE

Process of Radiograph Taking and Processing Based On State Level Guideline (*AK4 Pengambilan X-Ray*)

★ Critical step



# MODEL OF GOOD CARE

	Process	Criteria	Standard	Pre-remedial
			%	%
1	<b>Choosing the appropriate mode for the area/ tooth of interest</b>	Choosing the correct exposure setting according to: <ul style="list-style-type: none"> <li>- the type of area/ tooth of interest, and</li> <li>- the patient's size.</li> </ul>	<b>100</b>	<b>60</b>
2	<b>Positioning of patient</b>	Ensure patient sit upright and does not move during shooting of x-ray.	<b>100</b>	<b>45</b>
3	<b>Choosing the appropriate x-ray film holder</b>	Choose the appropriate x-ray film holder according to the area/ tooth of interest.	<b>100</b>	<b>100</b>
4	<b>Positioning of x-ray film</b>	Position the x-ray film as close as possible to the area/ tooth of interest.	<b>100</b>	<b>95</b>
5	<b>Positioning of x-ray tube</b>	Ensure the x-ray tube is parallel to the x-ray paralleling kit.	<b>100</b>	<b>95</b>



# MODEL OF GOOD CARE

	Process	Criteria	Standard	Pre-remedial
			%	%
6	X-ray processing		<u>100</u>	<u>50</u>
		• Inject the correct amount of DQE solution into the corner of the x-ray film packet.	100	100
		• Agitate the injected packet for more than 30 secs.	100	0
		• Immerse the x-ray film in the hardening solution.	100	100
		• Wash the hardened film in running water for >15 mins.	100	0
	• Drying film in the shade and good ventilation not more than 25°C.	100	50	



# **PROCESS OF GATHERING INFORMATION**

# METHODOLOGY

<b>Study Design</b>	<b>Prospective cross-sectional study</b>
<b>Study period</b>	<b>Pre-remedial: April-June 2023 Remedial cycles: July-December 2023 Post-remedial: January-March 2024</b>
<b>Sample population</b>	<b>All Dental Officers (DOs) and Dental Surgery Assistants (DSAs) and patients who had IOPA radiographs taken at Tengker Dental Clinic</b>
<b>Sampling method</b>	<b>Purposive sampling</b>
<b>Sample size</b>	<b>Pre-remedial: 46 (16 DOs, 9 DSAs, 21 patients) Post-remedial: 46 (16 DOs, 9 DSAs, 21 patients)</b>
<b>Study tools</b>	<b>BK13 (Monthly report), Questionnaire, Clinical Audit Form, Patient Satisfaction Survey</b>

# STUDY TOOL 1

## BK13 (MONTHLY REPORT)

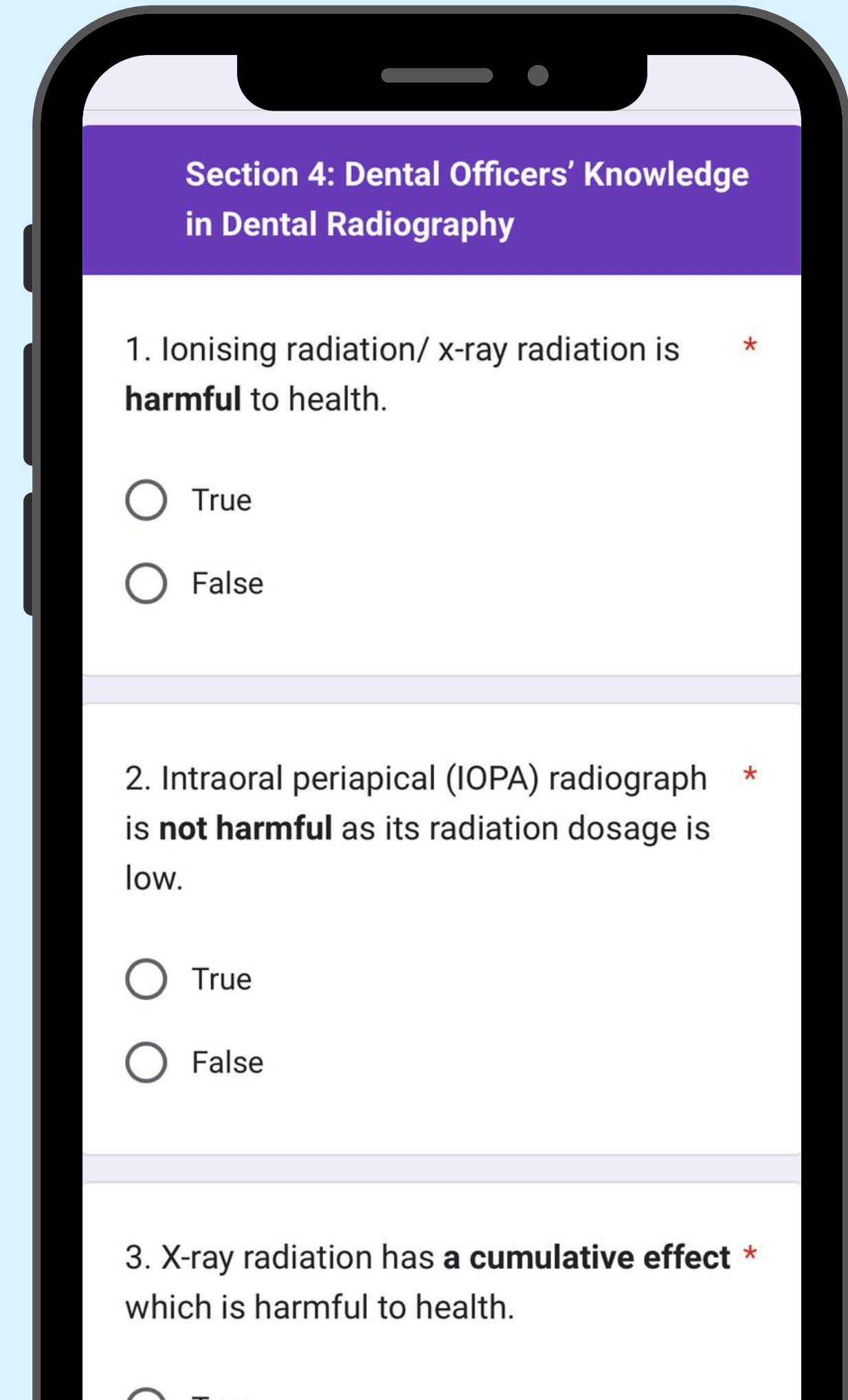
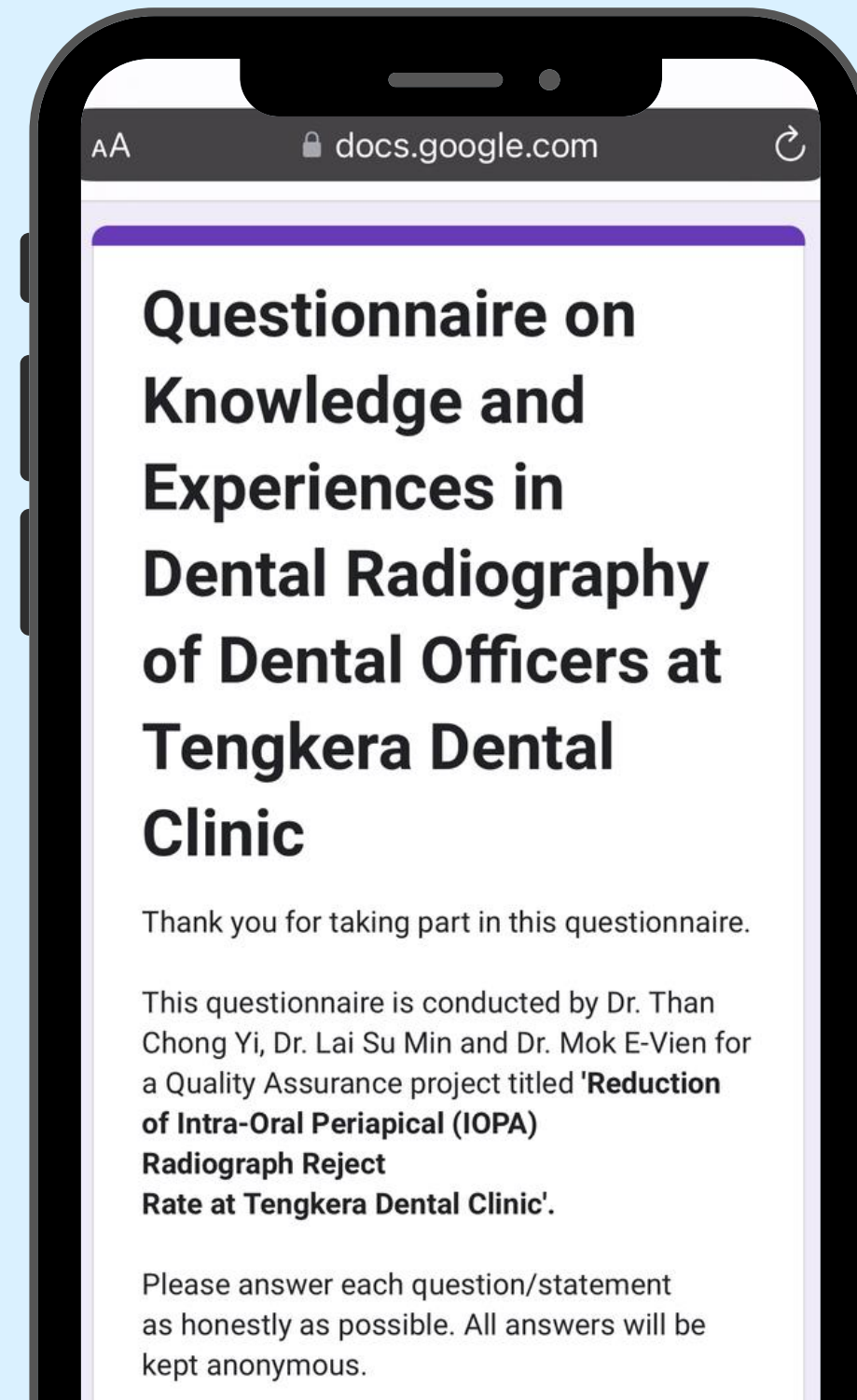
RINGKASAN DAFTAR BULANAN PENGAMBILAN X-RAY KLINIK PERGIGIAN TENKERA																
BULAN : JAN-DIS 2023																
KLINIK : KP TENKERA (PRIMER)																
BULAN	Baru	Ulangan	Jumlah Diambil	JENIS X-RAY			JUMLAH X-RAY DIAMBIL	Bil. Ditolak			Sebab X-ray ditolak**				Peratus X-ray ditolak	% Redo X-ray
				PA (PERIAPICAL)	BW (BITE WING)	O (OCCLUSAL)		Diterima	Ditolak	JUMLAH	Terlalu gelap / cerah	Kawasan tidak diambil	Terlalu panjang/pendek (distortion)	Lain-lain (sebutkan)		
JANUARI	50	2	52	52			52	50	2	52			2		3.85	3.85
FERUARI	68	4	72	72			72	68	4	72		4			5.6	5.6
MAC	75	4	79	79			79	74	5	79		2	1	2	6.3	5.1
APRIL	53	1	54	54			54	53	1	54		1			1.9	1.9
MEI	67	3	70	70			70	66	4	70	1	2	1		5.7	4.3
JUN	93	6	99	99			99	93	6	99		6			6.1	6.1
JULAI	91	2	93	93			93	91	2	93		1	1		2.2	2.2
OGOS	102	7	109	109			109	102	7	109	1	5			6.4	6.4
SEPTEMBER	68	1	69	69			69	68	1	69			1		1.4	1.4
OKTOBER	101	3	104	104			104	101	3	104	2	1			2.9	2.9
NOVEMBER	59	0	59	59			59	59	0	59					0.0	0.0
DISEMBER	82	4	86	86			86	86	4	90	1	3			4.4	4.7
<b>JUMLAH</b>	<b>909</b>	<b>37</b>	<b>946</b>	<b>946</b>	<b>0</b>	<b>0</b>	<b>946</b>	<b>911</b>	<b>39</b>	<b>950</b>	<b>5</b>	<b>25</b>	<b>6</b>	<b>2</b>	<b>4.1</b>	<b>3.9</b>



## STUDY TOOL 2

# QUESTIONNAIRE FOR DO & DSA (THEORETICAL ASSESSMENT)

Validated by a Restorative Specialist





# STUDY TOOL 3

## CLINICAL AUDIT (SKILL ASSESSMENT)

Validated by a Restorative Specialist

Lampiran A

### BORANG PEMANTAUAN PENGAMBILAN X-RAY INTRA-ORAL UNTUK PEGAWAI PERGIGIAN (BERASASKAN AK 4 PENGAMBILAN X-RAY)

Nama Klinik : KLINIK PERGIGIAN TENGERA  
 Nama Auditor : DR QUAKE / DR THAN  
 Tarikh Pemantauan : \_\_\_\_\_

KATEGORI	NO	VARIABEL	PESAKIT																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		ID PESAKIT	6496	0319	0336	0036	5626	5626	5398	5398	5450	5450										
		SN XRAY	56/11	7/12	8/12	9/12	12/12	13/12	14/12	15/12	48/12	49/12										
Pengambilan Xray Intra Oral (Jenis Konvensional)	1	Pastikan bahagian mulut yang hendak di x-ray	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
	2	Berikan penerangan tentang prosedur pengambilan x-ray kepada pesakit	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0
	3	Gunakan jenis filem x-ray yang sesuai	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	Rekod dalam Bk-13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	5	Pasangkan suis lampu amaran radiasi	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	6	Pastikan mesin xray berfungsi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	7	Pilih program x-ray yang sesuai mengikut bahagian mulut	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	0	1
	8	Minta pesakit duduk di atas kerusi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	9	Pasangkan apron pelindung sinaran x-ray pada pesakit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	10	Letakkan filem x-ray di sebelah dalam bahagian mulut yang hendak di x-ray	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
	11	Pastikan filem kekal pada bahagian yang hendak di x-ray	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	12	Tunjukkan tiub x-ray dengan betul pada bahagian mulut yang berkenaan	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
	13	Gunakan x-ray parelling kit sekiranya ada dan mengikut keadaan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	14	Minta pesakit jangan bergerak semasa pengambilan x-ray	1	0	0	1	1	1	0	0	0	0	1	0	0	1	1	1	0	0	1	0
	15	Mulakan pancaran sinaran x-ray	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	16	Keluarkan filem dari mulut pesakit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	17	Padamkan suis mesin x-ray dan lampu amaran radiasi	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	18	Minta pesakit menunggu di ruang menunggu/ bilik rawatan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Kod skor diisi sebagai	
0	: Tidak Tepat
1	: Tepat
TB	: Tidak Berkaitan

PENGIRAAN SKOR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
KAD RAWATAN	N (Jumlah skor)	19	6	20	20	19	20	12	20	20	19	20	19	20	9	18	20	19	20
	D (Jumlah variabel diperiksa)	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	Peratus skor (N / D ) x 100	95%	30%	100%	100%	95%	100%	60%	100%	100%	95%	100%	95%	100%	45%	90%	100%	95%	100%
	PURATA SKOR																		



# STUDY TOOL 4

## PATIENT SATISFACTION SURVEY

### Validated by a Restorative Specialist

#### Borang Kaji Selidik Pesakit Tentang Radiografi (Pengambilan X-ray) Gigi di Klinik Pergigian Tengker

Borang kaji selidik ini mengandungi 2 bahagian (A dan B).

Soalan berikut adalah soalan berkaitan pengalaman dan tahap kepuasan pesakit terhadap radiografi (pengambilan x-ray) gigi di Klinik Pergigian Tengker, Melaka.

Diharapkan anda menjawab semua soalan dengan ikhlas untuk membantu penyelidik mendapatkan maklumat yang tepat bagi menjalankan projek *Quality Assurance*.

Segala maklumbalas yang diberikan akan dirahsiakan.

Kerjasama anda melengkapkan soal selidik ini adalah amat dihargai.

#### Bahagian A: Maklumat Umum Pesakit

Umur:

Sila tandakan  dalam petak yang berkenaan.

- Golongan 17 tahun dan ke bawah
- Golongan 18 tahun – 59 tahun
- Golongan 60 tahun dan ke atas

#### Bahagian B: Pengalaman dan Tahap Kepuasan Pesakit Terhadap Radiografi (Pengambilan X-ray) Gigi

Sila tandakan  dalam petak yang berkenaan.

No.	Soalan	Ya	Tidak
1	Sebelum pengambilan x-ray gigi, adakah pemeriksaan gigi atau mulut dilakukan oleh doktor gigi terdahulu?		
2	(Untuk wanita dewasa sahaja) Sebelum pengambilan x-ray gigi, adakah doktor gigi bertanya sama ada anda mengandungi atau tidak?		

3	Sebelum pengambilan x-ray gigi, adakah doktor gigi memberitahu tentang keselamatan pengambilan x-ray gigi?		
4	Sebelum pengambilan x-ray gigi, adakah doktor gigi menjelaskan prosedur pengambilan x-ray gigi kepada anda?		
5	Adakah doktor gigi atau pembantu pembedahan pergigian memberitahu anda supaya tidak gerak semasa pengambilan x-ray gigi?		

6. Saya rasa takut semasa pengambilan x-ray.

1 (Tidak takut)	2	3	4	5	6	7	8	9	10 (Sangat takut)

7. Saya rasa sakit dalam mulut semasa pengambilan x-ray.

1 (Tidak sakit)	2	3	4	5	6	7	8	9	10 (Sangat sakit)

8. Saya rasa puas hati dengan prosedur pengambilan x-ray.

1 (Tidak puas)	2	3	4	5	6	7	8	9	10 (Sangat puas)

Ulasan atau cadangan tentang pengambilan x-ray gigi:

Tamat Borang Kaji Selidik





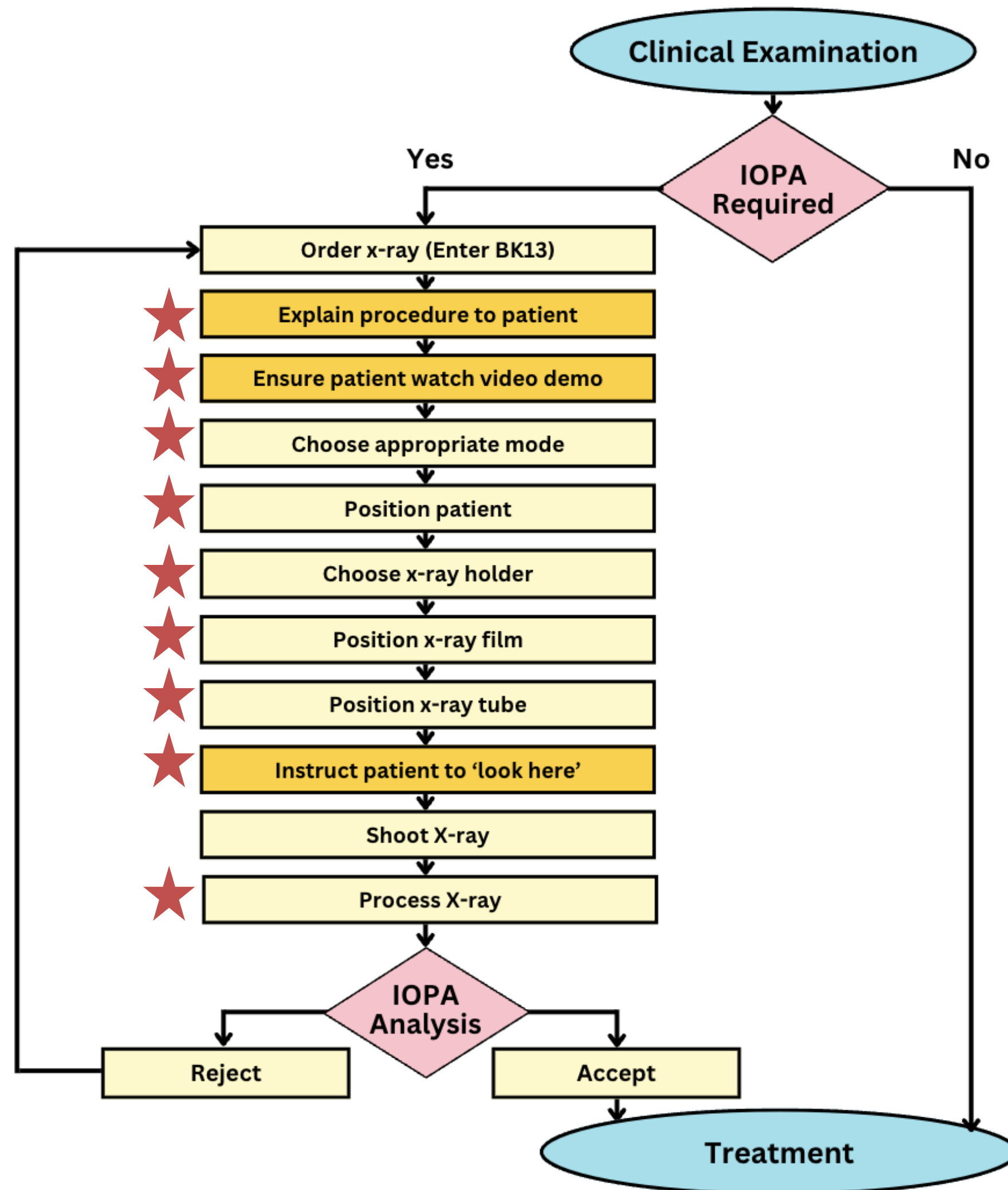
# **STRATEGY FOR CHANGE**



# NEW PROCESS OF CARE

Process of Radiograph Taking and Processing Based On State Level Guideline (AK4 Pengambilan X-Ray)

- ★ Critical step
- New critical step



# CYCLE 1

To improve operators' knowledge and skills



# 1

# INFOGRAPHIC GUIDELINE

- Convert current wordy guideline (AK4) to infographic posters

TANGGUNGJAWAB	TINDAKAN
<b>AK4 PENGAMBILAN X-RAY</b>	
<b>A. PENGAMBILAN X-RAY INTRA ORAL (JENIS KONVENSIONAL DAN DIGITAL):</b>	
PPPPP	1. Pastikan bahagian mulut yang hendak di x-ray.
PPP	2.1 Bagi Mesin X-ray jenis konvensional: <ul style="list-style-type: none"> <li>Gunakan jenis film x-ray yang sesuai</li> <li>Rekod dalam Daftar Pengambilan X-ray M-BKPNM-BK13 pin.01 terkini.</li> </ul>
	2.2 Bagi Mesin X-ray jenis digital: <ul style="list-style-type: none"> <li>Gunakan jenis sensor plate yang sesuai.</li> <li>Daftar dalam database di komputer induk</li> <li>Rekod dalam Daftar Pengambilan X-ray M-BKPNM-BK13 pin.01 terkini menggunakan nombor kad pengenalan pesakit.</li> </ul>
PPP	3. Pasangkan suis lampu amaran radiasi. Pastikan mesin x-ray berfungsi.
PPP	4. Pilih program x-ray yang sesuai mengikut bahagian mulut.
PPP	5. Minta pesakit duduk di atas kusi.
PPPPP	6. Pasangkan apron pelindung sinaran x-ray pada pesakit. Amankan kawalan jangkitan silang.
PPPPP	7. Letakkan film x-ray/sensor plate di sebelah dalam bahagian mulut yang hendak di x-ray dan pastikan film kekal pada tempat tersebut.
PPPPP	8. Tujuan tiub x-ray dengan betul pada bahagian mulut berkenaan. <ul style="list-style-type: none"> <li>Gunakan 'x-ray paralleling kit' sekiranya ada dan mengikut keadaan</li> </ul>

Tarikh Kuatkuasa: 29.1.2020

TANGGUNGJAWAB	TINDAKAN
PPP	9. Minta pesakit supaya jangan bergerak-gerak semasa pengambilan x-ray.
PPP	10. Mulakan pancaran sinaran x-ray.
PPP	11. Keluarkan film /sensor plate dari mulut pesakit.
PPP	12. Padamkan suis mesin x-ray dan lampu amaran radiasi.
PPP	13. Minta pesakit menunggu di ruang menunggu/bilik rawatan.
<b>B. PEMROSESAN FILEM X-RAY KONVENSIONAL:</b>	
	1. Dengan Menggunakan "Processor" :
PPP	1.1 Pastikan larutan developer dan fixer adalah mencukupi dan tidak melebihi tarikh luput.
PPP	1.2 Masukkan film x-ray ke dalam "processor" dan keluarkan film dari pembalut.
PPP	1.3 Cuci film dalam developer dan fixer mengikut cara dan masa yang betul.
PPP	1.4 Keluarkan film dari "processor" dan cuci dengan air paip bersih, kemudian teruskan ke langkah 2.8

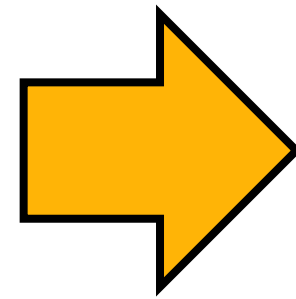
Tarikh Kuatkuasa: 29.1.2020

TANGGUNGJAWAB	TINDAKAN						
PPP	2.1 X-ray Instant Hanshin: <ul style="list-style-type: none"> <li>Sedakan larutan banchuan fixer mengikut arahan pada kotak pembungkusan X-ray.</li> </ul>						
PPP	2.2 Keluarkan larutan DQE dengan syringe						
PPP	2.3 Suntikkan larutan DQE dengan perlahan ke penjurus pembalut X-Ray mengikut ukuran yang ditetapkan: <table border="1"> <tr> <td>Dental Size</td> <td>3-3.5ml</td> </tr> <tr> <td>Junior Size</td> <td>2-2.5ml</td> </tr> <tr> <td>Occulual Size</td> <td>9-9.5ml</td> </tr> </table>	Dental Size	3-3.5ml	Junior Size	2-2.5ml	Occulual Size	9-9.5ml
Dental Size	3-3.5ml						
Junior Size	2-2.5ml						
Occulual Size	9-9.5ml						
PPP	2.4 Gerakan larutan DQE dengan memicing perlahan-lahan pembalut plastik film selama lebih dari 30 saat.						
PPP	2.5 Buka pembalut film						
PPP	2.6 Rendam film ke dalam larutan 'hardening' yang telah disediakan.						
PPP	2.7 Cuci film di bawah air mengalir lebih dari 15 minit dan tidak melebihi 30 minit.						
PPP	2.8 Pengecatan mesti dibuat pada tempat yang terlindung dan mempunyai peredaran udara yang baik serta tidak melebihi 25°C						
PPP	3. Film X-Ray diserahkan kepada Pegawai Pergigian untuk pengesahan status samada diterima atau tidak.						

Tarikh Kuatkuasa: 29.1.2020

TANGGUNGJAWAB	TINDAKAN
PPP	4. Bagi Perkhidmatan pesakit luar: <ul style="list-style-type: none"> <li>Label film X-Ray dengan 5 maklumat iaitu nama pesakit, tarikh x-ray diambil, no siri x-ray, no pembalut kad dan kawasan gigi terbit.</li> <li>Bagi X-ray yang tidak memuaskan dan tidak diterima, labelkan 'R' untuk 'reject'.</li> <li>Castikan no siri x-ray dan kawasan gigi pada kad rawatan</li> <li>Bagi Unit Pakar Periodontik sahaja:                             <ul style="list-style-type: none"> <li>X-ray di 'mount' pada transparency yang telah dicat nama pesakit dan kad pengiraan</li> <li>Pastikan setiap x-ray dicatikan tarikh diambil dan kawasan gigi.</li> <li>Simpan transparency (bersama film x-ray) ke dalam sampul (brosket) dan kepikan bersama kad rawatan LP 12.</li> </ul> </li> </ul>
PP	5. Castikan hasil penemuan x-ray ke dalam kad rawatan dan maklumkan kepada pesakit.
PPP	6. Kemaskini catatan pada Daftar Pengambilan X-ray M-BKPNM-BK13 pin.01 terkini.
PPP	7. Simpan film x-ray selepas rawatan ke dalam sampul plastik yang telah ditulis nama dan nombor pendaftaran pesakit.
PPP	8. Kepikan sampul berisi film x-ray pada kad rawatan.
PPP	9. Castikan dalam kad rawatan jika x-ray perlu dipaparkan bersama surat rujukan pesakit.
PPP	10. Ulang langkah A.2 hingga B bagi x-ray yang tidak diterima dan perlu diulang.

Tarikh Kuatkuasa: 29.1.2020



### Pengambilan X-Ray Intra Oral

Berdasarkan AK4 BKNM (Tarikh kuatkuasa: 29.1.2020)

**1**

Pastikan bahagian mulut yang hendak di x-ray.

**2**

Rekod dalam Daftar Pengambilan X-ray (BK13).

**3**

Pasangkan suis lampu amaran radiasi.

**4**

Pilih program x-ray yang sesuai mengikut bahagian mulut.

Tooth	Setting	Adult	Child
Incisor	KV MA Seconds	65 7 0.100	65 7 0.050
Premolar	KV MA Seconds	65 7 0.100	65 7 0.050
Lower Molar	KV MA Seconds	65 7 0.125	65 7 0.064
Upper Molar	KV MA Seconds	65 7 0.160	65 7 0.080

(Berdasarkan manual Progeny 8 inch Cone)

**5**

- Minta pesakit duduk.
- Pasangkan apron pelindung sinaran x-ray pada pesakit.

**6**

- Letakkan film x-ray di sebelah dalam bahagian mulut yang hendak di x-ray.
- Pastikan film kekal pada tempat tersebut.

**7**

- Tujukan tiub x-ray dengan betul pada bahagian mulut berkenaan.
- Gunakan 'x-ray paralleling kit' sekiranya ada & mengikut keadaan.

**8**

**Jangan bergerak!**

Minta pesakit supaya jangan bergerak-gerak semasa pengambilan x-ray.

**9**

Mulakan pancaran sinaran x-ray.

**10**

- Keluarkan film dari mulut pesakit.
- Padamkan suis mesin x-ray dan lampu amaran radiasi.

## Arahan Kerja (AK) 4



**BEFORE**





**AFTER**







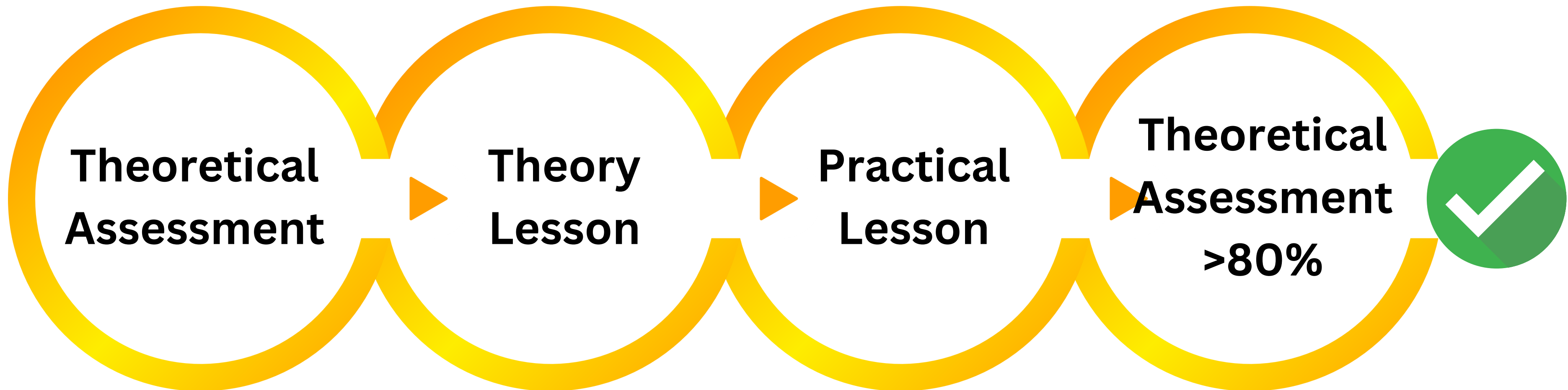
- Clear & concise
- Easy to refer to



# 2

## HANDS-ON WORKSHOP

- Conducted by a Restorative Specialist for DOs and DSAs













# 3

# CLINICAL AUDIT

- Conducted by Dental Officer In-Charge on all DOs and DSAs

Lampiran A

**BORANG PEMANTAUAN PENGAMBILAN X-RAY INTRA-ORAL UNTUK PEGAWAI PERGIGIAN (BERASASKAN AK 4 PENGAMBILAN X-RAY)**

Nama Klinik : KLINIK PERGIGIAN TENKERA  
 Nama Auditor : DR QUAKE / DR THAN  
 Tarikh Pemantauan : \_\_\_\_\_

KATEGORI	NO	VARIABEL	PESAKIT																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		ID PESAKIT	6496	0319	0336	0036	5626	5626	5398	5398	5450	5450										
		SN XRAY	56/11	7/12	8/12	9/12	12/12	13/12	14/12	15/12	48/12	49/12										
Pengambilan Xray Intra Oral (Jenis Konvensional)	1	Pastikan bahagian mulut yang hendak di x-ray	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	Berikan penerangan tentang prosedur pengambilan x-ray kepada pesakit	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0
	3	Gunakan jenis filem x-ray yang sesuai	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	Rekod dalam Bk-13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	5	Pasangkan suis lampu amaran radiasi	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	6	Pastikan mesin xray berfungsi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	7	Pilih program x-ray yang sesuai mengikut bahagian mulut	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	0	1
	8	Minta pesakit duduk di atas kerusi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	9	Pasangkan apron pelindung sinaran x-ray pada pesakit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	10	Letakkan filem x-ray di sebelah dalam bahagian mulut yang hendak di x-ray	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
	11	Pastikan filem kekal pada bahagian yang hendak di x-ray	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	12	Tujukan tiub x-ray dengan betul pada bahagian mulut yang berkenaan	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
	13	Gunakan x-ray parelling kit sekiranya ada dan mengikut keadaan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	14	Minta pesakit jangan bergerak semasa pengambilan x-ray	1	0	0	1	1	1	1	0	0	0	0	1	0	0	1	1	0	0	1	0
	15	Mulakan pancaran sinaran x-ray	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	16	Keluarkan filem dari mulut pesakit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	17	Padamkan suis mesin x-ray dan lampu amaran radiasi	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	18	Minta pesakit menunggu di ruang menunggu/ bilik rawatan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Kod skor diisi sebagai

0 : Tidak Tepat

1 : Tepat

TB : Tidak Berkaitan

PENGIRAAN SKOR																			
KAD RAWATAN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
N (Jumlah skor)	19	6	20	20	19	20	12	20	20	19	20	19	20	9	18	20	19	20	
D (Jumlah variabel diperiksa)	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
Peratus skor (N / D ) x 100	95%	30%	100%	100%	95%	100%	60%	100%	100%	95%	100%	95%	100%	45%	90%	100%	95%	100%	
<b>PURATA SKOR</b>																			

# CYCLE 2

To reduce patient movement during radiograph taking



# 4

# VIDEO DEMONSTRATION

- 2-minute explanation & demonstration for patients











KEMENTERIAN KESIHATAN MALAYSIA

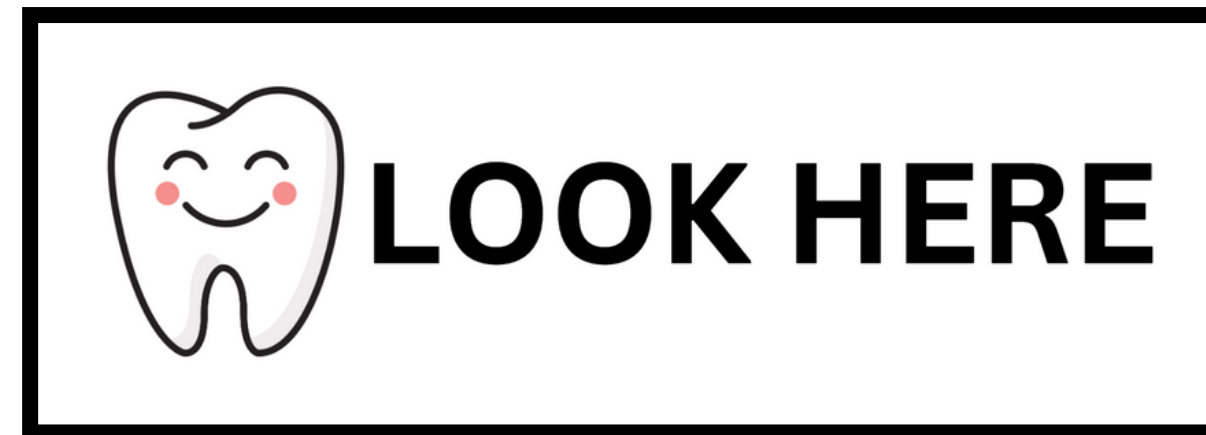
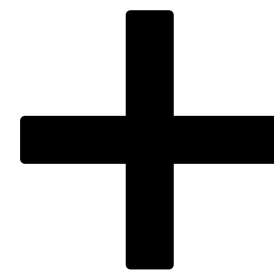
# 5

## 'LOOK HERE' SIGN

- Affordable, reproducible tool to help patients stay still



**Flexible phone holder**  
**RM9.90**



**Customisable sign**  
**Free of charge**





HAK KERAJAAN

Penerimaan X-Ray Intra Oral

1	2	5	6
3	4	7	8
9	10		



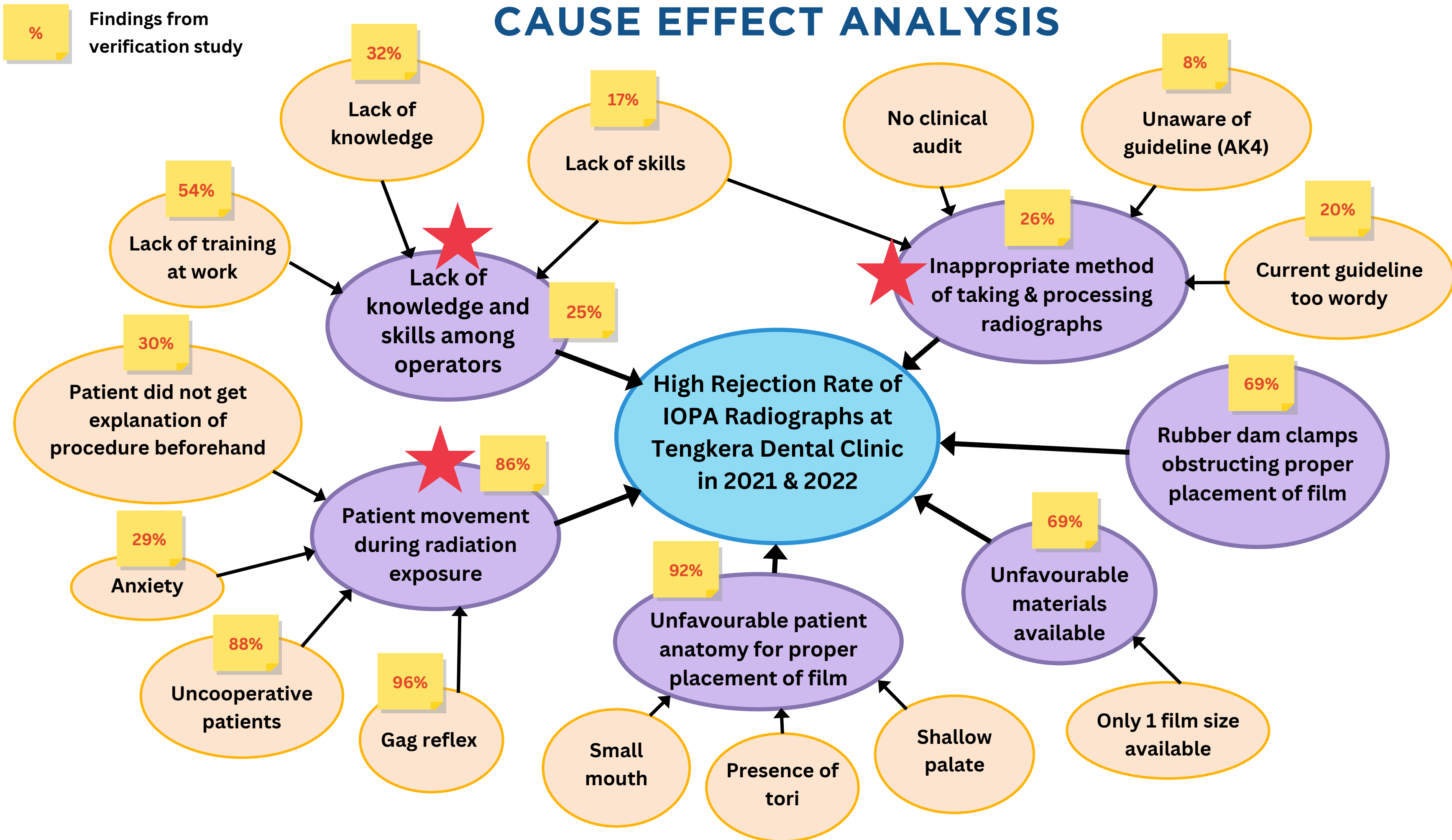








# CAUSE EFFECT ANALYSIS





# SUMMARY OF REMEDIAL MEASURES

Cycle 1

Cycle 2

	Remedial Measures	Area of focus
1	Infographic guideline	<ul style="list-style-type: none"> <li>• Lack of knowledge and skills among operators</li> <li>• Inappropriate method of taking &amp; processing radiographs</li> </ul>
2	Hands-on workshop	
3	Clinical audit	
4	Video demonstration	<ul style="list-style-type: none"> <li>• Patient movement during radiation exposure</li> </ul>
5	'Look here' sign	



# **EFFECTS OF CHANGE**



# NEW MODEL OF GOOD CARE

	Process	Criteria	Std.	Pre	Post
			%	%	%
<b>New</b>	<b>Explaining the procedure to patient</b>	Dentist explains procedure to patient verbally.	<b>100</b>	<b>0</b>	<b>100</b>
<b>New</b>	<b>Ensuring patient watch demo video</b>	Making sure that patient watch demo video before entering x-ray room.	<b>100</b>	<b>0</b>	<b>100</b>
<b>1</b>	<b>Choosing the appropriate mode for the area/ tooth of interest</b>	Choosing the correct exposure setting according to: <ul style="list-style-type: none"> <li>- the type of area/ tooth of interest, and</li> <li>- the patient's size.</li> </ul>	<b>100</b>	<b>60</b>	<b>95</b>
<b>2</b>	<b>Positioning of patient</b>	Ensure patient sit upright and does not move during shooting of x-ray.	<b>100</b>	<b>45</b>	<b>95</b>
<b>3</b>	<b>Choosing the appropriate x-ray film holder</b>	Choose the appropriate x-ray film holder according to the area/ tooth of interest.	<b>100</b>	<b>100</b>	<b>100</b>

 New critical step

# NEW MODEL OF GOOD CARE

	Process	Criteria	Std.	Pre	Post
			%	%	%
4	Positioning of x-ray film	Position the x-ray film as close as possible to the area/ tooth of interest.	100	95	100
5	Positioning of x-ray tube	Ensure the x-ray tube is parallel to the x-ray paralleling kit.	100	95	100
New	Instructing patient to 'look here'	Move the 'look here' sign to patient's eye level and remind patient to stay still throughout the procedure.	100	0	100

 New critical step



# NEW MODEL OF GOOD CARE

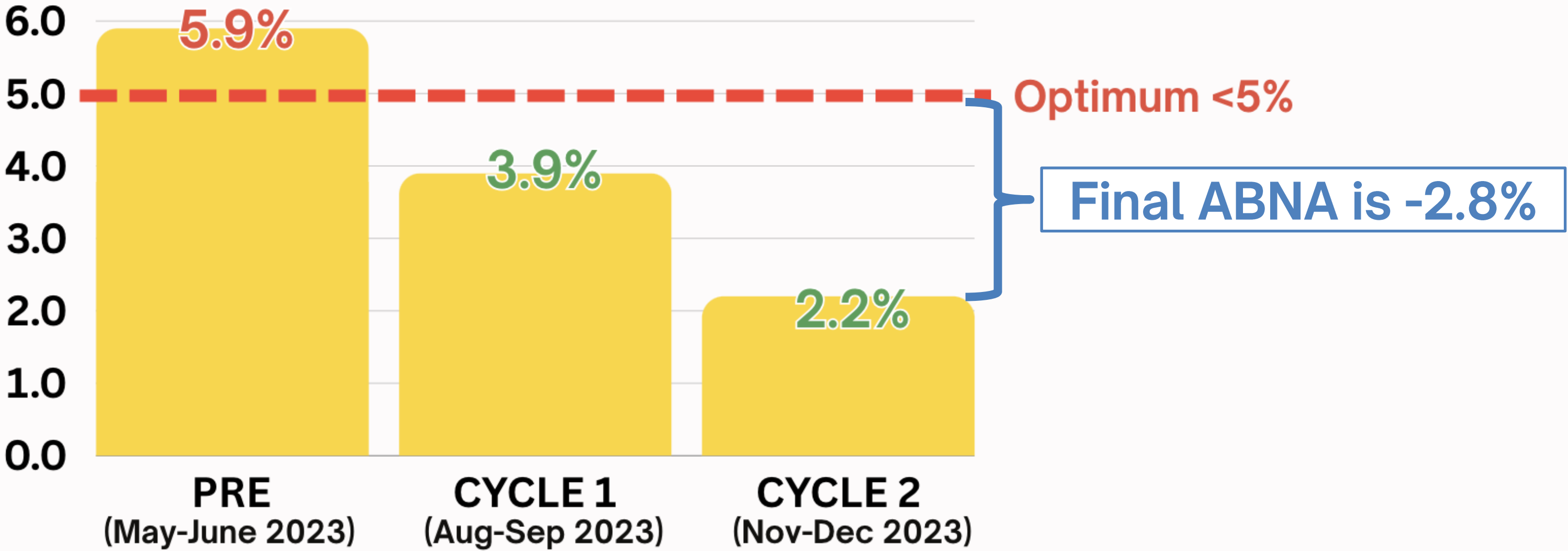
	Process	Criteria	Std.	Pre	Post
			%	%	%
6	X-ray processing	<ul style="list-style-type: none"> <li>Inject the correct amount of DQE solution into the corner of the x-ray film packet.</li> <li>Agitate the injected packet for more than 30 secs.</li> <li>Immerse the x-ray film in the hardening solution.</li> <li>Wash the hardened film in running water for &gt;15 mins.</li> <li>Drying film in the shade and good ventilation not more than 25°C.</li> </ul>	<b><u>100</u></b>	<b><u>50</u></b>	<b>98</b>
				<b>100</b>	<b>100</b>
				<b>0</b>	<b>100</b>
				<b>100</b>	<b>100</b>
				<b>0</b>	<b>90</b>
			<b>50</b>	<b>100</b>	



# POST-REMEDIAL ANALYSIS (ABNA)

Based on monthly report BK13

Rejection Rate (%)



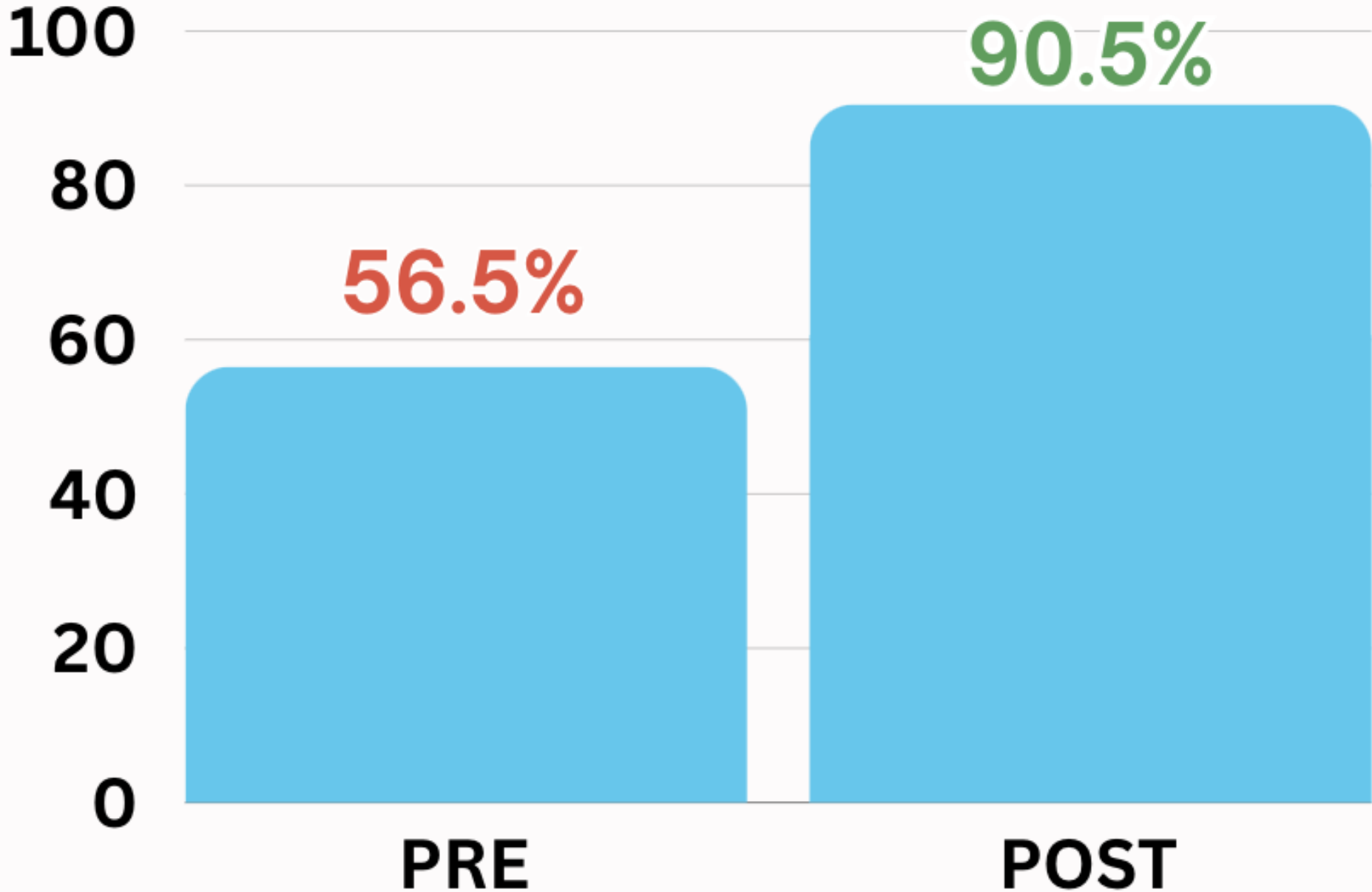




# OPERATORS' KNOWLEDGE

Based on Theoretical Assessment among Operators

Average score (%)



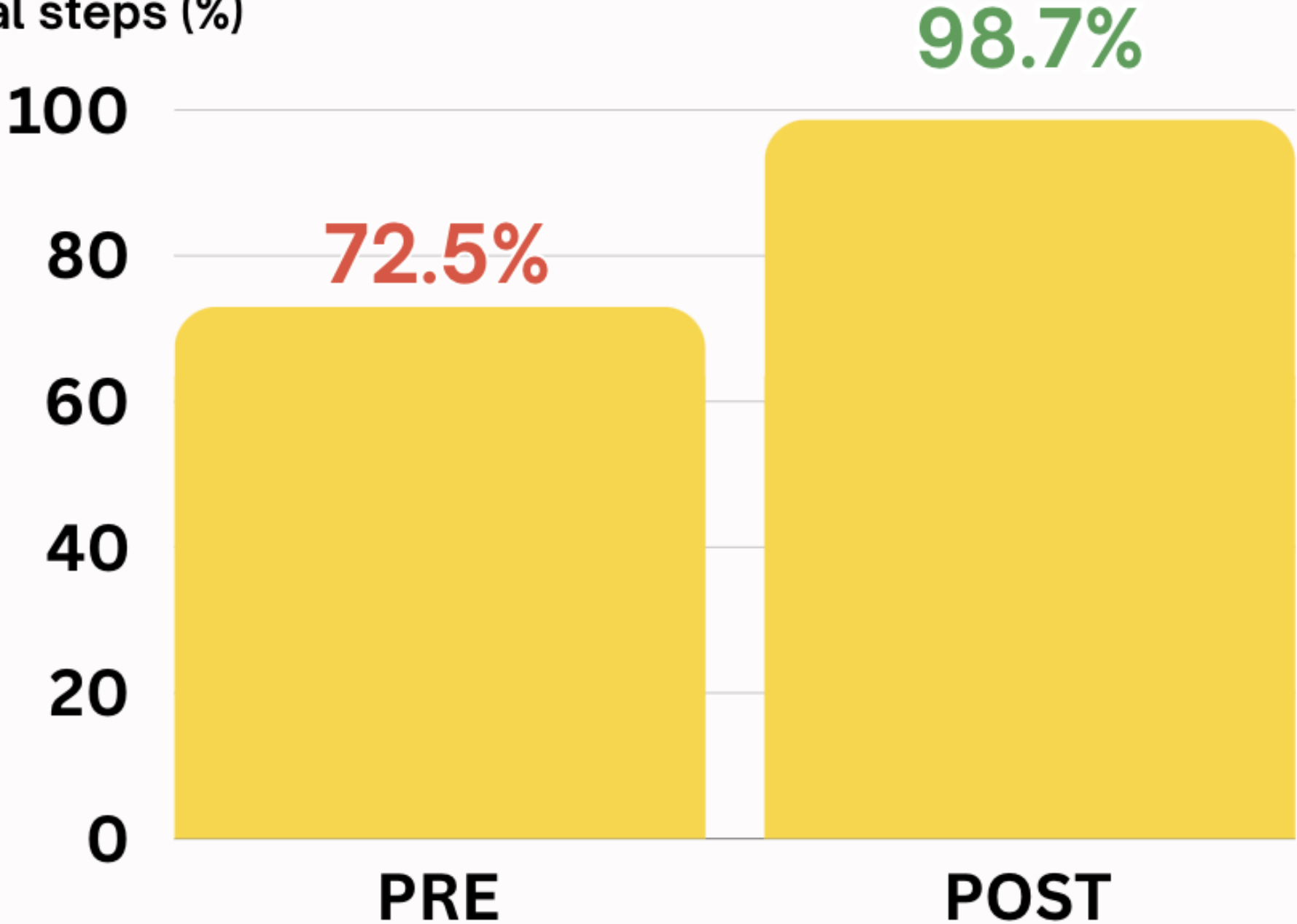
34% improvement



# OPERATORS' SKILLS


Based on Clinical Audit

Adherence to critical steps (%)



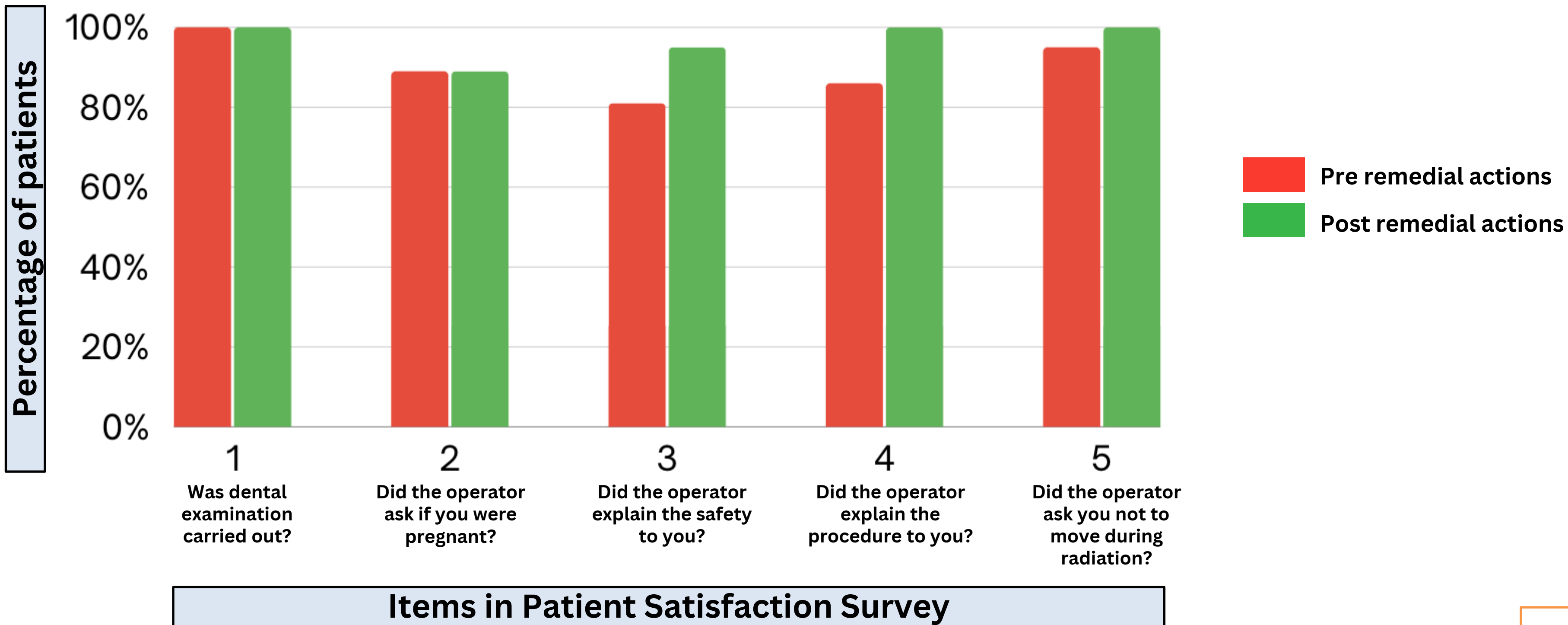
26.2% improvement





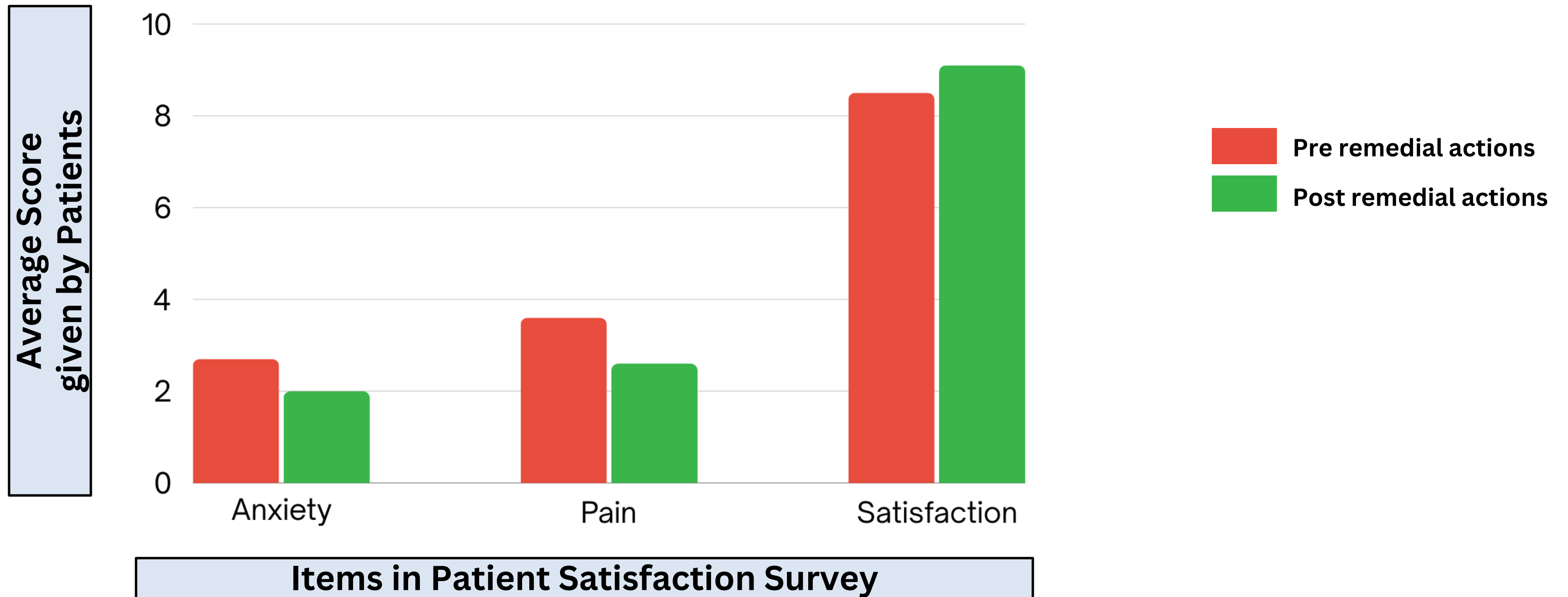
# PROJECT IMPACT

# Patient **Experience** towards IOPA Radiograph Taking Procedure





# Patient **Satisfaction** towards IOPA Radiograph Taking Procedure



# FEEDBACK FROM PATIENTS

## BEFORE REMEDIAL MEASURES

Ulasan atau cadangan tentang pengambilan x-ray gigi:

*Would appreciate to know risk of number of times X-ray taken within a period. Feel uncomfortable with equipment in mouth.*

**“I would appreciate to know risk of number of times x-ray taken within a period. Feel uncomfortable with equipment in mouth.”**

Ulasan atau cadangan tentang pengambilan x-ray gigi:

*Letak peralatan dlm mulut tidak selesa. Jika boleh have 'stand' for alat.*

Tamat Borang Kaji Selidik

**“Letak peralatan dalam mulut tidak selesa. Jika boleh, have ‘stand’ for alat.”**



# FEEDBACK FROM PATIENTS

## AFTER REMEDIAL MEASURES

Ulasan atau cadangan tentang pengambilan x-ray gigi:

Terbaik

“Terbaik”

Ulasan atau cadangan tentang pengambilan x-ray gigi:

Video pengenalan pengambilan x-ray diteruskan supaya pesakit faham.

“Video pengenalan pengambilan x-ray diteruskan supaya pesakit faham.”

Ulasan atau cadangan tentang pengambilan x-ray gigi:

Tak faham B.M., mulut rasa ~~tek~~ penuh, tak selesa

“Tak faham BM.  
Mulut rasa penuh, tak selesa”

# 43% COST REDUCTION

## RM 3.60 PER IOPA RADIOGRAPH (FILM + CHEMICAL)

YEAR	NO. OF REJECTED FILMS	COST (RM)
2022	68	244.80
2023	39	140.40
DIFFERENCE	29	104.40



## **EXPENSES: RM 20.40**

<b>ITEMS</b>	<b>COST (RM)</b>
Flexible phone holder	9.90
Poster printing	10.50
<b>Total</b>	<b>20.40</b>

**NET COST SAVED IN A YEAR: RM84.00**



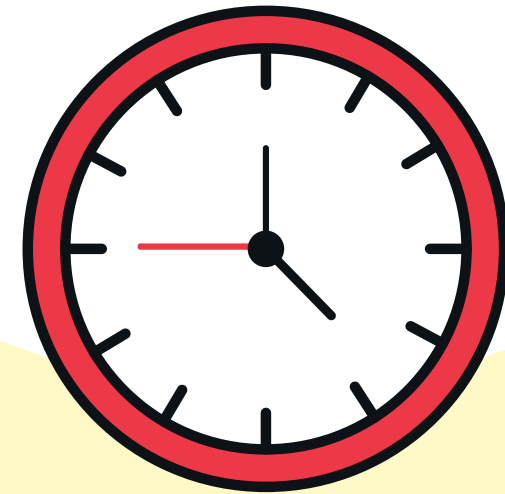
# **CHALLENGES & LESSONS LEARNED**



# CHALLENGES



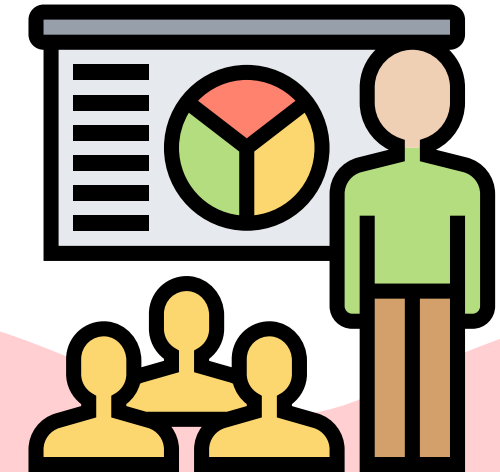
**1) Limited real patients available for hands-on workshop**



**2) Lack of time and supervisor to carry out clinical audit regularly**



**3) Some patients did not fully understand video & verbal explanation due to language barrier**



**4) Lack of basic knowledge and training on how to carry out QA projects**

# LESSONS LEARNT

1

Regular training & clinical audit are necessary to improve operators' skills and knowledge.

2

Infographics can be more effective than wordy guidelines to convey complex instructions.

3

Patient experience & satisfaction can be enhanced through effective communication.

4

There is always space for improvement if we look into our current performance carefully and think critically.



The slide features a white background with decorative orange elements. In the top-left corner, there is a large, irregular orange shape and a smaller solid orange circle. In the bottom-right corner, there is a large, irregular orange shape and two smaller solid orange circles. The text 'THE NEXT STEP' is centered in a bold, black, sans-serif font.

# THE NEXT STEP

# OUR NEXT STEPS

1

Currently maintaining all remedial measures at Tengkeru Dental Clinic.

2

Currently expanding remedial measures to all government dental clinics in the Melaka Tengah district, to be followed by the entire Melaka.

3

To produce an English version of video demonstration to cater to a wider population of patients.

4

To liaise with Oral Health Division of Melaka to enhance the current dental radiography guideline and establish a new standard reject rate.


5

To introduce all remedial measures to the medical radiology department in Melaka.




# ENDORSEMENT LETTER

## From District Dental Office



**PEJABAT KESIHATAN PERGIGIAN DAERAH MELAKA TENGAH**  
 JALAN TUN SRI LANANG  
 75100 MELAKA

Tel : 06-2825122  
 Emel : ppdmktgh@moh.gov.my



---

**Dr. Lai Su Min (Ketua Kumpulan)**  
Klinik Pergigian Ayer Molek

**Dr. Than Chong Yi**  
Klinik Pergigian Tengker

**Dr. Mok E-Vien**  
Klinik Pergigian Ayer Molek

YBrs. Dr,

**SOKONGAN PROJEK QA PERGIGIAN DAERAH MELAKA TENGAH**

Merujuk kepada perkara di atas.

2. Sukacita pihak kami memaklumkan bahawa, Kumpulan QA Melaka Tengah diketuai oleh Dr Lai Su Min, sebagai Kumpulan QA Pejabat Pergigian Daerah Melaka Tengah.

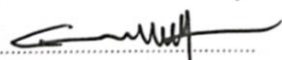
3. Oleh itu, saya menyokong projek Kumpulan QA ini kerana impaknya amat baik dari segi keberkesanan penyampaian perkhidmatan kesihatan pergigian kepada pelanggan. Remedial measures akan turut digunakan di Klinik Pergigian Cheng dan Klinik Pergigian Ayer Molek sebagai langkah awal penyeragaman projek QA tersebut di daerah ini.

3. Sehubungan itu, YBrs. Dr diharap dapat memberi sepenuh kerjasama dan komitmen bagi menjayakan projek ini. Segala kerjasama yang diberikan amatlah dihargai.


Sekian, terima kasih.





**"MALAYSIA MADANI"**  
**"TAHUN MELAWAT MELAKA 2024 (TMM 2024)"**  
**"BERKHIDMAT UNTUK NEGARA"**

Saya yang menjalankan amanah,



**(DR. NOORUL NADIAH BINTI NOOR ZAMRY – MDC 4474)**  
 Pakar Pergigian Kesihatan Awam  
 Pegawai Pergigian Daerah  
 Melaka Tengah

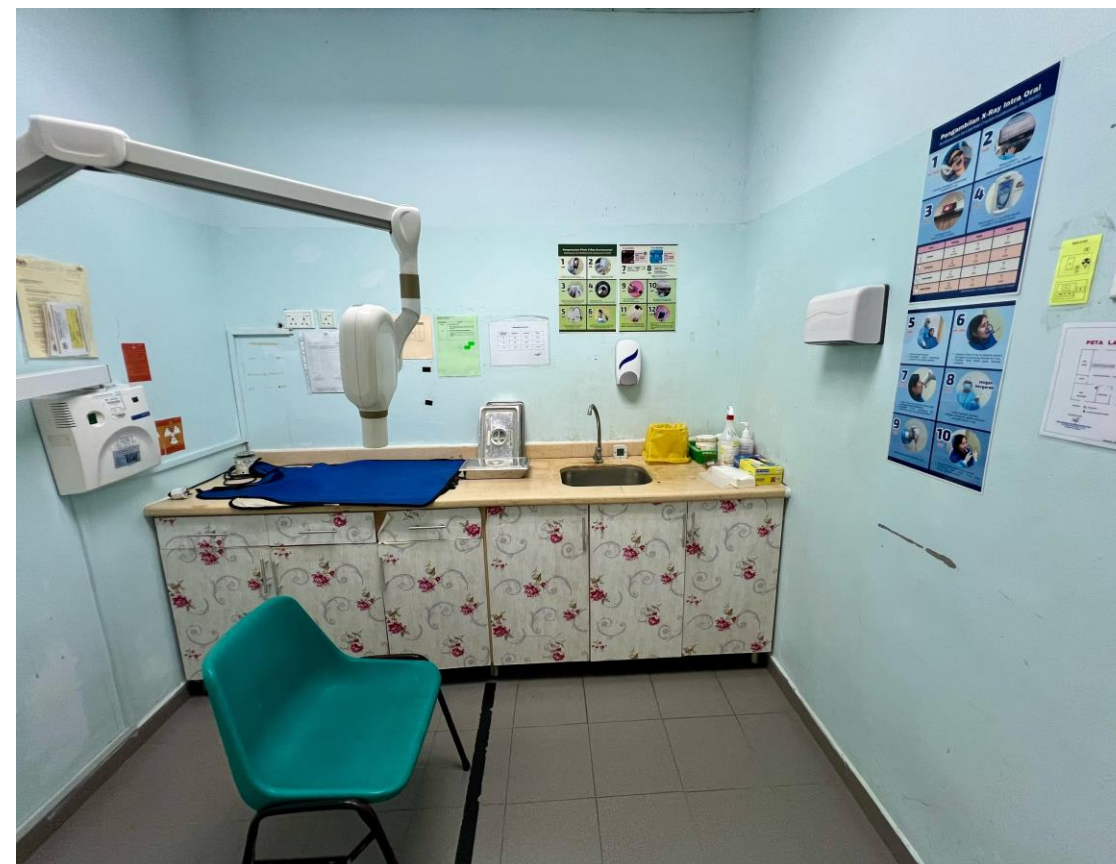


CERTIFIED TO ISO 9001:2015 CERT. NO. QMS 01397  
 (Sila nyatakan rujukan surat ini apabila menjawab )

# REMEDIAL MEASURES EXPANDED TO

## 1. Cheng Dental Clinic      2. Ayer Molek Dental Clinic

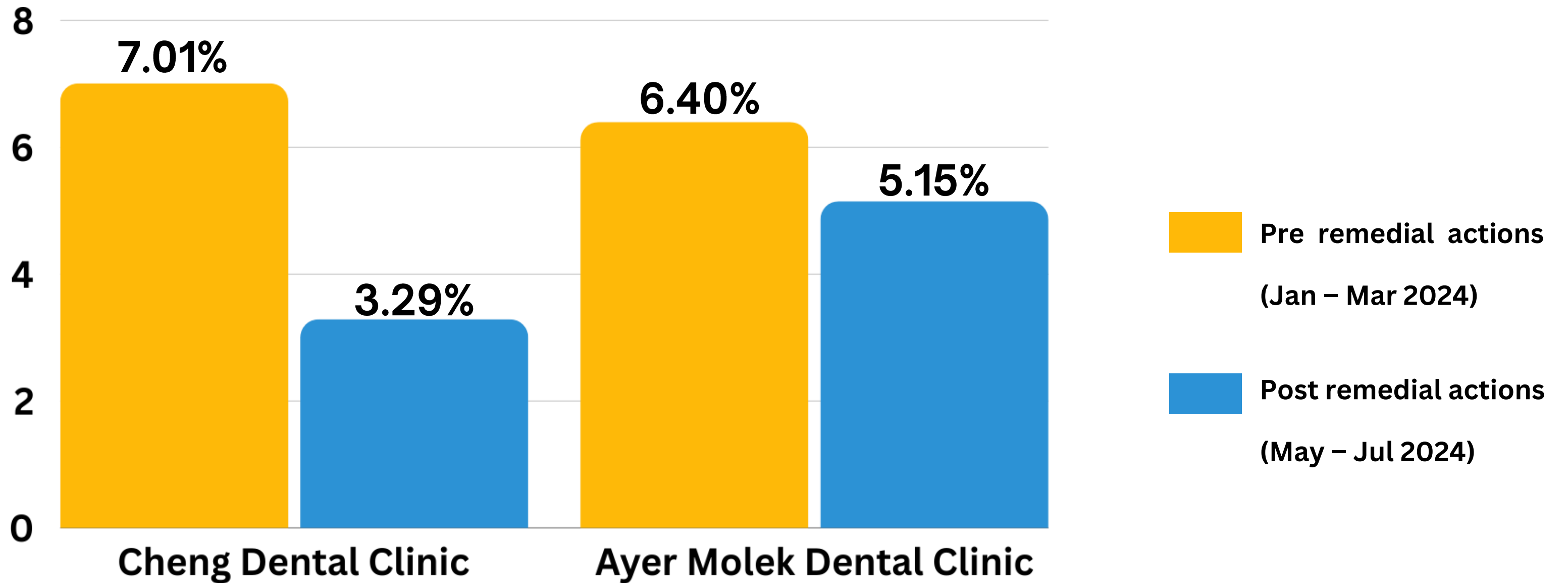






# POST-INTERVENTION ANALYSIS

Rejection Rate %



# GANTT CHART

Time	Apr -23	May -23	Jun -23	Jul -23	Aug -23	Sep -23	Oct -23	Nov -23	Dec -23	Jan -24	Feb -24	Mar -24	Apr -24	May -24
Committee establishment	Planned Actual													
Brainstorming & problem selection	Actual	Planned Actual	Planned Actual											
Verification study & problem analysis		Planned Actual	Planned Actual											
Cycle 1 – remedial action implementation and re-evaluation				Planned Actual	Planned Actual	Planned Actual								
Cycle 2 – remedial action implementation and re-evaluation							Planned Actual	Planned Actual	Planned Actual					
Discussion & report writing										Planned Actual	Planned Actual	Actual		
Presentation												Planned Actual	Planned Actual	Planned Actual

Planned  
 Actual

# REFERENCES

**Ali, S. A. (2018). Quality Analysis of periapical radiographs taken by Dental assistants. Journal of Liaquat University of Medical & Health Sciences, 17(04), 260–264. doi:10.22442/jlumhs.181740589**

**Arachchi, W. E., Chandrasena, W., Tudugala, R., & Jayasinghe, R. (2015). Rejest Analysis of Intra-Oral Periapical (IOPA) Radiographs of Department of Radiology, Dental Teaching Hospital, Peradeniya, Sri Lanka. Proceedings of 8th International Research Conference, KDU.**

**Baharon, Mohd.R. (2014) *Dental Radiography - portal myhealth, MyHealth*. Available at: <http://www.myhealth.gov.my/en/dental-radiography/> (Accessed: 10 March 2024).**

**Schüler, I. M., Hennig, C.-L., Buschek, R., Scherbaum, R., Jacobs, C., Scheithauer, M., & Mentzel, H.-J. (2023). Radiation exposure and frequency of Dental, bitewing and occlusal radiographs in children and adolescents. Journal of Personalized Medicine, 13(4), 692. doi:10.3390/jpm13040692**

**Yeung, A. W. K. (2019). The “as low as reasonably achievable” (alara) principle: A brief historical overview and a bibliometric analysis of the most cited publications. Radioprotection, 54(2), 103–109. doi:10.1051/radiopro/2019016**



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Negeri Melaka*

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and Cheng Dental Clinic**

**8. All patients involved in our QA study**



# THANK YOU

TOGETHER LET'S CONTINUE TO REDUCE  
THE REJECTION RATE OF RADIOGRAPHS