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1. BACKGROUND OF PROJECT SKYLINE VIEW

- One of the common request for extremities in General Radiography is **knee X-Ray**, which constitutes **13%** of the medical imaging requests in year 2021.
- Skyline view** (also known as Tangential / Axial / Sunrise View) is a common request of the knee X-Ray projection to visualize **patella, femoropatellar joint** and **intercondylar sulcus**.
- However, there were some challenges faced while performing the knee skyline view.



2. PROBLEM STATEMENT

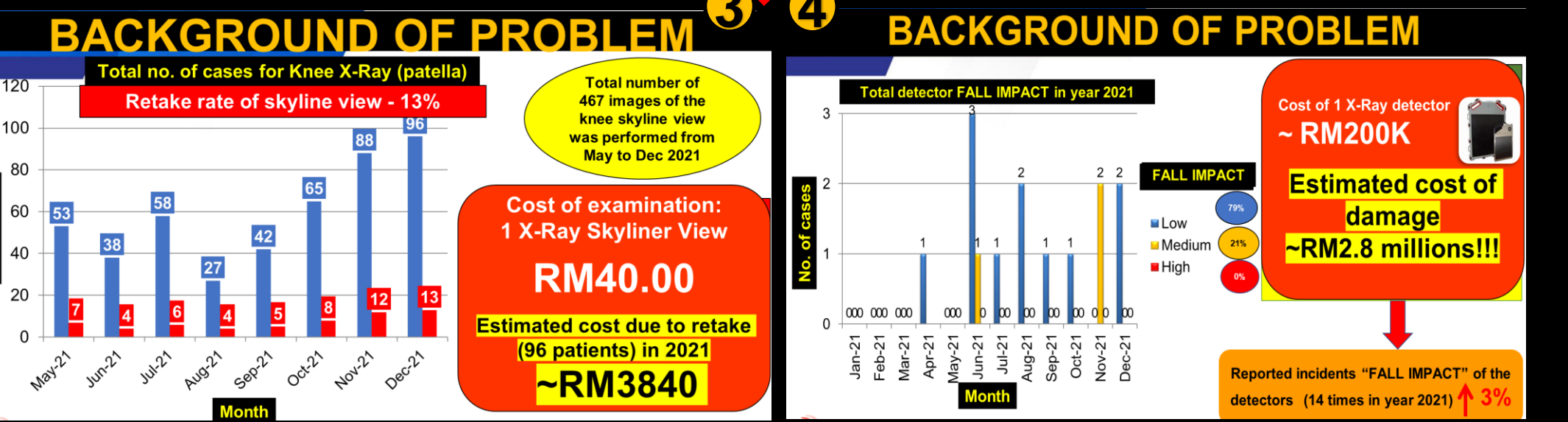
BACKGROUND OF PROBLEM SKYLINE VIEW

- Frequency of repetition of X-ray skyline (about >10%) due to blurred image caused by patient movement during exposure.
- Cost of 1 X-Ray detector ~RM200K
- Detector was unstable and had high tendency of falling as patient had to hold it in position manually
- Existing mobility devices are not compatible or ergonomic for some patients, especially patients who are old, weak or not strong

CURRENT PRACTICE - POSITIONING METHOD

LAURIN METHOD - CURRENT PRACTICE

- There is angled stand purchased for the patient depending on the degree of knee flexion
- No proper knee flexion and X-Ray beam angulation



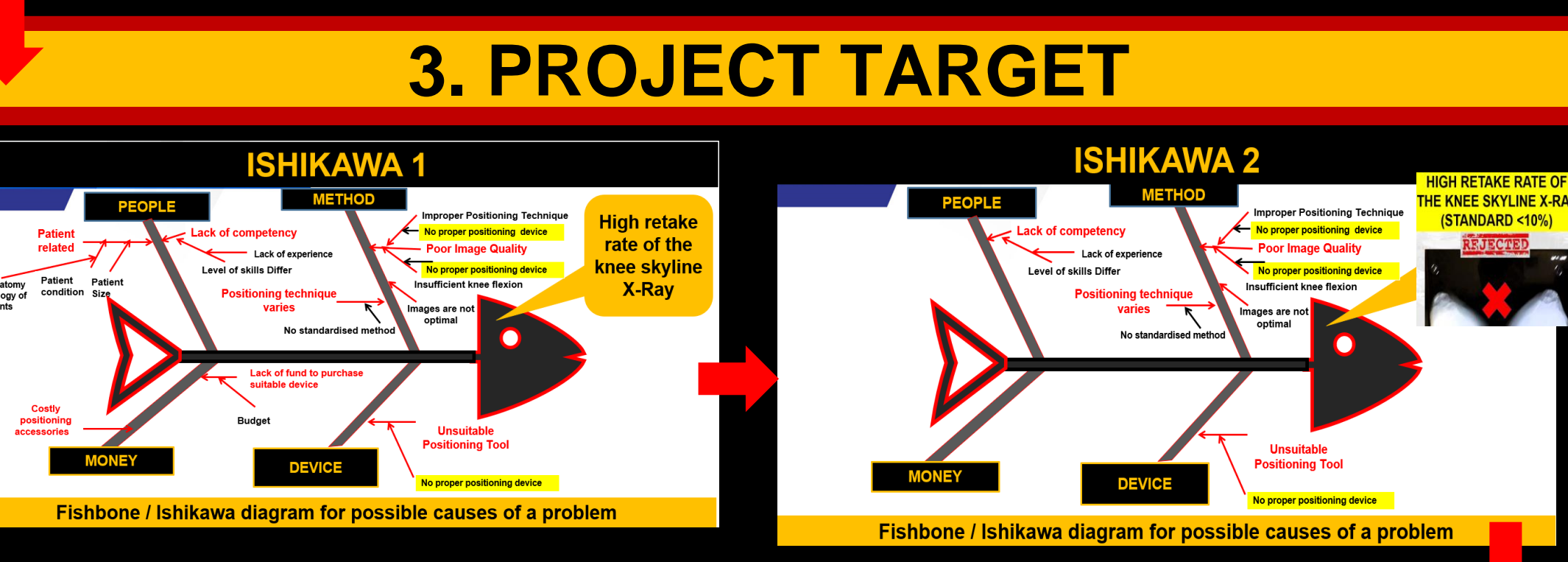
SMART

NO	PROBLEM	Weightage According to "SMART" criteria					TOTAL
		Specific	Measurability	Appropriateness	Remediable	Timeliness	
1	No standard method for knee skyline view	9	9	9	9	9	45
2	No suitable positioning device for knee skyline view	12	12	12	12	12	60
3	High risk of detector fall	10	10	10	10	10	50
4	Repetition of examination due to motion artifact	8	8	8	8	8	40
5	Poor image quality due to improper knee flexion	11	11	11	11	11	55

4 GROUP MEMBERS - RATING SCALE: 1=Low, 2=Medium, 3=High (*Max score 4 x 3 = 12)

ANALYSIS OF PROBLEM (5W 1H)

ANALYSIS OF PROBLEM	DETAILS
What	High retake rate of the knee skyline X-Ray
Why	No suitable positioning device for knee skyline X-Ray
Where	Department of Biomedical Imaging, South Tower, UMMC
When	During knee skyline view positioning
Who	i) Patients undergoing knee skyline examination ii) Radiographers involved in the examination process
How	Develop a suitable positioning device for knee skyline X-Ray



IMPACT OF PROBLEM TO STAKEHOLDERS

Stakeholders	Description	Positive impact with project completion	Negative impact without project completion	Degree of impact
Employees (Radiologists & Radiographers)	Enhanced image quality Reduced repetition Help with the diagnosis	Gain job satisfaction and sense of fulfilled Enhanced knowledge, skill & capacity Enhanced treatment (e.g. reduce radiation dose)	Increased risks of safety to patients (e.g. side effects of radiation) Lack of ownership	High
Patients & caregivers	Individuals who are sick and caregivers provide assistance to them Received diagnostic imaging services to improve treatment	Increased patients & caregivers satisfaction Reduced risks from imaging examinations Limited options to clinicians in regarding diagnostic imaging to improve treatment	Increased side effects from imaging examinations Customer complaints Bad reputation and litigation	High
Management	Planning, organizing and coordinating to provide quality service	Cost savings Increased safety	Increased risks in litigation Customer complaints	High
Legislative Dept	Organizing society and protecting citizens	Reduced risks of litigation organizing society and protecting citizens		High

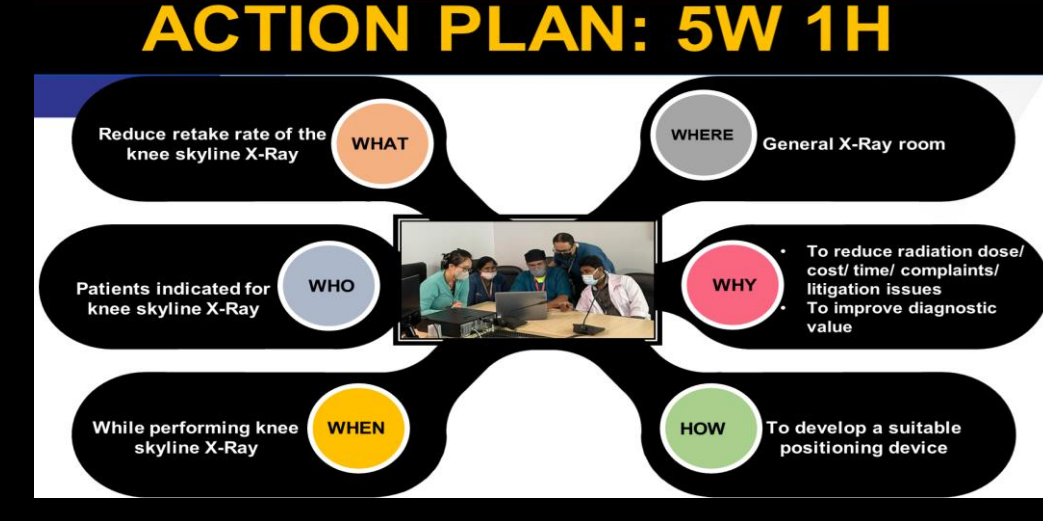
3. PROJECT TARGET - CONT'D

OBJECTIVE

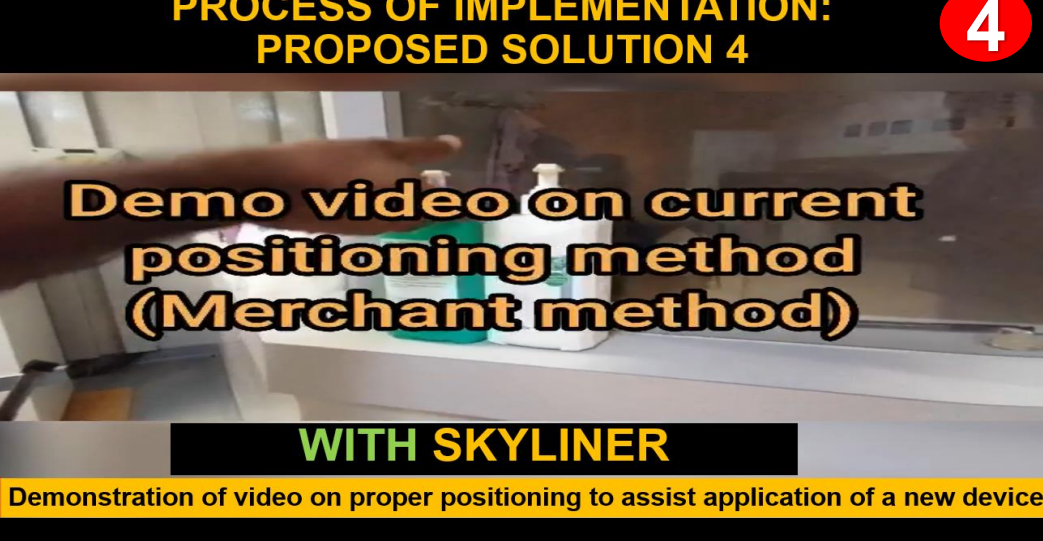
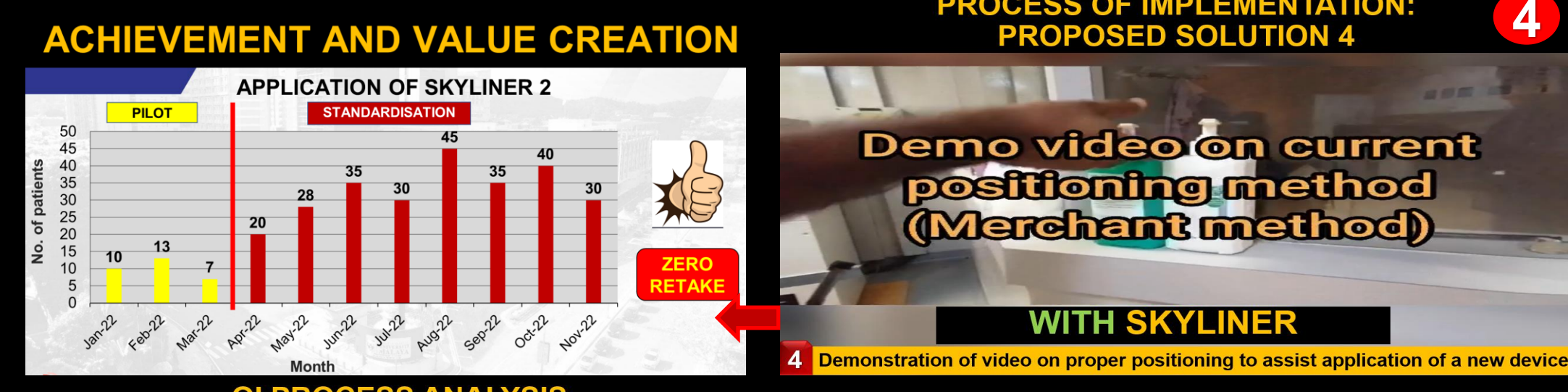
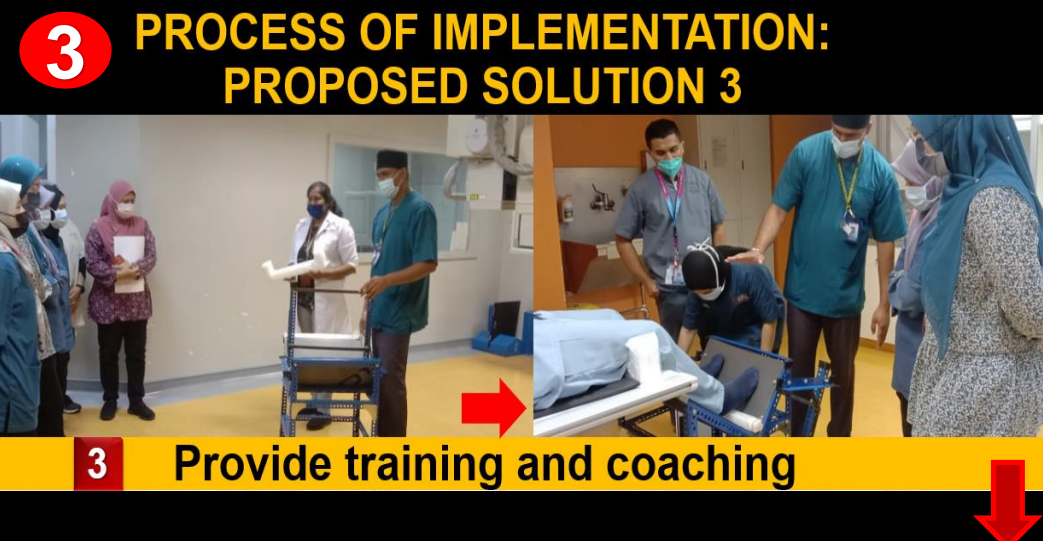
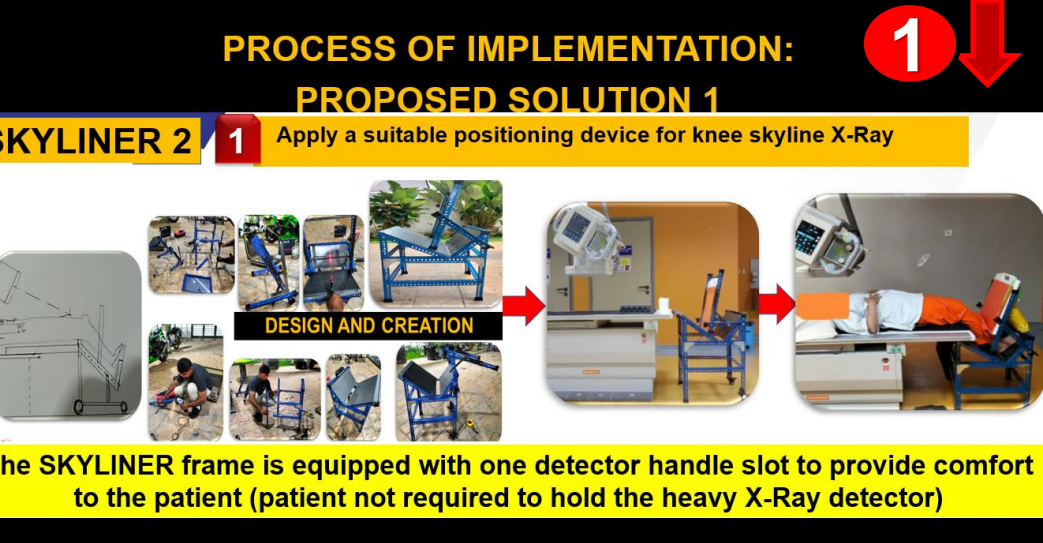
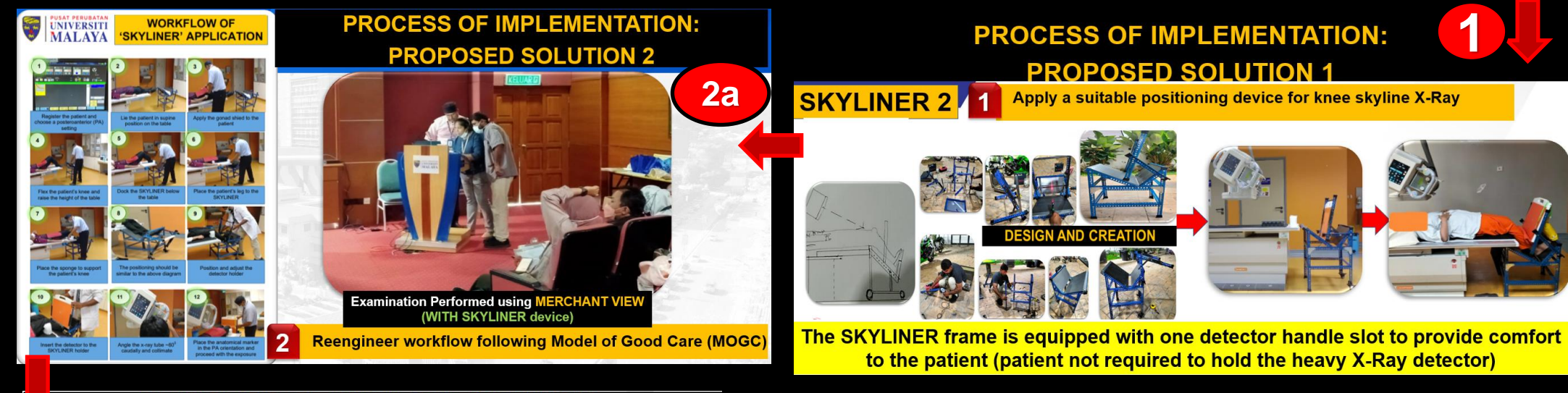
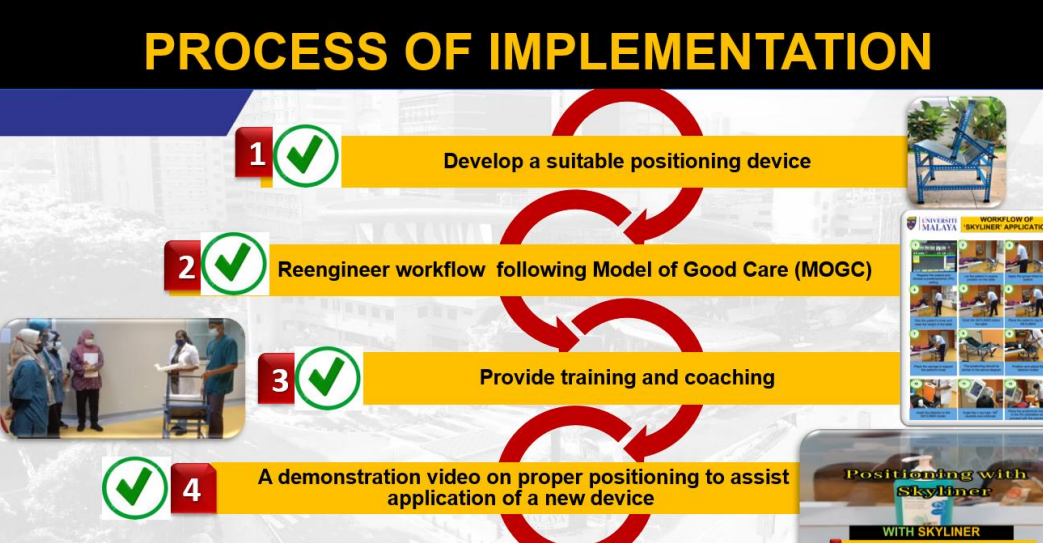
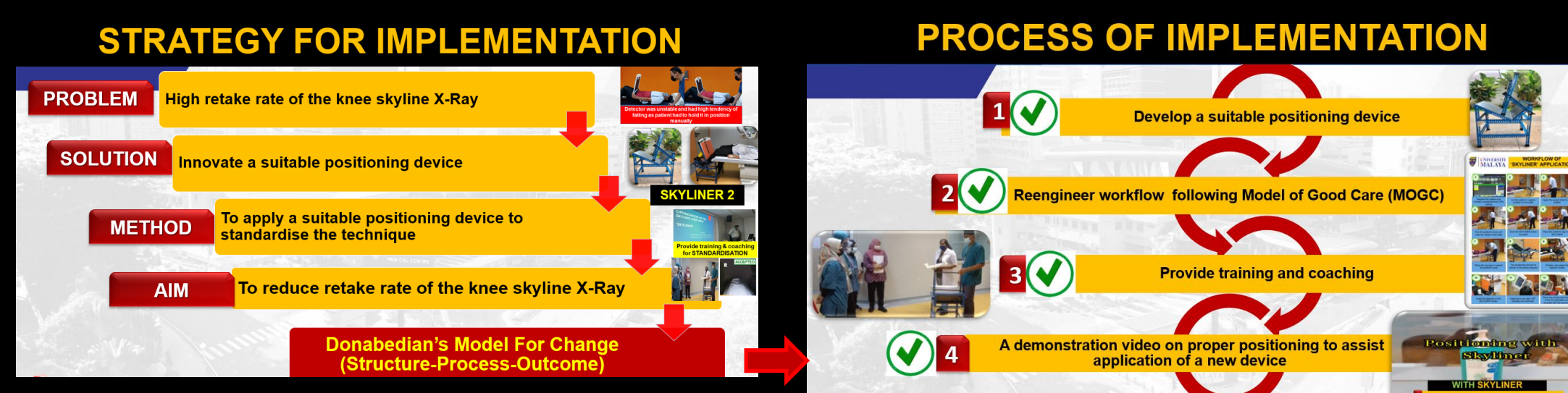
General objective:
To reduce the retake rate of the knee skyline X-Ray

Specific objectives:

- To develop suitable positioning device for knee skyline view
- To standardise the technique of positioning for knee skyline view
- To reduce radiation dose cost time



4. IMPLEMENTATION



PLAN-DO-CHECK-ACT CYCLE

PLAN: Problem identification, Problem selection, Identify root causes, Find innovative solution

DO: Gather information, Reengineer workflow, Apply and verify

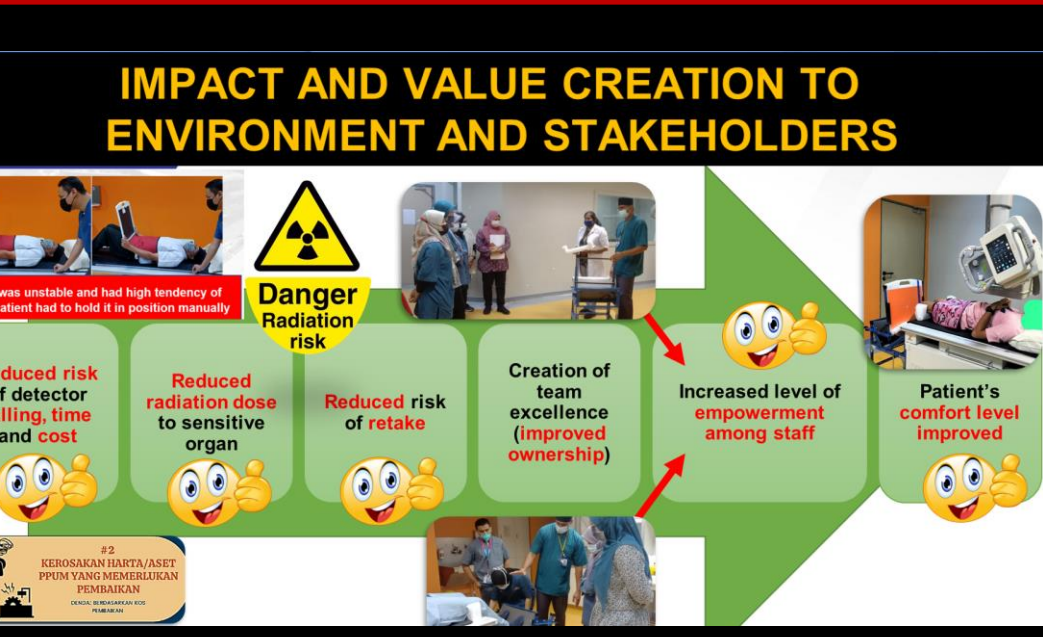
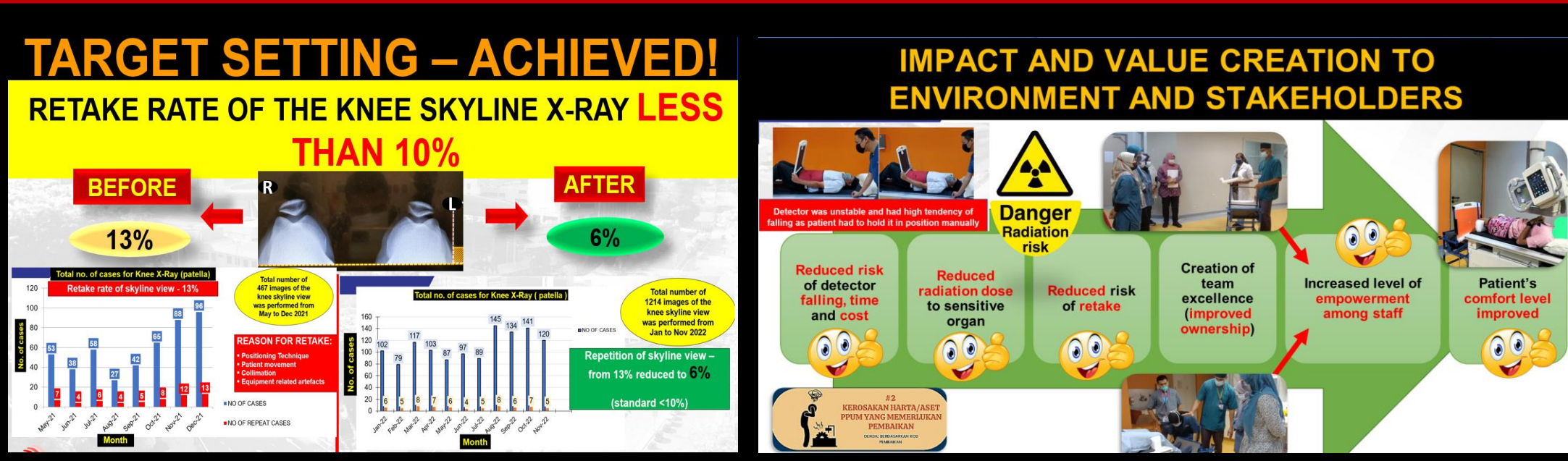
CHECK: Monitor new workflow, Justify image quality, Analyse data, Verify results of the actions taken

ACT: Standardisation, Staff empowerment, Preparation for the next level of plan

GANTT CHART

Year	Month	2021	2022	*PIC
Problem identification				G-A-S-B
Problem selection identify root causes				G-A-G-B
Find innovative solution				G-A-G-S
Gathering information Reengineer workflow				G-B-S-A
Apply and verify				G-S-B-A
Monitor new workflow Compare image quality Data analysis				G-S-A-B
Sharing & standardization				G-S-A-B
Staff Empowerment				G-A-B
Preparation for the next stage of plan				G-A-B

5. IMPACT OF PROJECT From ZERO to HERO!!!



CONCLUSION

SKYLINER 2 Reduced the retake rate of the knee skyline X-Ray

OVERALL MEMBERS ACHIEVEMENT EVALUATION

Team members scored average by **increased to 86%**

MERCHANT'S METHOD REDUCED TIME

WITHOUT POSITIONING DEVICE: 10 MINUTES

LAURIN'S METHOD: 8 MINUTES

WITH POSITIONING DEVICE - SKYLINER 2: 6 MINUTES

MERCHANT'S METHOD: 3.5 MINUTES

NEXT STEP

Developed suitable device for knee skyline view

Standardised the technique of positioning for knee skyline view

Reduced radiation dose cost time

PERFECT IMAGE

ACKNOWLEDGEMENTS

SKYLINER 2 is a registered trademark of the inventor.

Patent

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