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ASIAN SOCIETY FOR
QUALITY IN HEALTH CARE

Topic 2

Completed Projects
on Engaging Patients for Patient Safety

ENGAGING PATIENTS FOR SAFE FOOT X-RAY POSITIONING : FLEXI FOOT IMMOBILISER DEVICE FOR POLYTRAUMA PATIENTS

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01. ABSTRACT

INTRODUCTION

Foot injuries in the Universiti Malaya Medical Centre, Kuala Lumpur, Malaysia, are common among polytrauma patients. However, there was a notable increase in the retake rates (49.8%) of foot X-rays due to a lack of suitable immobilisers. Engaging patients towards developing a suitable immobiliser for foot X-rays is vital to reduce the retake rates. Therefore, this study aimed to test a prototype foot immobiliser device with patients' engagement to reduce the retake rate of foot X-rays, increase image quality and improve patient care among polytrauma patients.

MATERIALS & METHODS

The retrospective data of 30 patients with the current foot immobilisers, foams, and sandbags were analysed. Prospectively, 30 polytrauma patients were applied with Flexi Foot, a prototype foot immobiliser device, during a pilot study. In the implementation phase, staff empowerment, hands-on training, video sharing, and information pamphlets were provided to the radiographers for standardisation. A cross-sectional study was conducted to collect data from patients' experience with Flexi Foot, using a pain score scale (adopted from the Ministry of Health, Malaysia), together with radiographers and radiologists' surveys of image evaluation. The examination time before and after the Flexi Foot application was also recorded.

RESULTS

All polytrauma patients (n=30) reported a mild score of pain (48%) during foot X-rays with a significant difference (Mann Whitney U, p <0.001) using Flexi Foot. The radiographer's survey showed >90% in suitability, less movement, image optimisation and durability. The positioning time was reduced by 50%. However, there was no statistically significant difference in positioning time (Mann Whitney U, p =0.282) due to the large variability of the set-up time of the device. The radiologist's survey on image evaluation showed >80% good image quality with significant improvement (Mann Whitney U, p = 0.005). The Flexi Foot immobiliser device significantly reduced the percentage of retake rate by 47% (Fisher's exact test, p = 0.024).

CONCLUSIONS

Patient engagement in applying the Flexi Foot has assisted in reducing the retake rate of foot X-rays among polytrauma patients, optimised image quality, and improved care while addressing safety concerns. Flexi Foot is a reliable, innovative foot immobiliser device for polytrauma patients.

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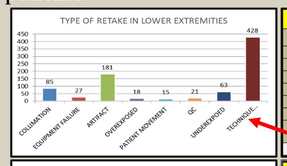
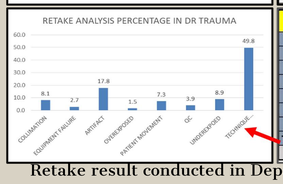
02. INTRODUCTION

There was a notable increase in the retake rates (49.8%) of foot X-rays due to a lack of suitable immobilisers. Engaging patients towards developing a suitable immobiliser for foot X-rays is vital to reduce the retake rates. This study aimed to test a prototype foot immobiliser device with patients' engagement to reduce the retake rate of foot X-rays, increase image quality and improve patient care among polytrauma patients.

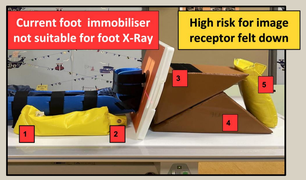


LOWER LIMB RETAKE	TOTAL	%
COLLIMATION	85	10.1
EQUIPMENT FAILURE	27	3.2
ARTIFACT	181	21.6
OVEREXPOSED	18	2.1
PATIENT MOVEMENT	15	1.8
QC	21	2.5
UNDEREXPOSED	63	7.5
TECHNIQUE (POSITIONING/CENTERING)	428	51.1
TOTAL	838	100



LOWER LIMB RETAKE IN DR TRAUMA	TOTAL	%
COLLIMATION	21	8.1
EQUIPMENT FAILURE	7	2.7
ARTIFACT	46	17.8
OVEREXPOSED	4	1.5
PATIENT MOVEMENT	19	7.3
QC	10	3.9
UNDEREXPOSED	23	8.9
TECHNIQUE (POSITIONING & CENTERING	129	49.8
TOTAL	259	100

Retake result conducted in Department of Emergency Medicine



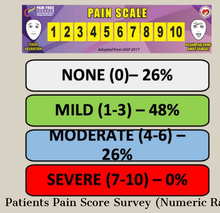


Current foot immobiliser

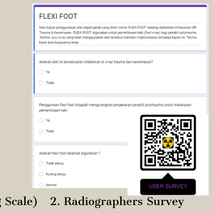
03. METHODS & MATERIAL

Study Design :
Cross sectional study

- Patient Interview (Numeric Rating Scale)
- Radiographers Survey
- Radiologist Survey



1. Patients Pain Score Survey (Numeric Rating Scale)



2. Radiographers Survey

IMAGE : A
ACC : 5017582

ITEM	NOT ACCEPTABLE	POOR	MODERATE	GOOD	EXCELLENT
DIAGNOSTIC VALUE	1	2	3	4	5
IMAGE QUALITY	1	2	3	4	5
ARTIFACT	1	2	3	4	5
OVERALL	1	2	3	4	5

COMMENTS:

3. Radiologists Survey (Image Evaluation)

04. RESULTS

With Flexi Foot immobiliser device:





1. All patients (n=30) reported a mild score of pain (48%), (Mann Whitney U, p <0.001) using Flexi Foot.

NONE (0)– 26%
MILD (1-3) – 48%
MODERATE (4-6) – 26%
SEVERE (7-10) – 0%

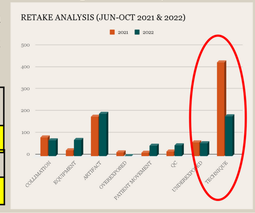
2. The radiographer's survey showed >90% in suitability, less movement, image optimisation and durability.

DIAGNOSTIC VALUE	PERCENTAGE
EXCELLENT	84%
ARTIFACT	PERCENTAGE
GOOD	64%

IMAGE QUALITY	PERCENTAGE
EXCELLENT	80%
OVERALL	PERCENTAGE
EXCELLENT	84%

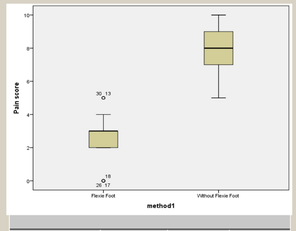
3. The radiologist's survey on image evaluation showed >80% good image quality (Mann Whitney U, p = 0.005)

4. The Flexi Foot immobiliser device significantly reduced the percentage of retake rate by 47% (Fisher's exact test, p = 0.024)



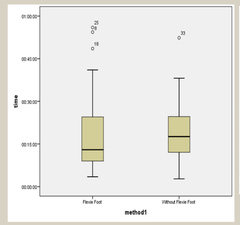
REDUCE RETAKE ANALYSIS ON POSITIONING TECHNIQUE
47%

05. GRAPHS & TABLES



	Pain Score
Mann-Whitne U	1.500
Wilcoxon W	466.500
Z	-6.636
Asymp. Sig. (2-tailed)	.000

1. Pain Score Result



	Method 1	
	Flexi Foot time (minutes)	Without Flexi Foot time (minutes)
Mean	18.33	18.94
Standard Deviation	14.58	10.72
Median	12.97	17.60
Percentile 25	9.00	12.07
Percentile 75	24.52	24.63

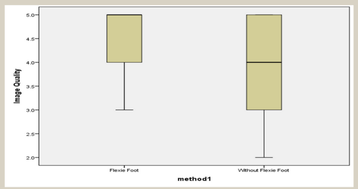
	Time
Mann-Whitney U	364.000
Wilcoxon W	829.000
Z	-1.076
Asymp. Sig. (2-tailed)	.282

3. Time Result

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.651[a]	1	.017		
Continuity Correction[b]	3.647	1	.056		
Likelihood Ratio	7.583	1	.006		
Fisher's Exact Test				.024	.024
Linear-by-Linear Association	5.556	1	.018		
N of Valid Cases	59				

n rejected * method Crosstabulation				
Count				
		Method		
		normal	Flexi Foot	Total
rejected	no	24	30	54
	yes	5	0	5
Total		29	30	59

2. Retake Analysis Result



	Img_Quality
Mann-Whitney U	266.500
Wilcoxon W	701.500
Z	-2.778
Asymp. Sig. (2-tailed)	.005

4. Image Quality Result

06. DISCUSSION

With Flexi Foot immobiliser device:

1	Reduces retake analysis (p-value =0.024)	• The retake rate for foot imaging was reduced by 47% throughout the project using the Flexi Foot
2	Significant differences in patient's pain scores (p <0.001)	• Flexi Foot increased patient comfort
3	Improved image evaluation by radiologist (p <0.005)	• Flexi Foot provides better image quality for foot imaging
4	No statistically time difference (p=0.282)	• This could be due to the large variability of the Flexi Foot device set up time during the foot imaging examination





Better patient care was achieved as most patients reported only mild pain during the Foot X-Ray examination. Flexi Foot is also suitable to be used for patient on a wheelchair.

07. CONCLUSION

Patient engagement in applying the Flexi Foot has assisted in reducing the retake rate of foot X-rays among polytrauma patients, optimised image quality, and improved care while addressing safety concerns. Thus, Flexi Foot is a reliable, innovative foot immobiliser device for polytrauma patients

08. REFERENCES

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