INCREASING THE PERCENTAGE OF WARFARIN PATIENTS WITH GOOD TIME IN THERAPEUTIC RANGE CONTROL IN KLINIK KESIHATAN SULTAN ISMAIL

Kami Sedia Membantu
Penyayang • Profesionalisme • Kerja Berpasukan

Group Members - Team PowerWARF Girls

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Terms and Definition

Term	Definition
Warfarin	• A vitamin K antagonist. **Narrow Therapeutic Index (NTI) medicine**. • Used as anticoagulant in Atrial Fibrillations(AF), Atrial Valve Replacement (AVR), Mitral Valve Replacement (MVR), Deep Vein Thrombosis (DVT), Antiphospholipid syndrome (APLS)
International Normalised Ratio (INR)	• A blood test used to monitor anticoagulation control • Ratio of a patient's prothrombin time to control (normal people) • Measures how quick the blood clot
Time in therapeutic range (TTR)	• **Indicator of the quality of anticoagulation control** • Measures the percentage of time a patient's INR is within the targeted range
Good TTR	Thrombosis Canada[3]: **>60%**
PhIS	Pharmacy Information System, a system which stores patients' medication profile and is used by pharmacy in processing prescription
Chemolims	A laboratory information system used in Klinik Kesihatan Sultan Ismail (KKSI) to review patient's blood test results
POCT	Point of care testing which provides instant INR result and is comparable to laboratory testing

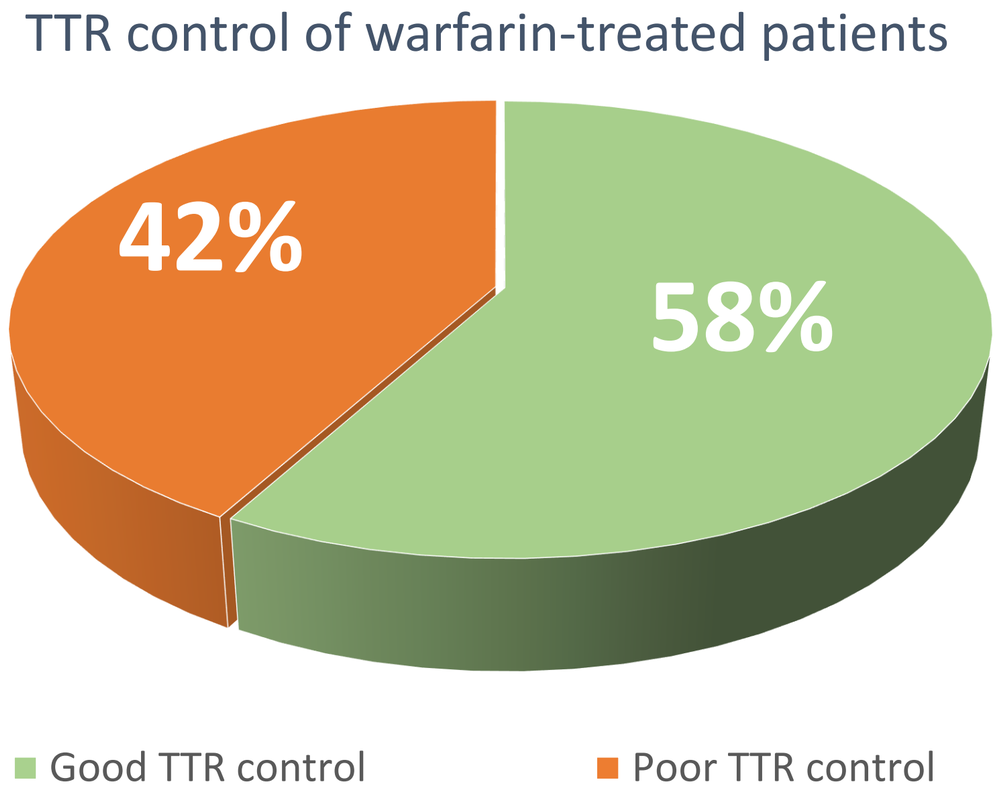
3. Thrombosis Canada. Warfarin: management of out-of-range INRs. Whitby, ON: Thrombosis Canada; 2015. Available from: http://thrombosiscanada.ca/clinicalguides/#.

Selection of Opportunities for Improvement

Problem Identification

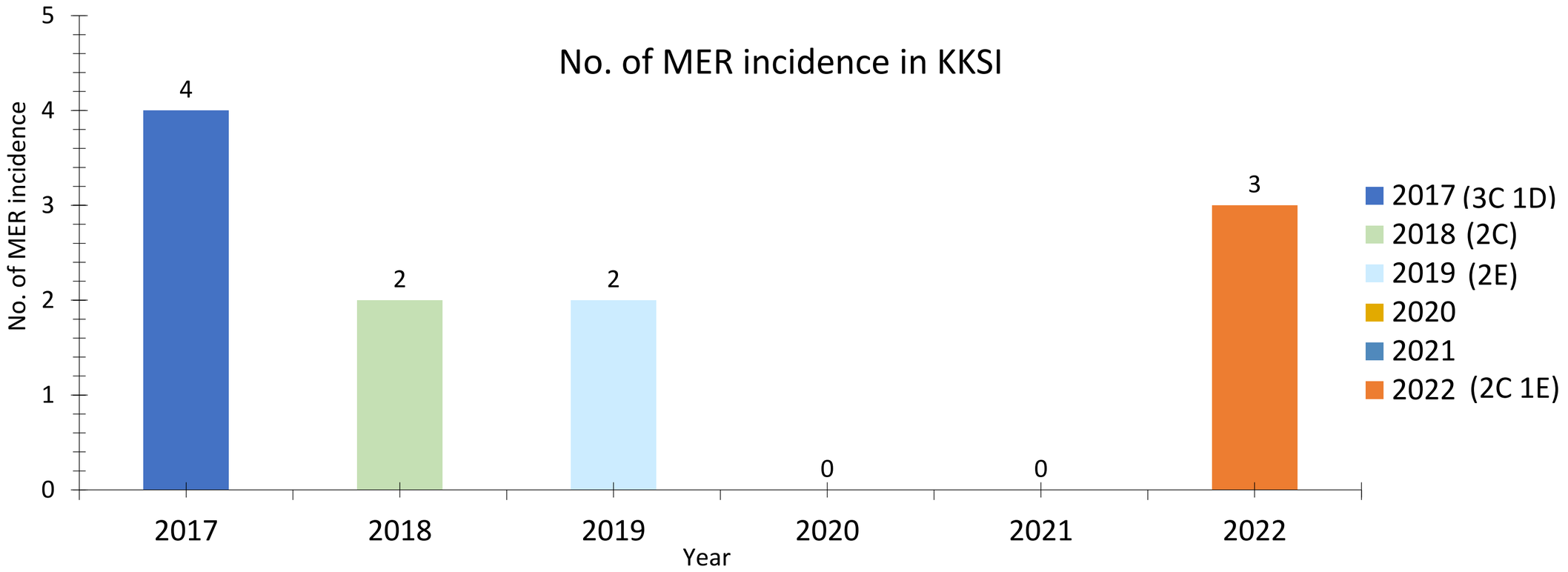
1. Low percentage of warfarin-treated patients with good TTR control in KKSI
2. Medication error incidence in KKSI
3. High percentage of patients who defaulted VAS appointment to refill medications in KKSI
4. Low percentage of good adherence to medications among diabetes patients in KKSI

TTR achievement of warfarin-treated patients in KKSI Sept 2022-Feb 2023



DSA Percentage of Patient with Good TTR control: 65%

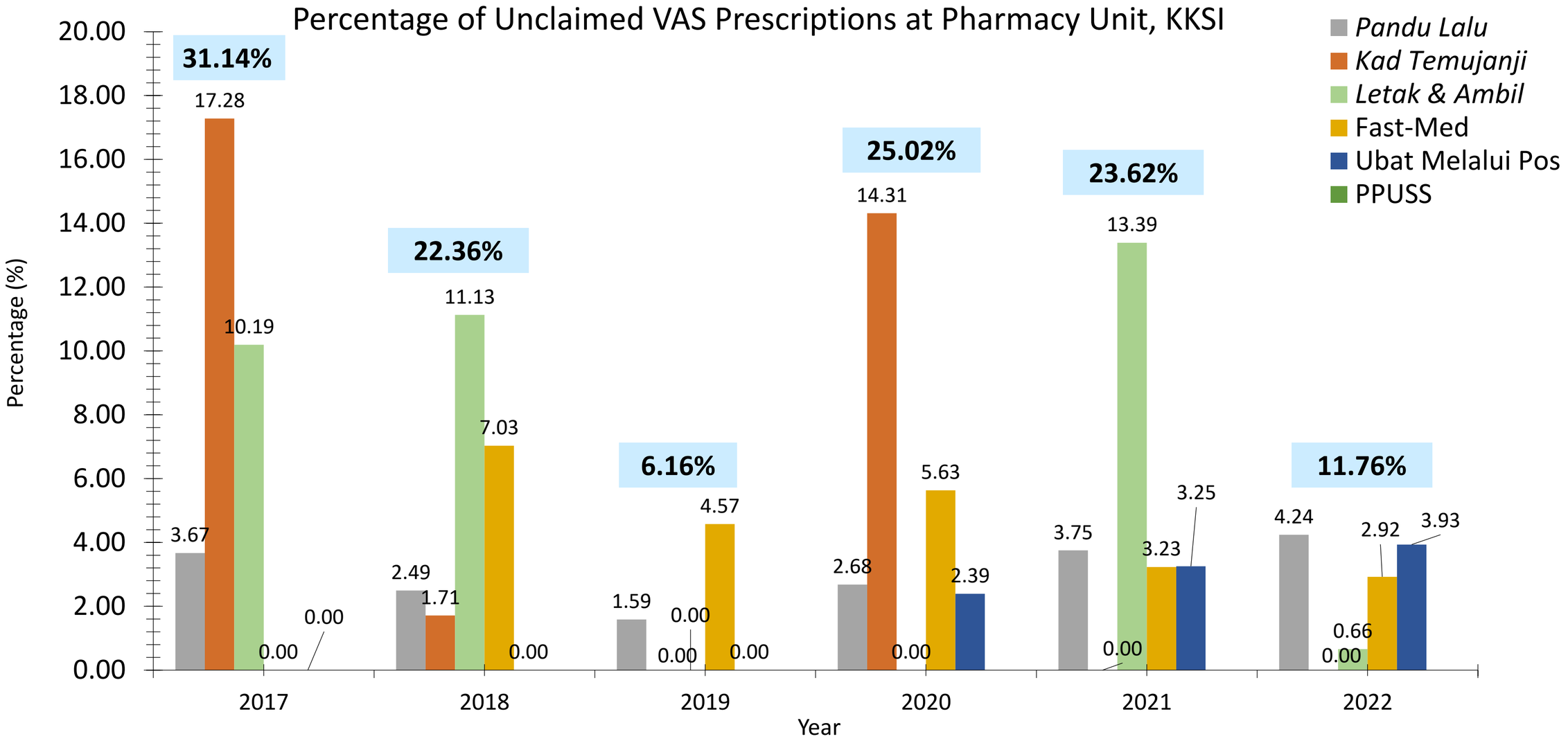
MER Incidence in KKSI



MPSG 2.0 Goal 3 - Medication Safety: KPI 5: Zero (0) Cases of Medication Error Leading to Severe Harm or Death

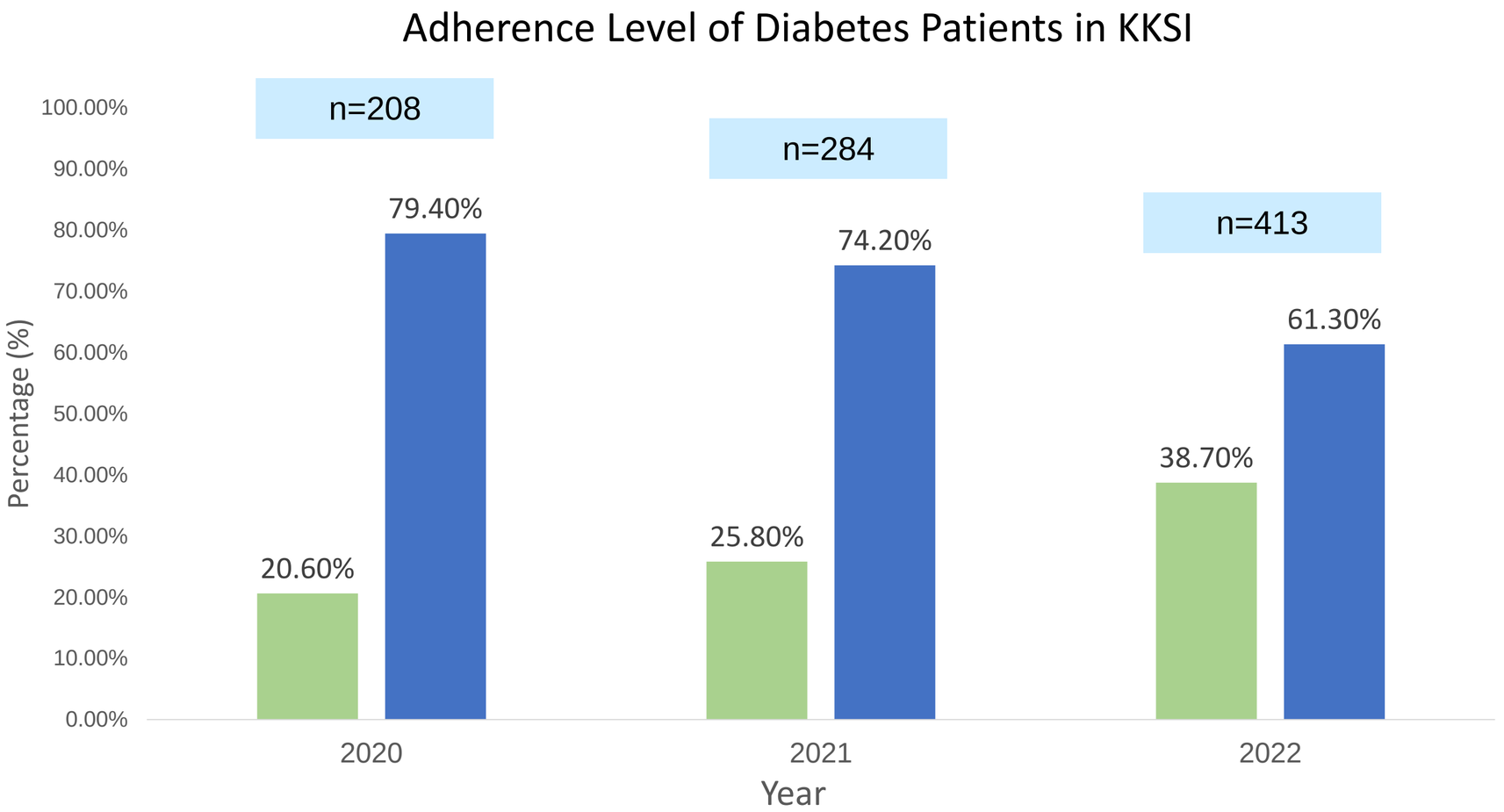
Medication error classification:
Category C - An error occurred that reached the patient but did not cause patient harm.
Category D - An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm.
Category E - An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention

Unclaimed VAS prescriptions at pharmacy unit, KKSI



DSA Percentage of Unclaimed VAS (Value added services): 6%

Adherence level to medications among diabetes patients in KKSI



MyMAAT SCORE	GRADING
≥ 54	Good adherence
< 54	Moderate and poor adherence

DSA Percentage of Patients with Good Adherence to Medications: 80%

Problem Prioritisation: SMART Criteria

List of problems	Seriousness	Measurable	Appropriate	Remediable	Timeliness	Total
Low percentage of warfarin-treated patients with good TTR control in KKSI	**18**	**18**	**18**	**12**	**16**	**82**
Medication error incidence in KKSI	16	18	18	11	9	72
High percentage of patients who defaulted VAS appointment to refill medications in pharmacy KKSI	9	18	14	8	9	58
Low percentage of good adherence to medications among diabetes patients in KKSI	16	17	14	9	9	65

Rating Scale: 1=Low 2=Moderate 3=High

6 group members

Reason for Selection

S

- Only 58% of warfarin-treated patients in KKSI achieved good TTR control
- Poor TTR control is associated with increased risks of **thromboembolic events, bleeding, and all-cause mortality**

M

Percentage of patients with good TTR (TTR>60%) can be measured

A

Appropriate as optimal anticoagulation control can improve patient's safety, prevent thromboembolic events and reduce health care cost

R

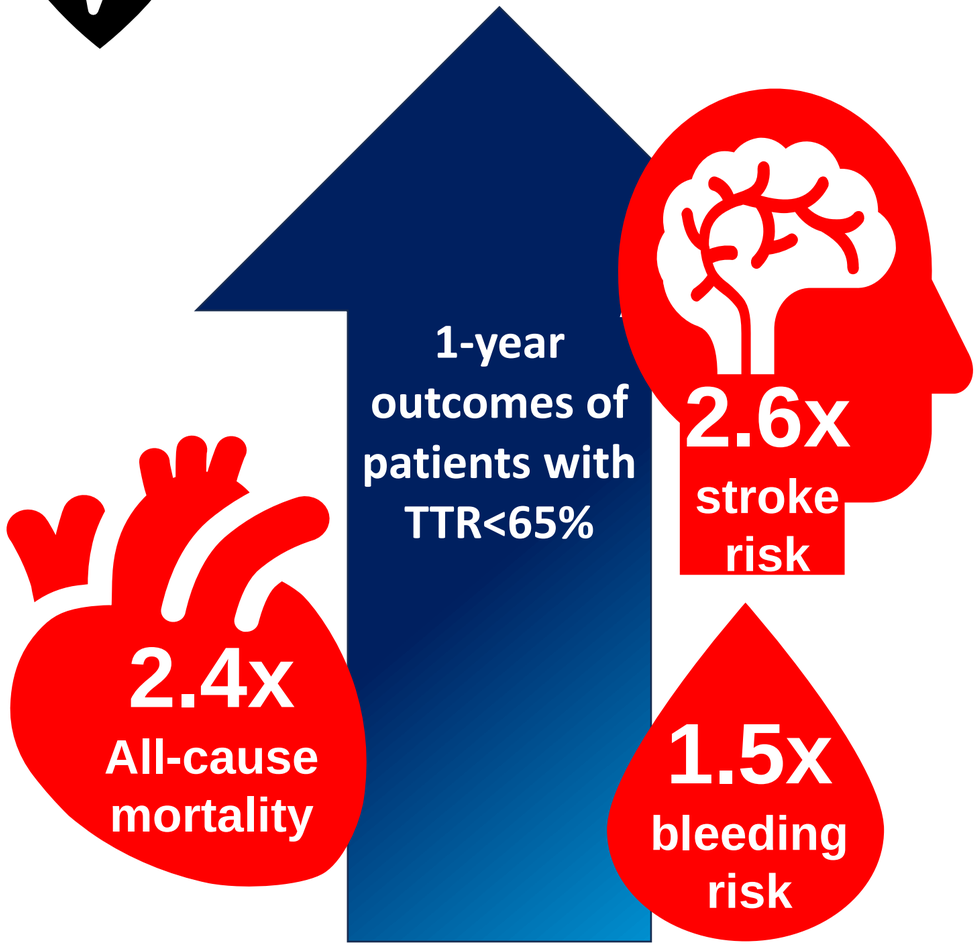
Remediable by appropriate strategies of change and involvement of multidisciplinary teams

T

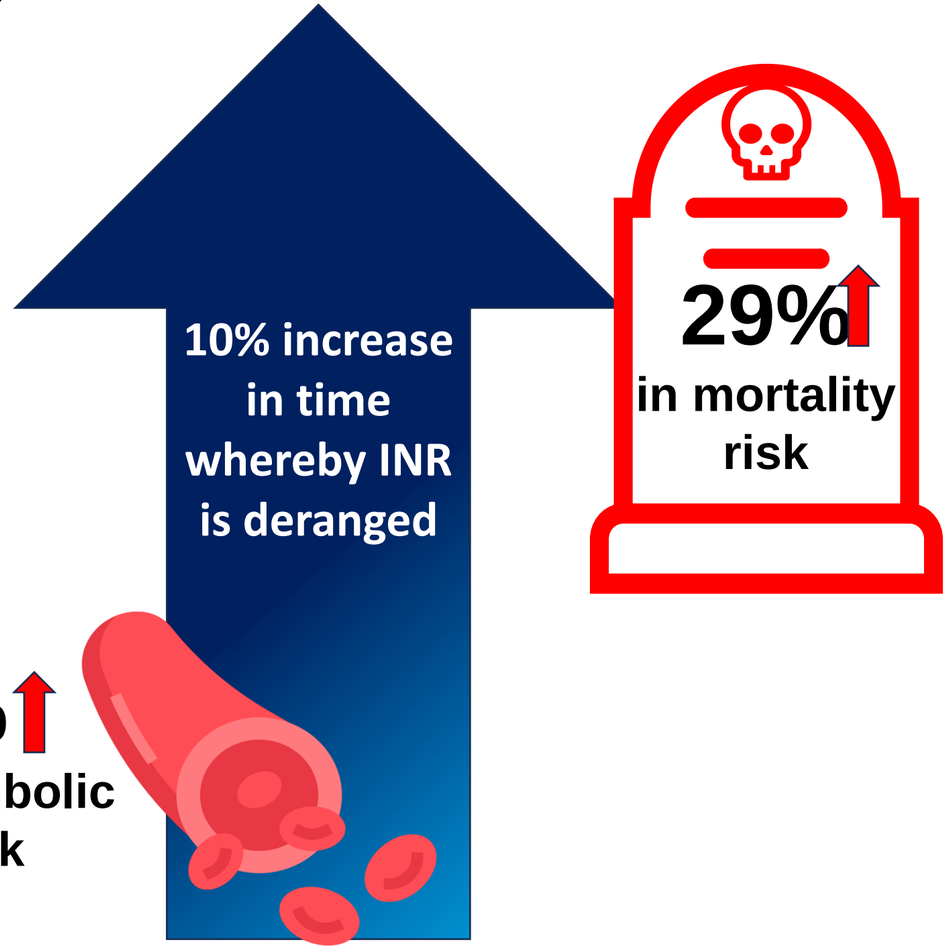
Can be completed in a timely manner

Literature Review

GARFIELD-AF Registry



Jones et al, 2005



1. Haas S, Ten Cate H, Accetta G, Angchaisuksiri P, Bassand JP, Camm AJ, Corbalan R, Darius H, Fitzmaurice DA, Goldhaber SZ, Goto S, Jacobson B, Kayani G, Mantovani LG, Misselwitz F, Pieper K, Schellong SM, Stepinska J, Turpie AG, van Eickels M, Kakkar AK; GARFIELD-AF Investigators. Quality of Vitamin K Antagonist Control and 1-Year Outcomes in Patients with Atrial Fibrillation: A Global Perspective from the GARFIELD-AF Registry. PLoS One. 2016 Oct 28;11(10).
2. Jones M, McEwan P, Morgan CL, Peters JR, Goodfellow J, Currie CJ. Evaluation of the pattern of treatment, level of anticoagulation control, and outcome of treatment with warfarin in patients with non-valvar atrial fibrillation: a record linkage study in a large British population. Heart. 2005 Apr;91(4):472-7.

5W 1H Problem Analysis

WHAT
Low percentage of good TTR control among warfarin-treated patients

WHERE
Warfarin clinic in *Klinik Kesihatan Sultan Ismail*

WHEN
Every Thursday

WHY
Incomplete patient history taking by doctors, lack of intervention by pharmacists, lack of knowledge among doctors and pharmacists, lack of cooperation from patients

WHO
Doctors, pharmacists and warfarin-treated patients

HOW
No proper workflow to follow

Problem Statement

PROBLEM

A verification study conducted from September 2022 to February 2023 showed that only **58%** of warfarin-treated patients in KKSI achieved good TTR control.

EFFECTS

Poor TTR control will lead to increased risks of thromboembolic events, bleeding, and mortality.

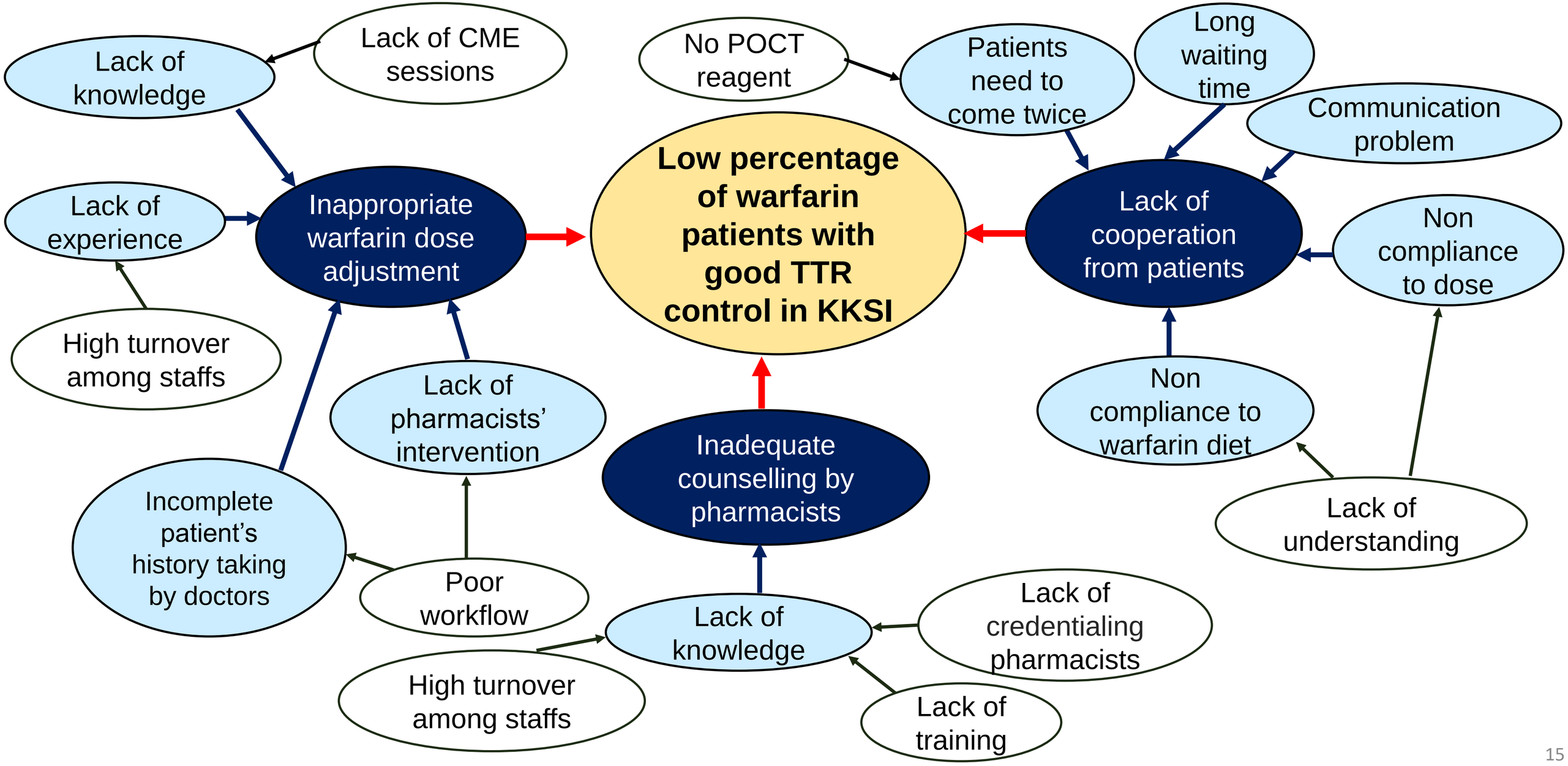
POSSIBLE CAUSES

Incomplete patient history taking by doctors, lack of intervention by pharmacists, lack of knowledge among doctors and pharmacists, and lack of cooperation from patients.

AIM OF STUDY

To increase the percentage of warfarin-treated patients with good TTR control.

Problem Analysis Chart



Study Objectives

General Objective:

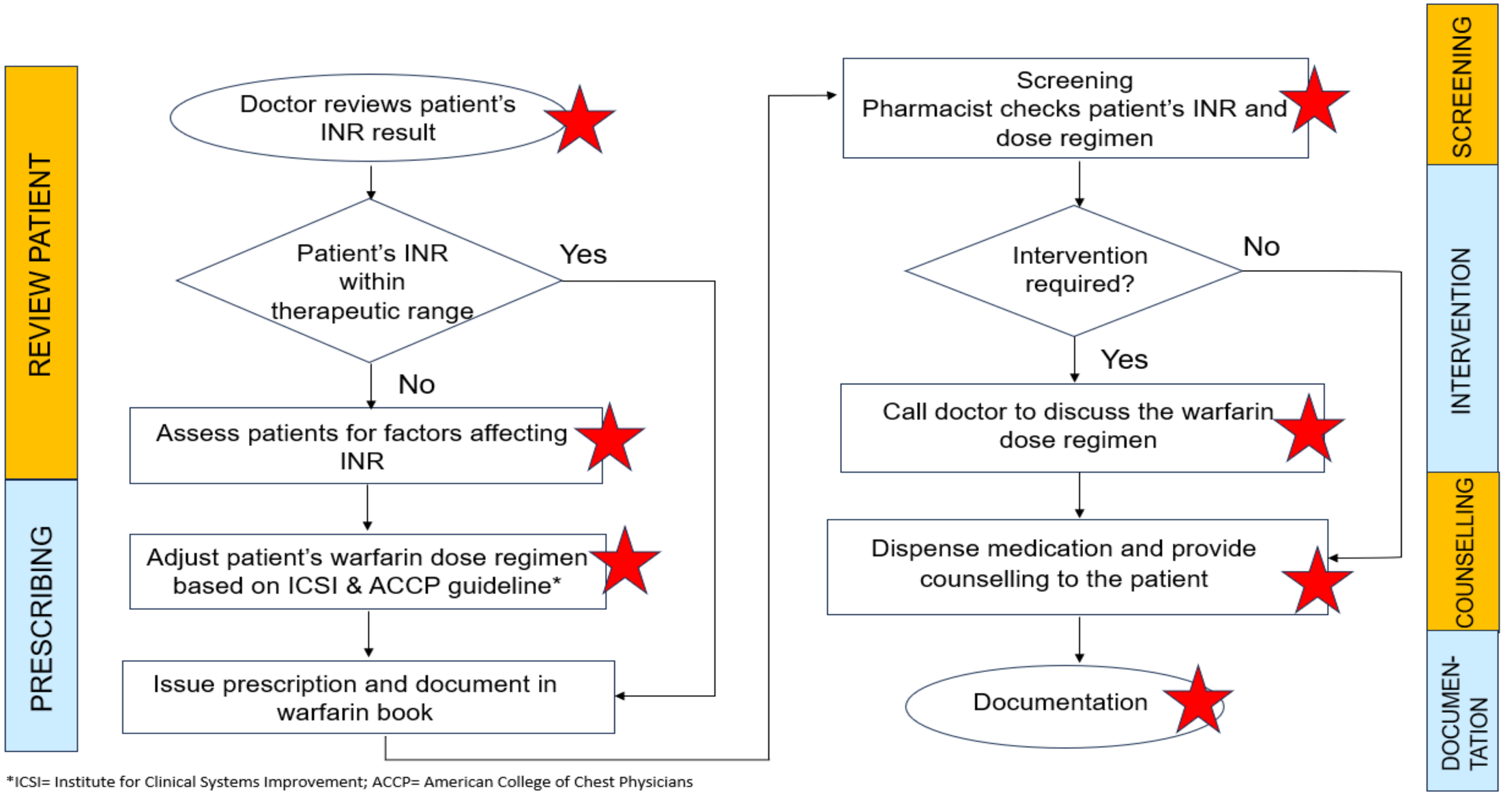
- To increase the percentage of warfarin-treated patients with good TTR control in *Klinik Kesihatan Sultan Ismail*

Specific Objectives:

1) To **verify** the magnitude of patients with good TTR control
2) To **identify** the probable causes contributing to the low percentage of patients with good TTR control
3) To **formulate and implement** remedial measures in increasing the percentage of patients with good TTR control
4) To **evaluate** the effectiveness of the remedial measures

Key Measures for Improvement

Process of Care



*ICSI= Institute for Clinical Systems Improvement; ACCP= American College of Chest Physicians

Model of Good Care (1)

Process	Criteria	Standard
1) Review patient	• Check warfarin indication • Check INR target • History taking for all factors which may affect INR	100% 100% 100%
2) Prescribing	• Make dose adjustment based on ICSI guidelines • Prescribe appropriate duration based on ACCP guidelines	100% 100%
3) Screening	• Ensure the correct INR targets and indications are written on the prescription • Ensure the dose adjustment and duration prescribed are appropriate based on guidelines	100% 100%

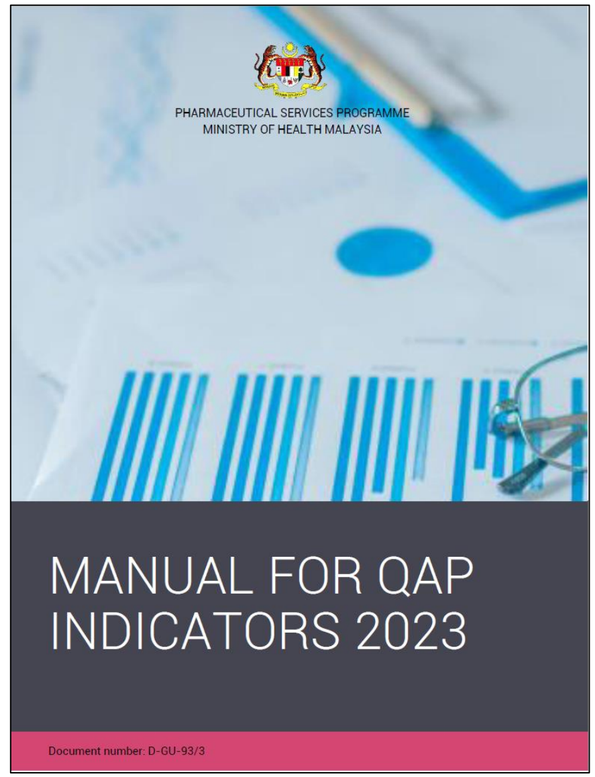
Model of Good Care (2)

Process	Criteria	Standard
4) Intervention	• Discuss with doctors if the dose adjustment or duration is inappropriate	100%
5) Counselling	• Counsel patients on relevant factors which affect their INRs • Assess patients' understanding and compliance • Ensure patients who require additional counselling are referred to the counselling room	100% 100% 100%
6) Documentation	• Document the counselling session • Arrange for follow-up appointments	100% 100%

Indicator and Standard

Indicator

% of warfarin-treated patients with good TTR control in KKSI



Formula

$$\frac{\text{Number of patients with good TTR control}}{\text{Total number of warfarin-treated patients}} x\ 100\%$$

Standard

65%

Based on the standard set in Quality Assurance Programme (QAP) Indicator Manual 2023, where the percentage of patients achieving good TTR is ≥ 65%

Process of Gathering Information

Methodology

Study design

Quality improvement study

Inclusion criteria

All currently active warfarin-treated patients in KKSI

Source of data

- KKSI Chemolims website
- Patient medical record
- Medication profile from PhIS

Compiled with Microsoft Excel spreadsheet

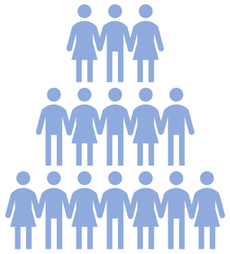
Sampling technique

Universal sampling

Exclusion criteria

- SPUB patients
- Patients who switched to other anticoagulants
- Patients who defaulted

Percentage of patients with good TTR control calculated



TTR Calculator

TTR Calculator KKSI (Mac 2023-Aug 2023) .XLSX

File Edit View Insert Format Data Tools Help

	A	B	C	D	E	F	G	H	I	J	K	L
1	Test Date	INR	Days Since Last Test	INR Diff	Previous INR Within Range?	Current INR Within Range?	Scenario	INR Diff Above Range	INR Diff Within Range	INR Diff Below Range	Days within Range since Last Test	% Days within Range since Last Test
2	06/03/2023	2.06				In Range						
3	03/04/2023	2.18	28	0.12	In Range	In Range	In Range	0	0.12	0	28.0	100%
4	29/05/2023	2.04	56	-0.14	In Range	In Range	In Range	0	0.14	0	56.0	100%
5	24/07/2023	3.43	56	1.39	In Range	Above	Calculate	0.43	0.96	0	38.7	69%
6	07/08/2023	3.88	14	0.45	Above	Above	Above	0.45	0	0	0.0	0%
7	21/08/2023	2.74	14	-1.14	Above		Calculate	0.88	0.26	0	3.2	23%
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	N	O
	Low Range	2
	High Range	3
	Rosendaal Method	
	Days Within Range	125.9
	Total Days	168.0
	% Days Within Range	74.9%
	% in Range	
	Total Number of Tests	6.0
	Number of Tests in Range	3.0
	% of Tests in Range	50.0%
	AGA[redacted] IN	730[redacted]

Instructions A[redacted] AGA[redacted]

Data collection form

KKSI Warfarin patient masterlist

Bil	Nama	IC	Indication	Target INR	Comorbidities	% TTR (SEPT2022-FEB 2023)	TTR<60%	TTR>60%	% TTR (MAC 2023-AUG2023)	TTR<60%	TTR>60%
1	[redacted]	86431	AF	2-3	-	100%	0	1	100%	0	1
2		35224	DVT	2-3	HYPERTENSION	4.20%	1	0	74.90%	0	1
3		15028	AF	2-3	DM, HPT	35.80%	1	0	77.50%	0	1
4		15698	APLS (DVT)	2-3	-	12.30%	1	0	31.00%	1	0
5		15637	AF	2-3	HPT, DYSLIPIDEMIA	70%	0	1	73.50%	0	1
6		85696	AF	2-3	-	43.30%	1	0	41.90%	1	0
7		15610	AF	2-3	HPT, DYSLIPIDEMIA	100%	0	1	100%	0	1
8		85459	AF	2-3	BA	57.20%	1	0	65.30%	0	1
9		65010	AF	2-3	-	47.40%	1	0	100%	0	1
10		05579	AF	2-3	-	99.60%	0	1	5.50%	1	0
11		85848	AF	2-3	DM, HPT	63.70%	0	1	100%	0	1
12		85715	AF	2-3	DM, DYSLIPIDEMIA	75.80%	0	1	63.40%	0	1
13		86208	AF	2-3	HPT	100%	0	1	74.90%	0	1
14		15784	AF	2-3	-	31.50%	1	0	43.20%	1	0
15		55309	MVR	2-3	BPH, DYSLIPIDEMIA	92.20%	0	1	100%	0	1
16		85444	AF	2-3	DYSLIPIDEMIA, IHD	57.10%	1	0	79.40%	0	1
17		16210	AF	2-3	DM, HYPERTENSION, HY	97.40%	0	1	70.40%	0	1
18		86110	AF	2-3	-	71.10%	0	1	100%	0	1
19		15703	AF	2-3	DYSLIPIDEMIA	97.20%	0	1	91.60%	0	1
20		86035	MVR	2.5-3.5	-	52.10%	1	0	100%	0	1
21		15234	AF	2-3	-	91.90%	0	1	73.90%	0	1
22		15614	AF	2-3	HPT, DM	19.20%	1	0	100%	0	1

Data collection tools

Contributing factors/ Variables	Data collection tools	Sample
Knowledge level of doctors and pharmacists	Pre test & post test	All doctors (n=26) and pharmacists (n=20) in KKSI
Patient's understanding and attitude towards warfarin	Questionnaires	All warfarin-treated patients throughout 12-15th Feb 2023 (n=30)
Completeness of doctor's review	Questionnaires	
Number of counselling sessions by pharmacists	Counselling records in PhIS	
Appropriateness of warfarin dose regimen	Warfarin prescriptions	All warfarin prescriptions throughout 12-15th Feb 2023 (n=30)
Number of interventions by pharmacists	Intervention notes	

Methodology

Study Timeline

Remedial Action 1
(1-14 March 2023)

Remedial Action 2
(1-14 September 2023)

Verification Study

September 2022 - February 2023

Cycle 1

March 2023 - August 2023

Cycle 2

September 2023 - February 2024

Analysis & Interpretation (Verification Study)

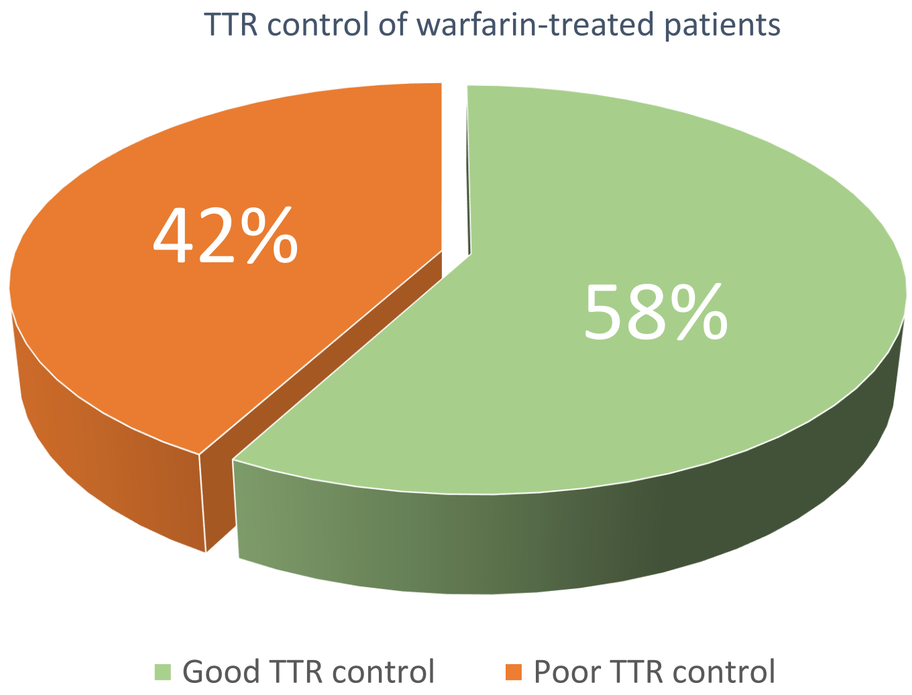
Verification Study

Variables to be collected	Source of data collection
Number of active warfarin-treated patients	Determined from PhIS (number of active warfarin prescriptions, n=102)
Patient's INR	Retrieved from Chemolims
Patient's TTR	Calculated from all the INR values using Rosendaal method (TTR calculator)

Goal for improvement

To increase the percentage of warfarin-treated patients with good TTR control from 58% to **65%**

September 2022 to February 2023



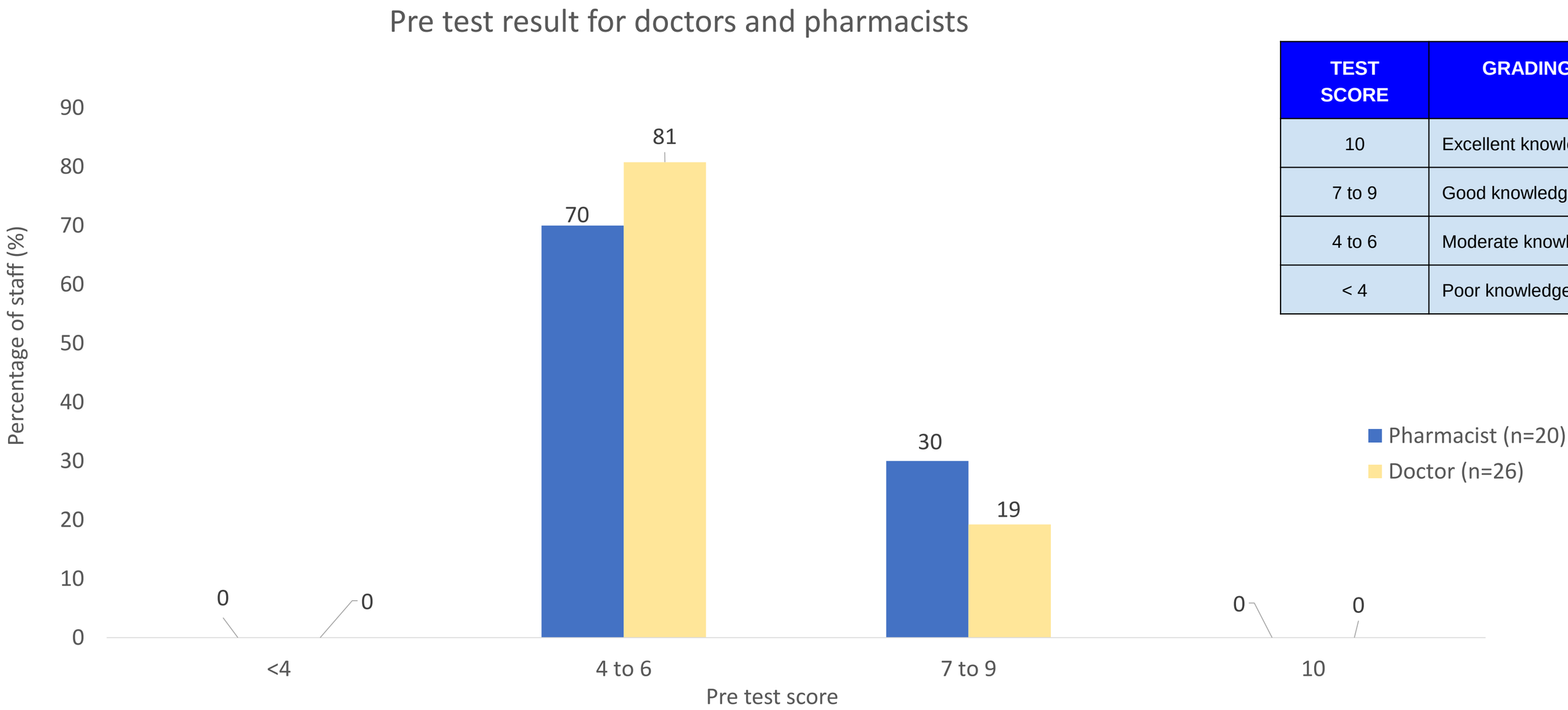
Model of Good Care (1)

Process	Criteria	Standard	Verification (n=30)
Review patient	• Check warfarin indication	100%	70%
	• Check INR target	100%	70%
	• History taking for all factors which may affect INR	100%	20%
Prescribing	• Make dose adjustment based on ICSI guidelines	100%	50%
	• Prescribe appropriate duration based on ACCP guidelines	100%	70%
Screening	• Ensure the correct INR targets and indications are written on the prescription	100%	100%
	• Ensure the dose adjustment and duration prescribed are appropriate based on guidelines	100%	60%

Model of Good Care (2)

Process	Criteria	Standard	Verification (n=30)
Intervention	• Discuss with doctors if the dose adjustment or duration is inappropriate	100%	80%
Counselling	• Counsel patients on relevant factors which affect their INRs	100%	50%
	• Assess patients' understanding and compliance	100%	50%
	• Ensure patients who require additional counselling are referred to the counselling room	100%	0%
Documentation	• Document the counselling session	100%	50%
	• Arrange for follow-up appointments	100%	0%

Analysis of Knowledge Level

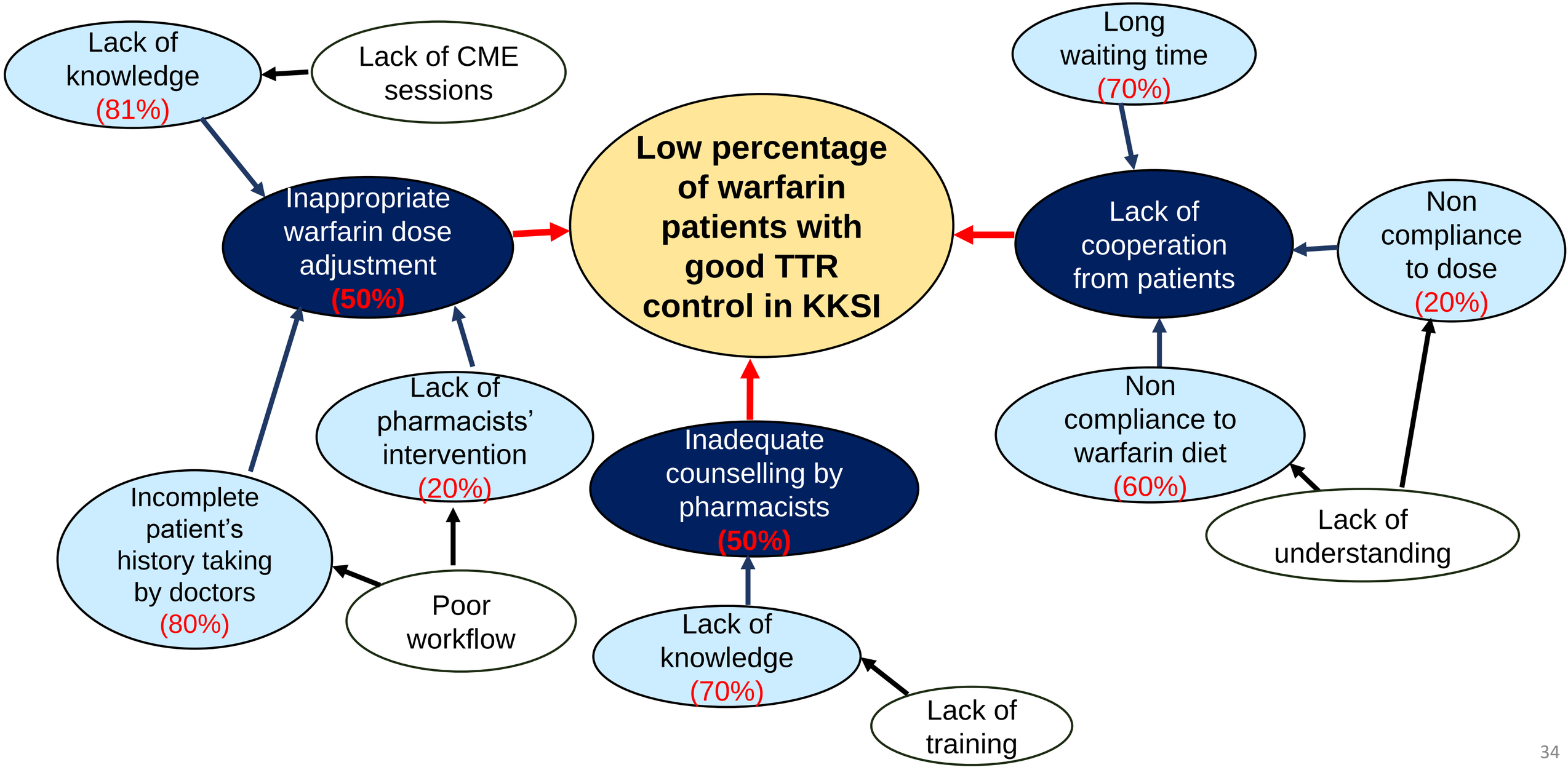


TEST SCORE	GRADING
10	Excellent knowledge
7 to 9	Good knowledge
4 to 6	Moderate knowledge
< 4	Poor knowledge

Patient’s Questionnaire Findings (n=30)

Variable	Criteria	Finding
Patient’s compliance	Compliant to warfarin dose	80% (24)
	Compliant to warfarin diet	40 % (12)
Patient’s understanding	Aware of their current dose regimen	70% (21)
Patient’s satisfaction	Satisfy with the time needed for INR review and medicine collection	30% (9)

Problem Analysis Chart



Strategies for Change (Remedial Action 1)

Strategies for Change - Cycle 1

Implementation of warfarin checklist (Warf-Check)

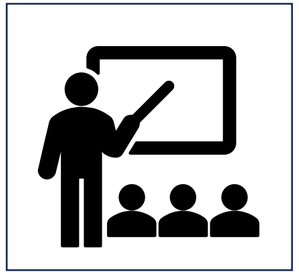
- Incomplete patient's interview by doctors
- Poor workflow

Development of express warfarin calculator (E-Warf)

- Long waiting time
- Lack of cooperation from patients

Establishment of extended counselling (Warf-EC)

- Inadequate counselling by pharmacist
- Non compliance to warfarin dose and diet



Conduction of continuing medical education sessions (CME)

- Lack of knowledge among doctors and pharmacists

Problem Analysis Chart

Low percentage of warfarin patients with good TTR control in KKSI

- Inappropriate warfarin dose adjustment **(50%)**
  - Lack of knowledge (81%)
    - Lack of CME sessions
  - Incomplete patient's history taking by doctors (80%)
  - Lack of pharmacists' intervention (20%)
    - Poor workflow
- Lack of cooperation from patients
  - Long waiting time (70%)
  - Non compliance to warfarin diet (60%)
    - Lack of understanding
  - Non compliance to dose (20%)
- Inadequate counselling by pharmacists **(50%)**
  - Lack of knowledge (70%)
    - Lack of training

Warfarin Checklist (Warf-Check)

Warfarin Checklist KKSI

Please fill in the form for warfarin patient with DERANGED INR. TQ

DATE OF VISIT:			DOCTOR'S NAME:				
NAME			IC				
WARFARIN INDICATION	AF / PE / DVT / AVR /MVR / OTHERS						
TARGET INR			CURRENT INR				
CURRENT DOSE	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
CHECKLIST (PLEASE TICK /)	**YES**	**NO**	**REMARKS/NOTES**				
CORRECT DOSE TAKEN							
MISSED DOSSE IN PAST 1 WEEK							
CHANGE IN SMOKING/DRINKING HABIT (IF RELEVANT)							
CHANGES IN MEDICINE (IF YES PLEASE SPECIFY)							
RECENTLY STARTED/STOPPING ANY SUPPLEMENTS/ TRADITIONAL MEDS							

Page 1

Doctors need to fill this checklist if patient's INR is out of range

Ensures the indication, target and current regimen are checked by doctor

- Provides structured interview
- Assess all relevant factors affecting INR

Ensures dose adjustment are calculated based on % change in weekly dose

SUBTHERAPEUTIC INR	**YES**	**NO**	**SUPRATHERAPEUTIC INR**	**YES**	**NO**
ANY DIET CHANGES: **INCREASE** VEGETABLE/VIT K INTAKE/SOY PRODUCTS			ANY DIET CHANGES: **DECREASE** VEGETABLE/VIT K INTAKE/SOY PRODUCTS		
IF YES, DOES THE PATIENT WANT TO CONTINUE THIS CURRENT DIET PATTERN?			IF YES, DOES THE PATIENT WANT TO CONTINUE THIS CURRENT DIET PATTERN?		
CHANGES IN PHYSICAL ACTIVITY			RECENT INTAKE OF ANTIBIOTICS/ANALGESICS		
SUGGESTION OF LOADING DOSE (IF INR <1.5)			RECENT BODY DISCOMFORT Eg. DIARRHEA, PAIN, FEVER		
IF YES, LOADING DOSE FOR TODAY=	MG		BLEEDING SYMPTOMS		
			SUGESSTION TO WITHOLD DOSE/ DAYS TO WITHOLD		

PLAN	MAINTAIN		INCREASE DOSE			DECREASE DOSE	
NEW DOSE SUGGESTION	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
% INCREASE/DECREASE IN WEEKLY DOSE							
EXPECTED INR READING							
ADDITONAL NOTES/ REMARKS							

- Time- saving
- Easier communication

E-Warf Calculator

E-WARF
EXPRESS WARFARIN DOSE CALCULATOR

How to use this Warfarin Dose Calculator:

1. Determine if patient's INR is subtherapeutic/supratherapeutic. Choose the tab based on the INR.
2. Read the warfarin dose adjustment guide.
3. Fill in the current daily warfarin dose.
4. Fill in the current INR reading.
5. Warfarin dose adjustment will be calculated automatically with daily dose suggestion and estimated INR shown.

Reference:

Anticoagulation MTAC (AC-MTAC) Protocol 2nd Edition (2020). Pharmaceutical Service Program, Ministry of Health Malaysia.

*** Please only use this warfarin calculator in EXCEL ONLINE to make sure the formula function is locked and preserved. Please do not download the file to your own device as the formula would not be accurate when the format changes.**

Prepared by:
Pharmacy Department, Klinik Kesihatan Sultan Ismail, 2023

USER MANUAL | INR < TARGET | INR > TARGET | AF WARFARIN INITIATION | EEKLY DOSING CHAR

Insert current INR and dose regimen

Instantly provide the new warfarin dose regimen with estimated INR value based on the percentage of weekly dose increase/decrease required

Fast & accurate dose adjustment
Shorten consultation time

Replaces physical calculator

Excel spreadsheet with pre included formula to simplify calculation process in dose adjustment

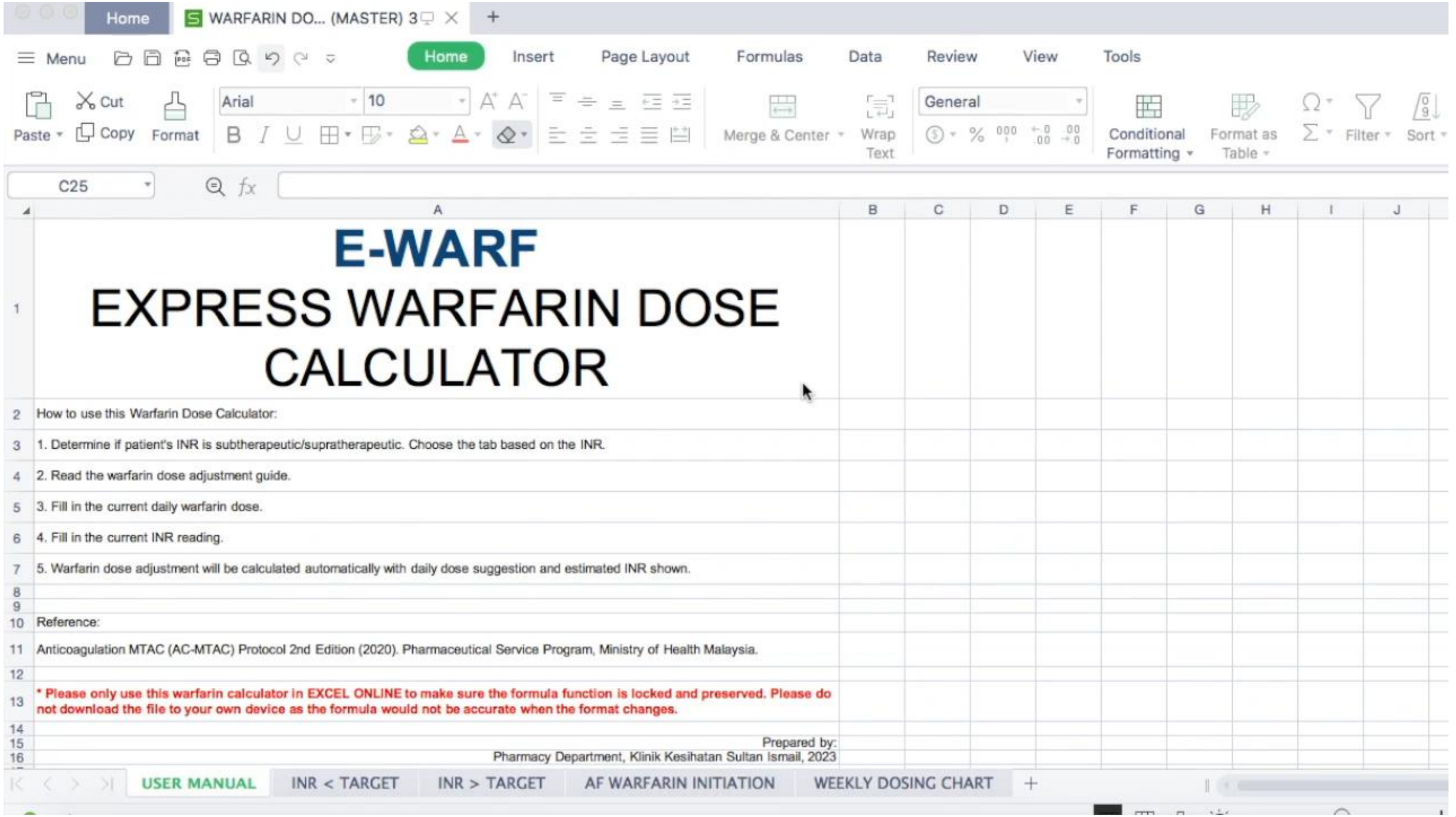
IF INR IS LESS THAN TARGET DURING MAINTENANCE PHASE:
1. ASSESS PATIENT'S COMPLIANCE AND ALL THE CLINICALLY IMPORTANT CHANGES IN THEIR LIFESTYLE (ACCORDING TO CHECKLIST).
2. IF PATIENT IS NOT COMPLIANT TO WARFARIN, CONSIDER MAINTAINING THE DOSE AND REVIEW PATIENT IN 2 WEEKS.
3. EXTENDED TARGET RANGE (±0.2 OF TARGET INR RANGE) CAN BE APPLIED (BEAR IN MIND THAT IF TWO CONSECUTIVE READINGS ARE BELOW THE TARGET RANGE, CONSIDER DOSE ADJUSTMENT). HOWEVER, FOR ALL VALVE REPLACEMENTS, ACUTE/RECENT VTE, THE EXACT TARGET RANGE MUST BE USED.
4. 1% INCREASE IN WARFARIN DOSE = INCREASE IN INR OF 0.1.
5. ALWAYS CONSIDER TREND IN INRS WHEN MAKING DOSE ADJUSTMENT. MAXIMUM CHANGES OF DAILY DOSE IS ±1MG.

*** FOR INITIATION PHASE, PLEASE REFER TO THE WARFARIN INITIATION SHEET.**

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	INR	1.4
Current warfarin dose (mg)	2	2	2	2	2	2	2	Total warfarin dose/week	14

If INR is less than target		Proposed weekly warfarin dose regimen							Actual percentage increase in warfarin dose	Estimated INR	Suggested TCA
Consider increasing maintenance dose by	Adjusted weekly dose (rounded down to the nearest 0.5)	Monday (mg)	Tuesday (mg)	Wednesday (mg)	Thursday (mg)	Friday (mg)	Saturday (mg)	Sunday (mg)			
5%	14.5	2	2	2	2	2	2	2.5	3.57%	1.76	1-2 weeks
10%	15	2	2	2	2	2	2.5	2.5	7.14%	2.11	
15%	16	2.5	2.5	2.5	2.5	2	2	2	14.29%	2.83	
20%	16.5	2.5	2.5	2.5	2.5	2.5	2	2	17.86%	3.19	

USER MANUAL | INR < TARGET | INR > TARGET | AF WARFARIN INITIATION | WEEKLY DOSING CHART


Home
WARFARIN DO... (MASTER) 3
Menu
Home
Insert
Page Layout
Formulas
Data
Review
View
Tools
Paste
Cut
Copy
Format
Arial
10
Merge & Center
Wrap Text
General
Conditional Formatting
Format as Table
Filter
Sort
C25
E-WARF
EXPRESS WARFARIN DOSE CALCULATOR
How to use this Warfarin Dose Calculator:
1. Determine if patient's INR is subtherapeutic/supratherapeutic. Choose the tab based on the INR.
2. Read the warfarin dose adjustment guide.
3. Fill in the current daily warfarin dose.
4. Fill in the current INR reading.
5. Warfarin dose adjustment will be calculated automatically with daily dose suggestion and estimated INR shown.
Reference:
Anticoagulation MTAC (AC-MTAC) Protocol 2nd Edition (2020). Pharmaceutical Service Program, Ministry of Health Malaysia.
* Please only use this warfarin calculator in EXCEL ONLINE to make sure the formula function is locked and preserved. Please do not download the file to your own device as the formula would not be accurate when the format changes.
Prepared by:
Pharmacy Department, Klinik Kesihatan Sultan Ismail, 2023
USER MANUAL
INR < TARGET
INR > TARGET
AF WARFARIN INITIATION
WEEKLY DOSING CHART

Warfarin Extended Counselling (Warf-EC)

Patient's selection criteria:

Patients with two consecutive INRs not in range

Patients with INR >4 or <1.5

Recent change in medicines

Patients will be referred to counselling room

Pharmacist reviews all factors and provides relevant counselling

Documentation in PhIS

Patients will be followed up during the next visit till their INR is stable for 2 consecutive visits

Comprehensive care to patients

Improved patient's understanding

Sharing on the practice of KKSI extended counselling in JKNJ Pharmacy practice meeting on 25th May 2023

MINIT MESYUARAT TPKN (FARMASI) BERSAMA KETUA PEGAWAI FARMASI / PEGAWAI FARMASI KESIHATAN | **BIL 1.2023**

6.7 **Pembentangan Kaunseling Warfarin Di Klinik Kesihatan Mahmoodiah dan Klinik Kesihatan Sultan Ismail oleh Cik Wang Sin Loo (Khamis, 25 Mei 2023)**

Makluman

KEHADIRAN

ATURCARA TAKLIMAT PERKONGSIAN AMALAN FARMASI

SLAID

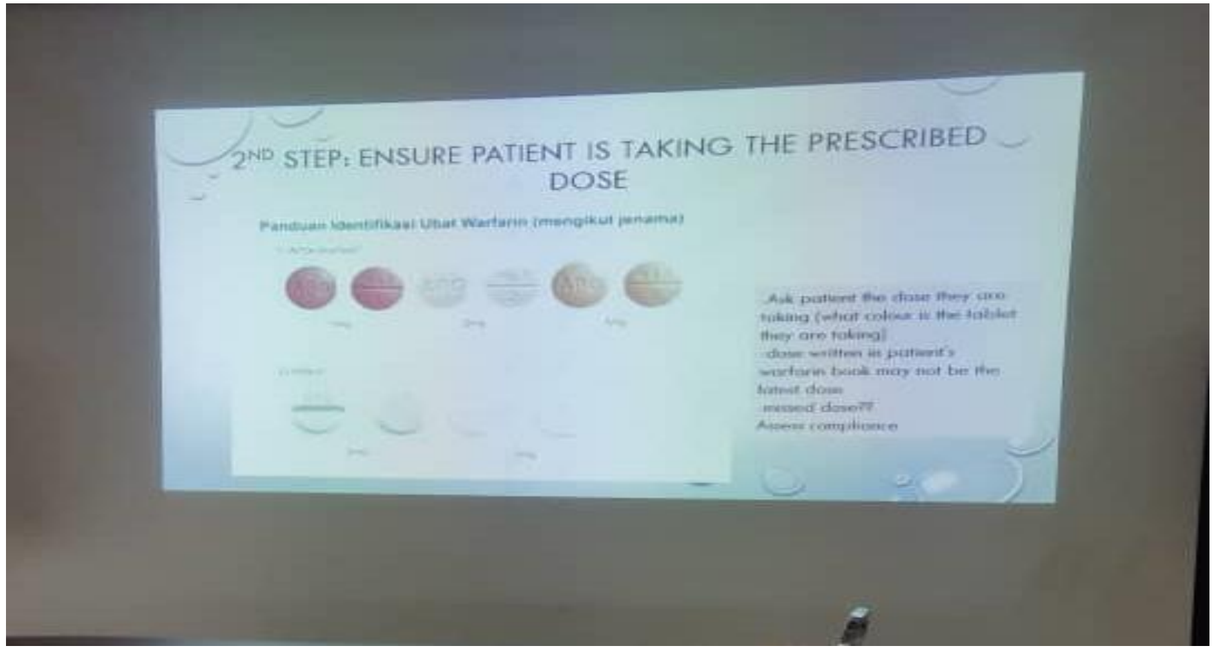
Masa	Perkara	Penceramah
9.30 pagi	Kehadiran peserta (KPF/ PFK/ Pembentang/ Peserta secara atas talian)	
9.45 pagi	Perutusan Pengerusi	Pn. Siti Hanidah Binti Maksom Timbalan Pengarah Kesihatan Negeri (Farmasi) Johor
10.00 pagi	Kaedah Pemantauan Suhu Bilik & Peti Sejuk di Unit Farmasi Logistik, Hospital Sultanah Aminah	Pn. Liew Bih Chung Pegawai Farmasi UF54 Hospital Sultanah Aminah
11.00 pagi	Pembentangan Garis Panduan Pendispensan Ubat Tahan Sakit/ Analgesik	Pn. Nur Hazalina Binti Md. Salleh Pegawai Farmasi UF54 Hospital Sultan Ismail
12.00 tengah hari	Kaunseling Warfarin Di Klinik Kesihatan Mahmoodiah dan Klinik Kesihatan Sultan Ismail	Cik Wang Sin Loo Pegawai Farmasi UF44 Pejabat Kesihatan Daerah Johor Bahru
1.00 petang	Bersurai	

Continuing Medical Education (CME)

- Three CME sessions were conducted for all doctors and pharmacists
- Post test to assess understanding

Topics delivered:

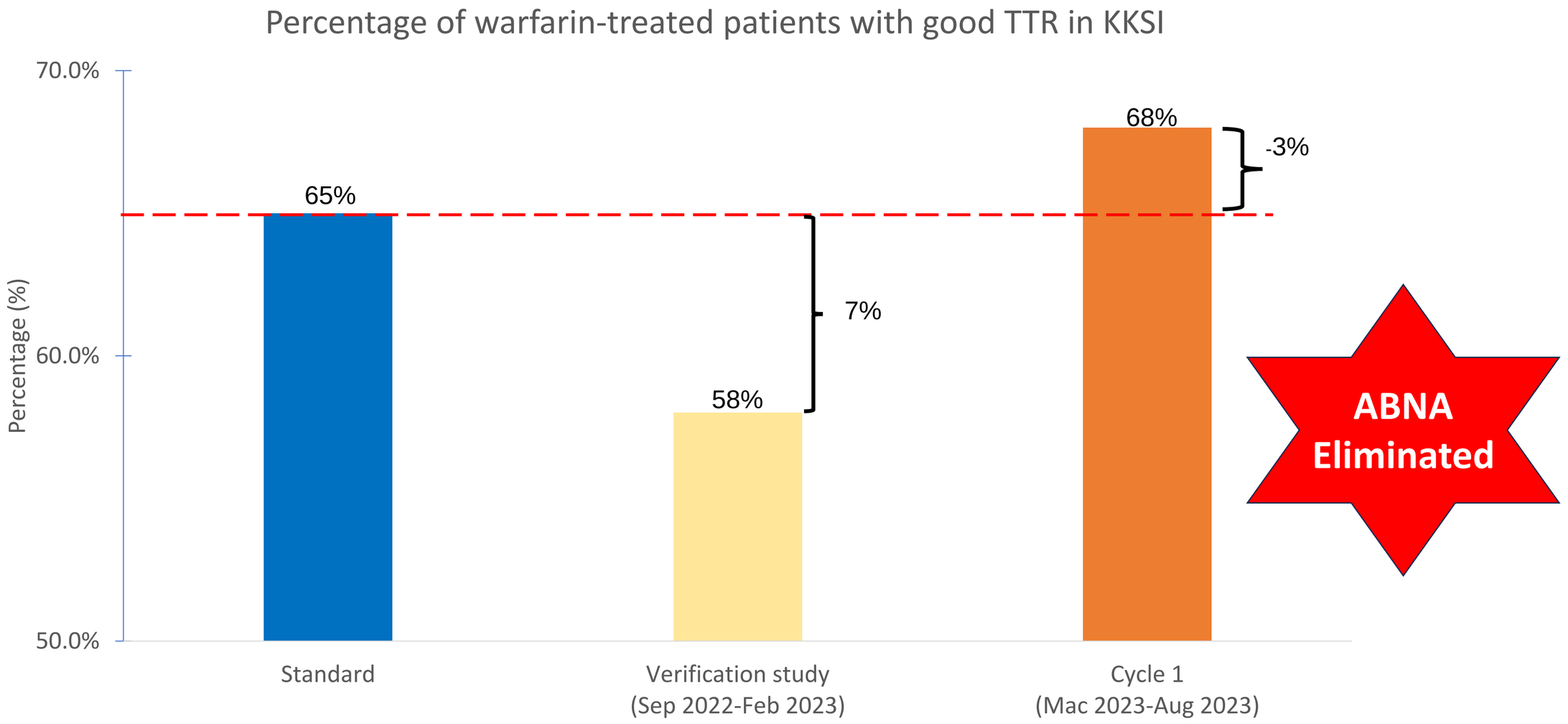
- Pharmacological action of warfarin
- Warfarin-food interactions
- Warfarin-drug interactions
- Guideline-based dosage adjustment
- Introduction of warfarin checklist



Improved knowledge & understanding

Effect of Change (Cycle 1)

Achievable Benefit Not Achieved (ABNA)



Effect of Change - Model of Good Care (1)

Process	Criteria	Standard	Verification (n=30)	Cycle 1 (n=102)
Review patient	• Check warfarin indication	100%	70%	100%
	• Check INR target	100%	70%	100%
	• History taking for all factors which may affect INR	100%	20%	100%
Prescribing	• Make dose adjustment based on ICSI guidelines	100%	50%	80%
	• Prescribe appropriate duration based on ACCP guidelines	100%	70%	90%
Screening	• Ensure the correct INR targets and indications are written on the prescription	100%	100%	100%
	• Ensure the dose adjustment and duration prescribed are appropriate based on guidelines	100%	60%	100%

Effect of Change - Model of Good Care (2)

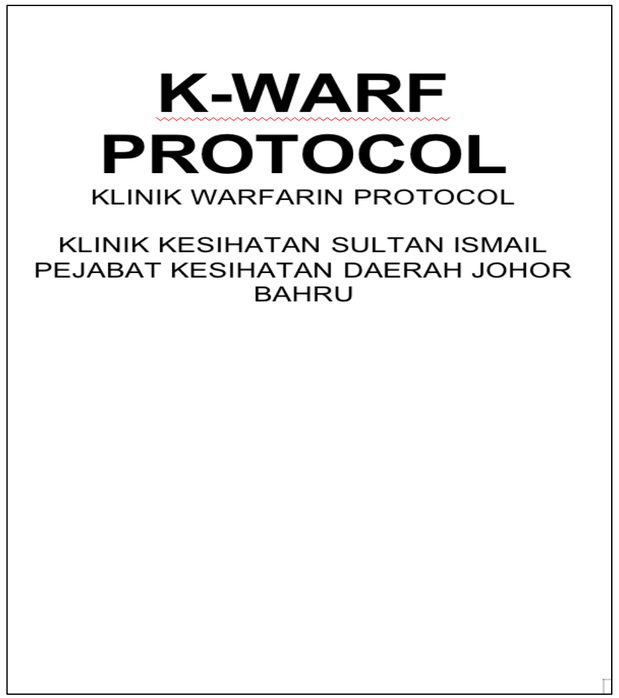
Process	Criteria	Standard	Verification (n=30)	Cycle 1 (n=102)
Intervention	• Discuss with doctors if the dose adjustment or duration is inappropriate	100%	80%	100%
Counselling	• Counsel patients on relevant factors which affect their INRs	100%	50%	100%
	• Assess patients' understanding and compliance	100%	50%	100%
	• Ensure patients who require additional counselling are referred to the counselling room	100%	0%	100%
Documentation	• Document the counselling session	100%	50%	100%
	• Arrange for follow-up appointments	100%	0%	100% (for extended counselling patients)

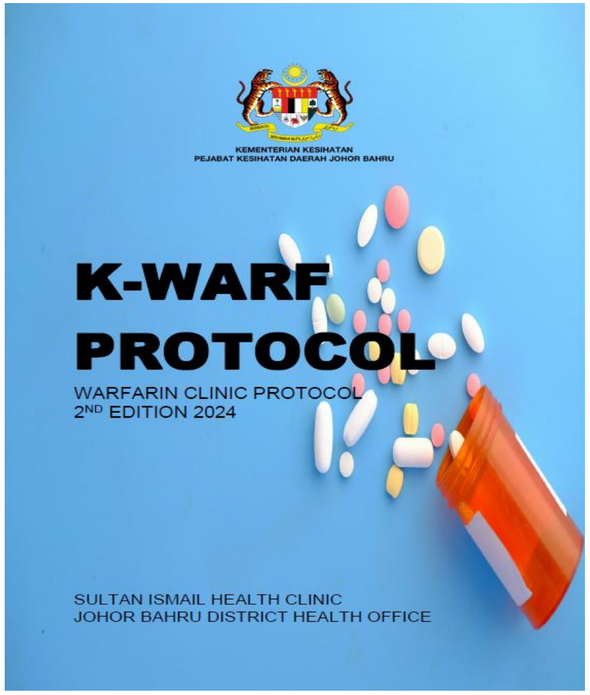
Strategies for Change (Remedial Action 2)

Strategies for Change - Cycle 2

K-WARF Protocol

- Reinforcement of strategies implemented in cycle 1
- Development of K-WARF protocol 1st Edition in September 2023 and 2nd edition was revised in February 2024





E-Warf Calculator

- QR code for E-warf calculator were generated and pasted on desks in consultation rooms to improve accessibility

IF INR IS LESS THAN TARGET DURING MAINTENANCE PHASE:
1. ASSESS PATIENT'S COMPLIANCE AND ALL THE CLINICALLY IMPORTANT CHANGES IN THEIR LIFESTYLE (ACCORDING TO CHECKLIST).
2. IF PATIENT IS NOT COMPLIANT TO WARFARIN, CONSIDER MAINTAINING THE DOSE AND REVIEW PATIENT IN 2 WEEKS.
3. EXTENDED TARGET RANGE (±0.2 OF TARGET INR RANGE) CAN BE APPLIED (BEAR IN MIND THAT IF TWO CONSECUTIVE READINGS ARE BELOW THE TARGET RANGE, CONSIDER DOSE ADJUSTMENT). HOWEVER, FOR ALL VALVE REPLACEMENTS, ACUTE/RECENT VTE, THE EXACT TARGET RANGE MUST BE USED.
4. 1% INCREASE IN WARFARIN DOSE = INCREASE IN INR OF 0.1.
5. ALWAYS CONSIDER TREND IN INRS WHEN MAKING DOSE ADJUSTMENT. MAXIMUM CHANGES OF DAILY DOSE IS ±1MG.

* FOR INITIATION PHASE, PLEASE REFER TO THE WARFARIN INITIATION SHEET.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	INR	1.4
Current warfarin dose (mg)	2	2	2	2	2	2	2	Total warfarin dose/week	14

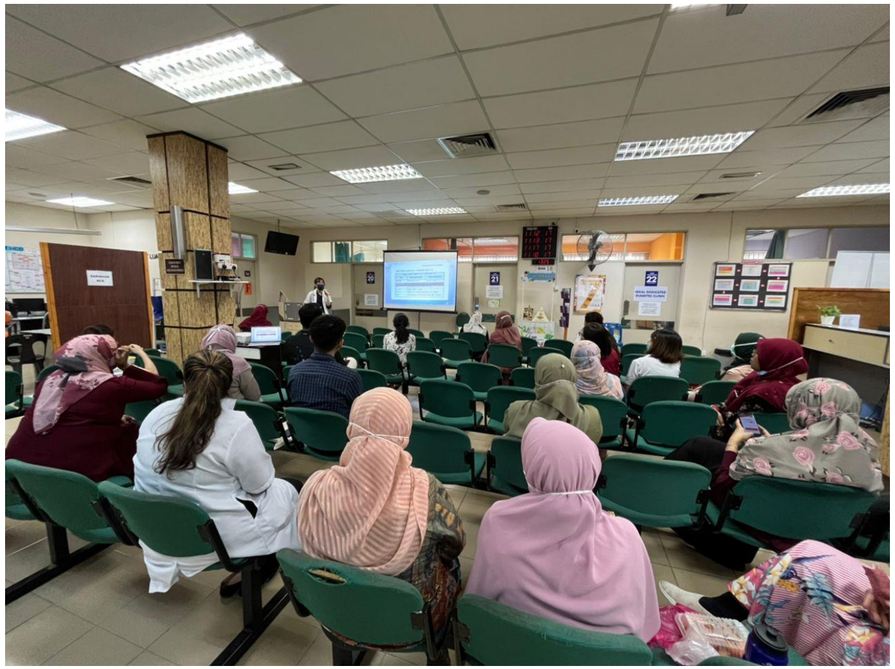
If INR is less than target		Proposed weekly warfarin dose regimen							Actual percentage increase in warfarin dose	Estimated INR	Suggested TCA
Consider increasing maintenance dose by	Adjusted weekly dose (rounded down to the nearest 0.5)	Monday (mg)	Tuesday (mg)	Wednesday (mg)	Thursday (mg)	Friday (mg)	Saturday (mg)	Sunday (mg)			
5%	14.5	2	2	2	2	2	2	2.5	3.57%	1.76	1-2 weeks
10%	15	2	2	2	2	2	2.5	2.5	7.14%	2.11	
15%	16	2.5	2.5	2.5	2.5	2	2	2	14.29%	2.83	
20%	16.5	2.5	2.5	2.5	2.5	2.5	2	2	17.86%	3.19	

USER MANUAL | INR < TARGET | INR > TARGET | AF WARFARIN INITIATION | WEEKLY DOSING CHART | +

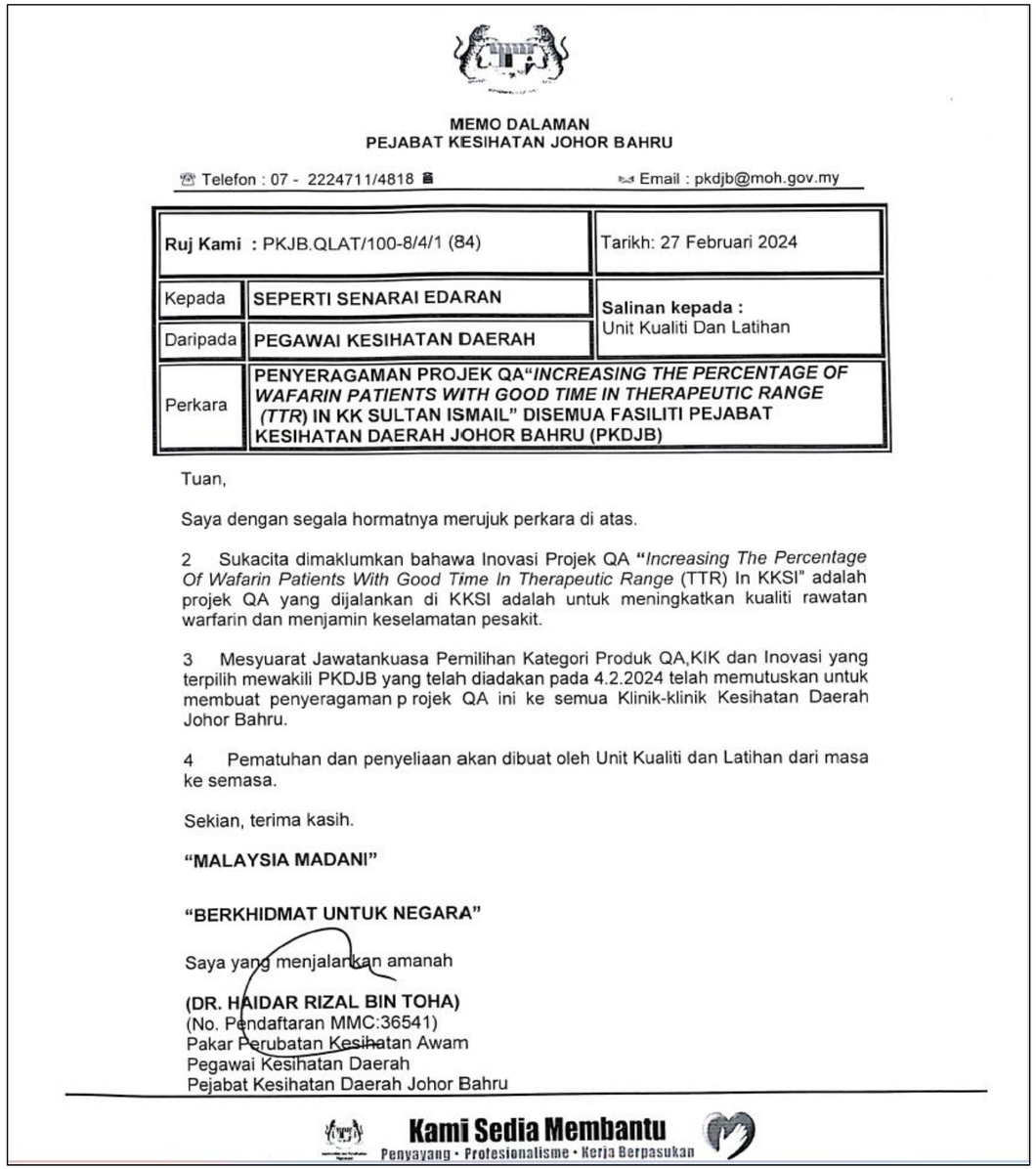
OFFLINE

Continuing Medical Education (CME)

- Another CME session was conducted in January 2024



Letter of Standardisation



MEMO DALAMAN
PEJABAT KESIHATAN JOHOR BAHRU

☎ Telefon : 07 - 2224711/4818 🖷 ✉ Email : pkdjb@moh.gov.my

Ruj Kami : PKJB.QLAT/100-8/4/1 (84)		Tarikh: 27 Februari 2024
Kepada	SEPERTI SENARAI EDARAN	**Salinan kepada :** Unit Kualiti Dan Latihan
Daripada	PEGAWAI KESIHATAN DAERAH	
Perkara	PENYERAGAMAN PROJEK QA"*INCREASING THE PERCENTAGE OF WAFARIN PATIENTS WITH GOOD TIME IN THERAPEUTIC RANGE (TTR)* IN KK SULTAN ISMAIL" DISEMUA FASILITI PEJABAT KESIHATAN DAERAH JOHOR BAHRU (PKDJB)	

Tuan,

Saya dengan segala hormatnya merujuk perkara di atas.

2 Sukacita dimaklumkan bahawa Inovasi Projek QA "*Increasing The Percentage Of Wafarin Patients With Good Time In Therapeutic Range* (TTR) In KKSI" adalah projek QA yang dijalankan di KKSI adalah untuk meningkatkan kualiti rawatan warfarin dan menjamin keselamatan pesakit.

3 Mesyuarat Jawatankuasa Pemilihan Kategori Produk QA,KIK dan Inovasi yang terpilih mewakili PKDJB yang telah diadakan pada 4.2.2024 telah memutuskan untuk membuat penyeragaman p rojek QA ini ke semua Klinik-klinik Kesihatan Daerah Johor Bahru.

4 Pematuhan dan penyeliaan akan dibuat oleh Unit Kualiti dan Latihan dari masa ke semasa.

Sekian, terima kasih.

"MALAYSIA MADANI"

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah

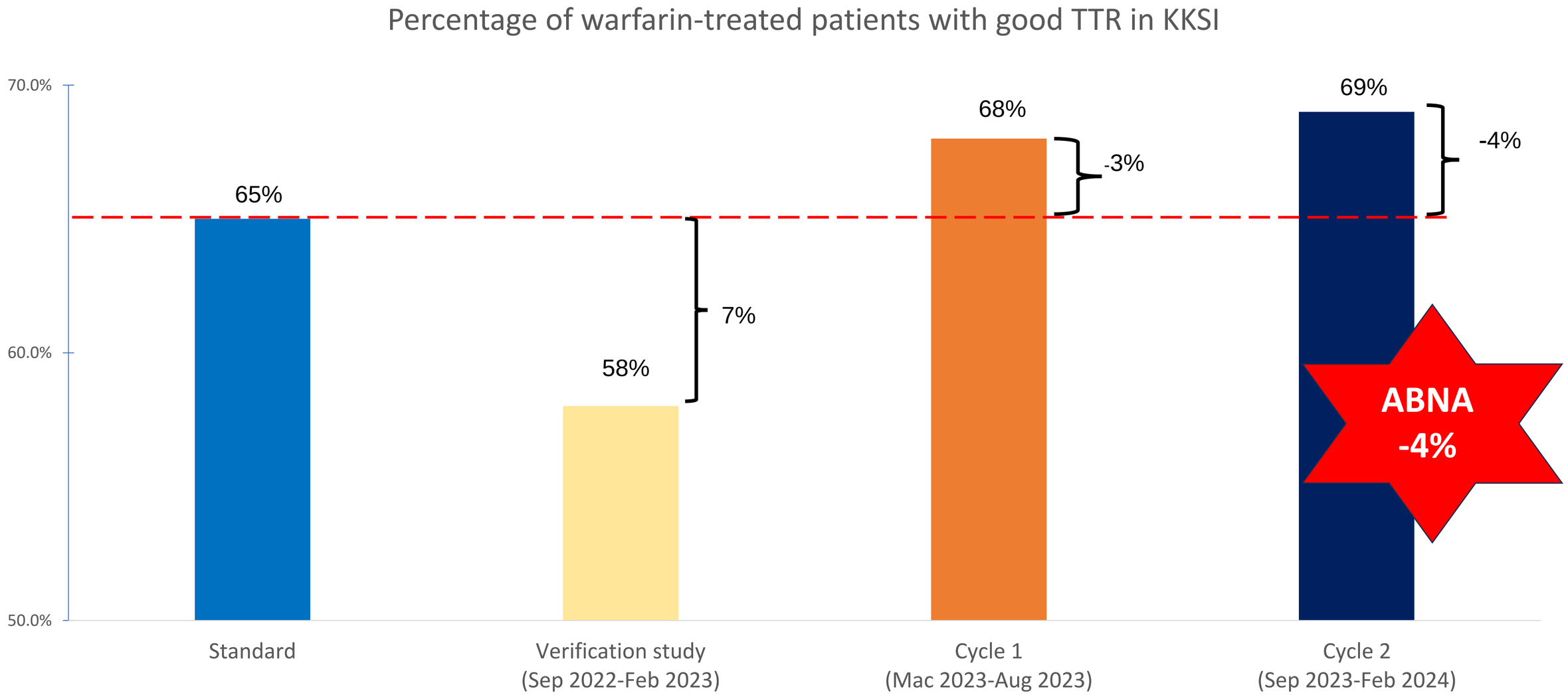
(DR. HAIDAR RIZAL BIN TOHA)
(No. Pendaftaran MMC:36541)
Pakar Perubatan Kesihatan Awam
Pegawai Kesihatan Daerah
Pejabat Kesihatan Daerah Johor Bahru

Kami Sedia Membantu
Penyayang • Profesionalisme • Kerja Berpasukan

*Mesyuarat Jawatankuasa Pemilihan Kategori Produk QA, KIK dan Inovasi yang terpilih mewakili PKDJB yang telah diadakan pada 4.2.2024 telah memutuskan untuk membuat **penyeragaman projek QA** ini ke semua Klinik-klinik Kesihatan Daerah Johor Bahru.*

Effect of Change (Cycle 2)

Achievable Benefit Not Achieved (ABNA)



Effect of Change - Model of Good Care (1)

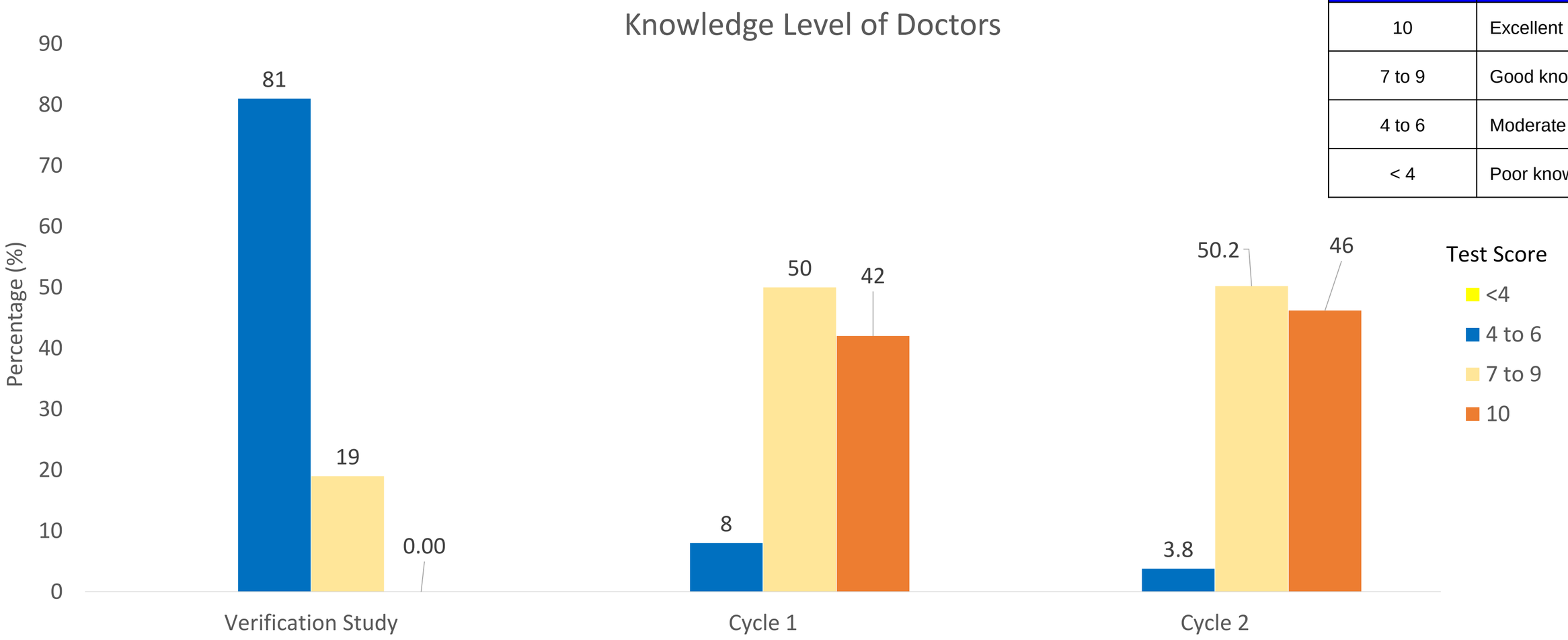
Process	Criteria	Standard	Verification (n=30)	Cycle 1 (n=102)	Cycle 2 (n=111)
Review patient	• Check warfarin indication • Check INR target • History taking for all factors which may affect INR	100% 100% 100%	70% 70% 20%	100% 100% 100%	100% 100% 100%
Prescribing	• Make dose adjustment based on ICSI guidelines • Prescribe appropriate duration based on ACCP guidelines	100% 100%	50% 70%	80% 90%	76% ↓ 90%
Screening	• Ensure the correct INR targets and indications are written on the prescription • Ensure the dose adjustment and duration prescribed are appropriate based on guidelines	100% 100%	100% 60%	100% 100%	100% 100%

Effect of Change - Model of Good Care (2)

Process	Criteria	Standard	Verification (n=30)	Cycle 1 (n=102)	Cycle 2 (n=111)
Intervention	• Discuss with doctors if the dose adjustment or duration is inappropriate	100%	80%	100%	100%
Counselling	• Counsel patients on relevant factors which affect their INRs • Assess patients' understanding and compliance • Ensure patients who require additional counselling are referred to the counselling room	100% 100% 100%	50% 50% 0%	100% 100% 100%	100% 100% 100%
Documentation	• Document the counselling session • Arrange for follow-up appointments	100% 100%	50% 0%	100% 100% (for extended counselling patients)	100% 100%

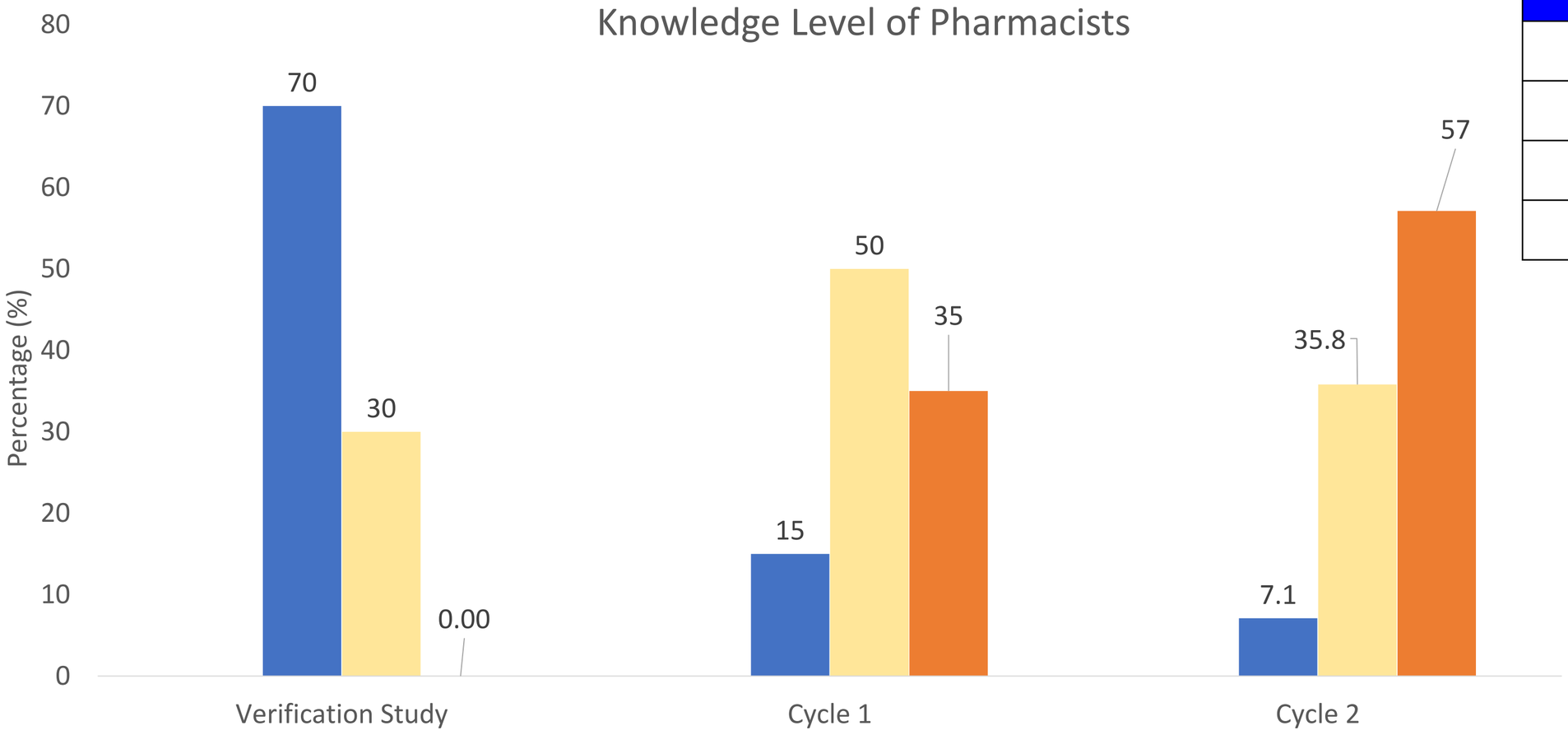
Effect of Change: Knowledge Level of Doctors

TEST SCORE	GRADING
10	Excellent knowledge
7 to 9	Good knowledge
4 to 6	Moderate knowledge
< 4	Poor knowledge



n = 26 for verification study and all cycles

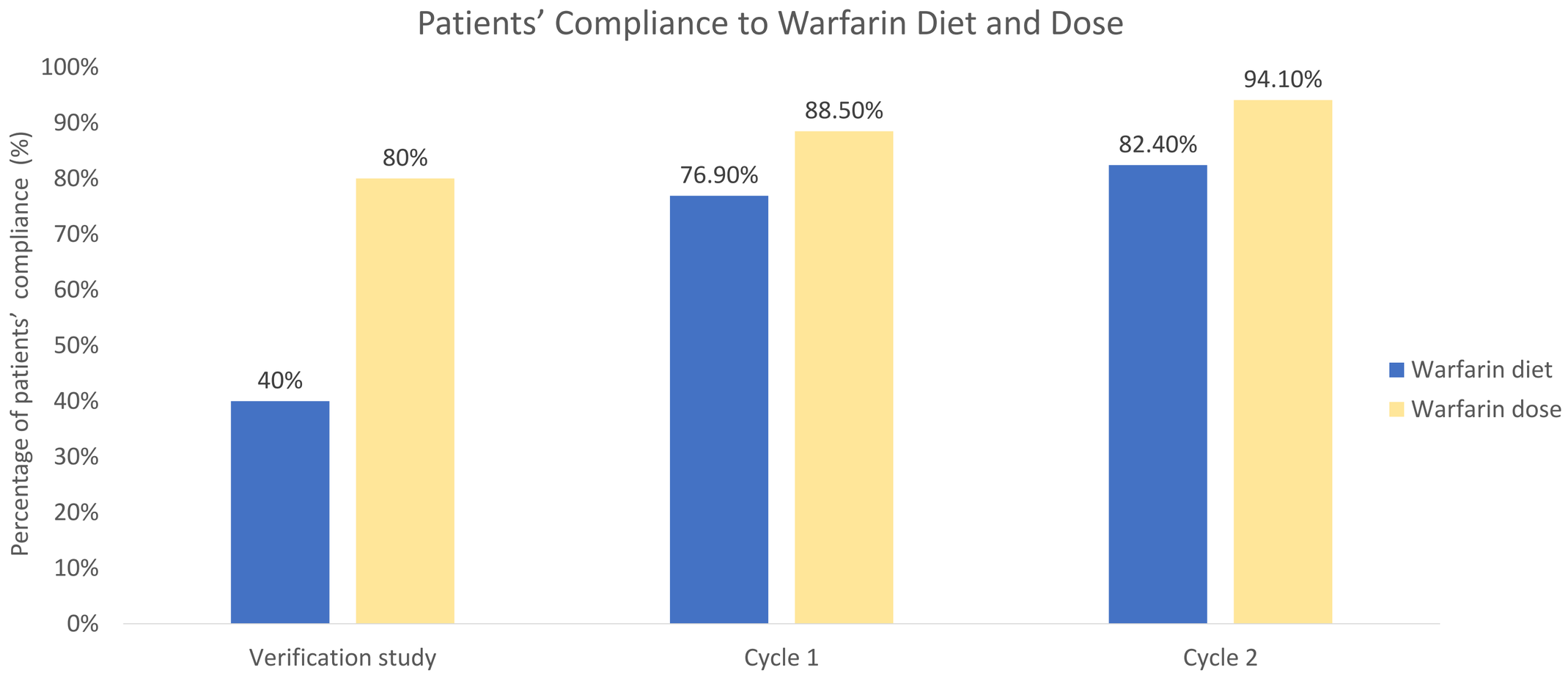
Effect of Change: Knowledge Level of Pharmacists



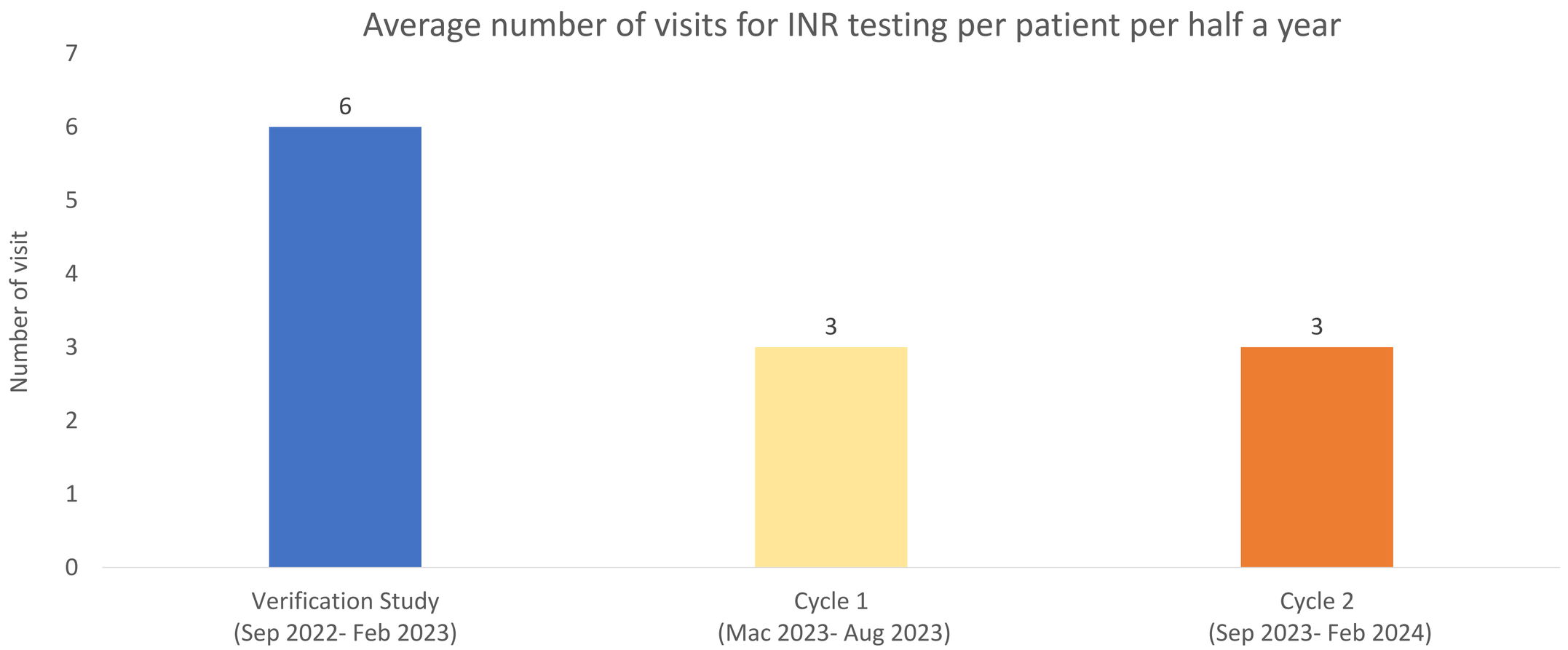
TEST SCORE	GRADING
10	Excellent knowledge
7 to 9	Good knowledge
4 to 6	Moderate knowledge
< 4	Poor knowledge

n = 20 for verification study & cycle 1
n = 14 for Cycle 2

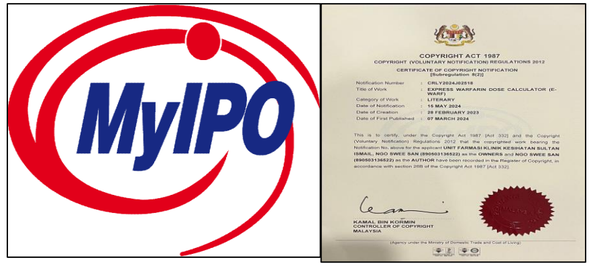
Analysis of Patients' Compliance to Warfarin Diet and Dose



Average Number of Visits for INR Testing



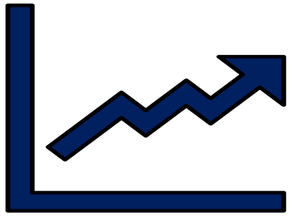
The Next Step



Obtained copyright for E-Warf

Application of International Standard Book Number (ISBN) for K-WARF protocol

Obtained e ISBN

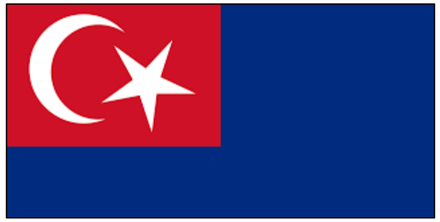


To increase the percentage of the indicator from 65% to 70%

May 2024

June 2024

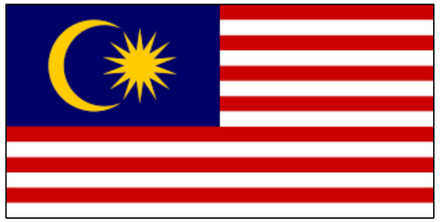
Sharing with other districts in Johor



Aug 2024

Sep 2024

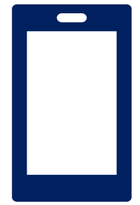
National FMS Conference



Sep 2024

The Next Step

- **Publish K-WARF protocol online**
- **Upgrade E-Warf to mobile application**

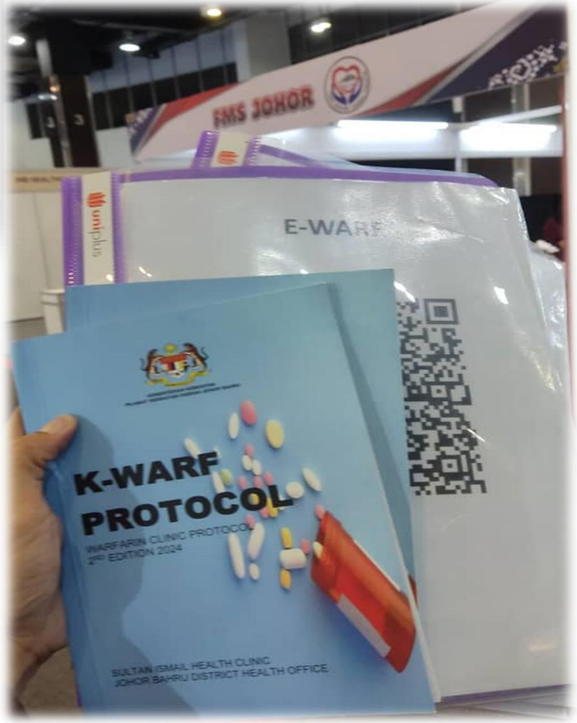


Sharing on the practice of E-Warf in JKNJ Pharmacy practice meeting on 10th June 2024

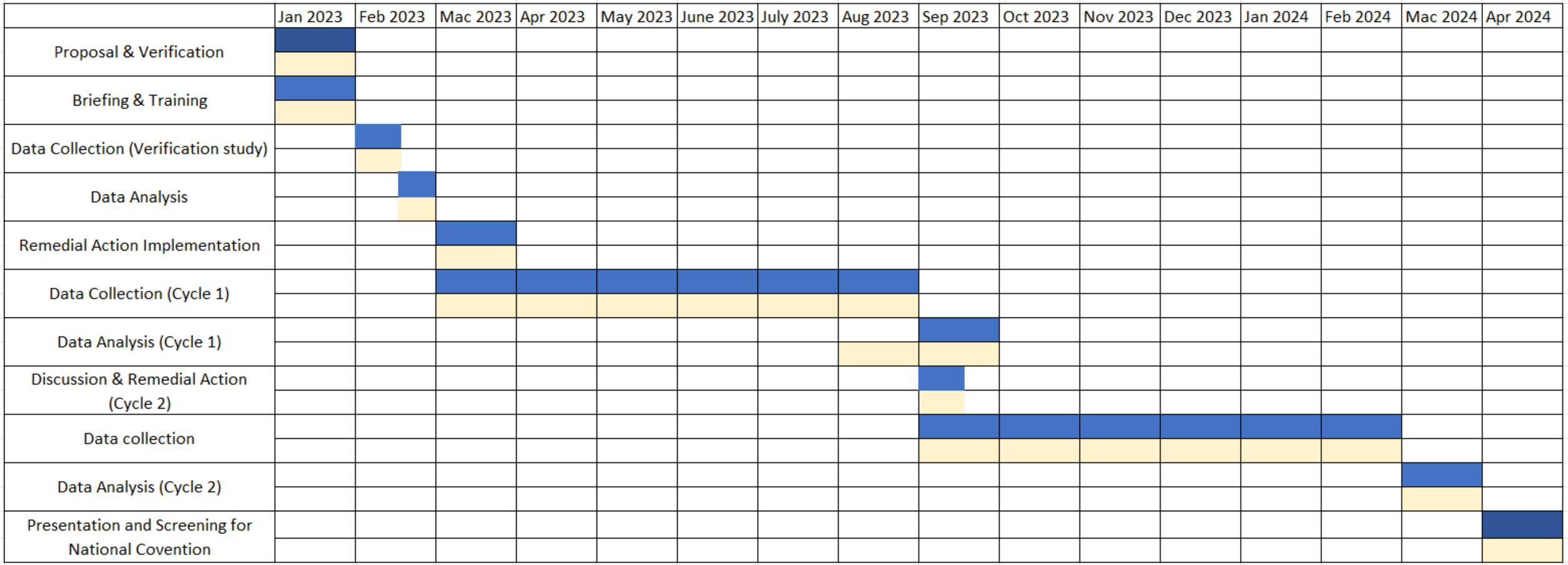
5.17	**Perkongsian Projek QII: e- WARF, Pejabat Kesihatan Daerah Johor Bahru**	
	Pembentangan perkongsian projek oleh Pejabat Kesihatan Daerah Johor Bahru	**Makluman**

Family Medicine Scientific Conference

Sharing of K-WARF Protocol at the FMS Conference 2024



Gantt Chart



Planned Progress

Actual Progress

References

1. Haas S, Ten Cate H, Accetta G, Angchaisuksiri P, Bassand JP, Camm AJ, Corbalan R, Darius H, Fitzmaurice DA, Goldhaber SZ, Goto S, Jacobson B, Kayani G, Mantovani LG, Misselwitz F, Pieper K, Schellong SM, Stepinska J, Turpie AG, van Eickels M, Kakkar AK; GARFIELD-AF Investigators. Quality of Vitamin K Antagonist Control and 1-Year Outcomes in Patients with Atrial Fibrillation: A Global Perspective from the GARFIELD-AF Registry. PLoS One. 2016 Oct 28;11(10).

2. Jones M, McEwan P, Morgan CL, Peters JR, Goodfellow J, Currie CJ. Evaluation of the pattern of treatment, level of anticoagulation control, and outcome of treatment with warfarin in patients with non-valvar atrial fibrillation: a record linkage study in a large British population. Heart. 2005 Apr;91(4):472-7

3. Thrombosis Canada. Warfarin: management of out-of-range INRs. Whitby, ON: Thrombosis Canada; 2015. Available from: http://thrombosiscanada.ca/clinicalguides/#.

Acknowledgement

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Dr. Hj. Haidar Rizal Bin Toha

Consultant Family Medicine Specialist
Dr. Rohayah Binti Abdullah

Senior Medical Officer
Dr. Dewi Juliana Binti Mohd. Namsah

Head of Pharmacy Unit PKDJB
Dr. Fajaratunur Binti A. Sani

Quality and Training Unit PKDJB

Special thanks to all doctors and pharmacists in KKSI

THANK YOU