



11th National QA Convention



Improving Utilization of Parenteral Iron Therapy for Treatment of Iron Deficiency Anemia (IDA) in Medical Wards of Hospital Kuala Lumpur



Kami Sedia Membantu
Penyayang • Profesionalisme • Kerja Berpasukan



Group Members

Jabatan Farmasi



Gan Shiau Shuang
(Team Leader)



**Adelin Yong
Sue Wen**



Chang Cheek Ee



Lee Hooi Peng



Marilyn Tan May Yeen

Jabatan Perubatan Unit Hematologi



**Dr. Sharifah Suryani
Syed Rahim Shah**
**Consultant
Hematologist**

Selection Of Opportunities For Improvement



Problem Identification And Verification

No	Problems	No of incidence	%
1.	Patient's own medications (POM) not served to patient.	1/20	5%
2.	Late discharge prescription endorsed by doctor	4/30	13.3%
3.	Return of expired medications by patients	4/20	20%
4.	Low smoking cessation rate among high risk patients	5/10	50%
5.	Underutilization of parenteral iron therapy for the treatment of IDA.	18/20	90%

Problem Prioritization – “SMART CRITERIA”

No	Problems	S	M	A	R	T	Total
1.	POM not served to patient.	15	9	9	12	15	60
2.	Late discharge prescription endorsed by doctor	9	15	15	9	12	60
3.	Return of expired medications by patients	9	15	15	9	9	57
4.	Low smoking cessation rate among high risk patients	15	15	15	6	6	57
5.	Underutilization of parenteral iron therapy for the treatment of IDA.	15	15	15	15	15	75

Rating scale: 1=Strongly disagree to 5=Strongly agree

Reasons For Selection

S

- Only **10%** of IDA patients received parenteral iron → **poor clinical outcomes**
- Unnecessary blood transfusion → **reduction in blood bank stock** and risk of adverse effects from transfusion

General Health Director, Tan Sri Dr Noor Hisham Abdullah's statement on May 2020:

"During the Movement Control Order (MCO), our **blood bank stock dropped by 40 per cent**

because we were unable to conduct blood donation campaigns, and the public also avoided coming to our blood banks to donate blood."¹

Blood Supply Dropped 40pc During MCO: MOH

By Celine Loo | 20 May 2020

Only 60% of targeted blood donations was collected during the MCO, and only 57% during the CMCO.



Reasons For Selection

S

- Only **10%** of IDA patients received parenteral iron → **poor clinical outcomes**
- Unnecessary blood transfusion → **reduction in blood bank stock** and risk of adverse effects from transfusion

M

- % IDA patients receive parenteral iron

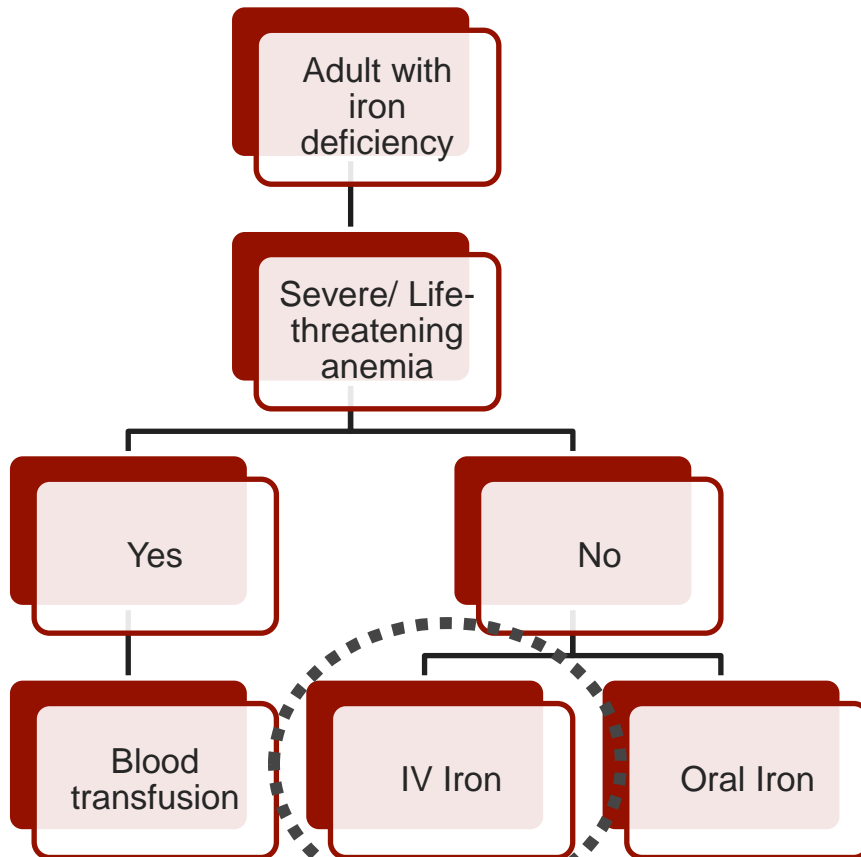
A

- Evidence based medicines, **safe and cost-effective**
- Achieve optimal treatment outcomes → **reduce cost of rehospitalization**

Evidence Based Medicines



UpToDate



Treatment of iron deficiency in nonpregnant adults²



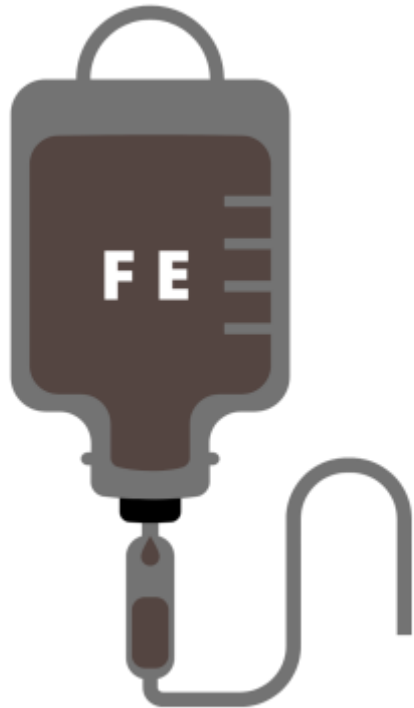
THE THREE PILLARS OF PBM

- **Avoid blood transfusion** for IDA without hemodynamic instability³
- Address the cause of IDA and fuel self-driven **erythropoiesis** with **iron supplementation**⁴

Effective



Medscape



=

Equally
effective⁵



500mg
parenteral iron

Iron in
2 pints of blood

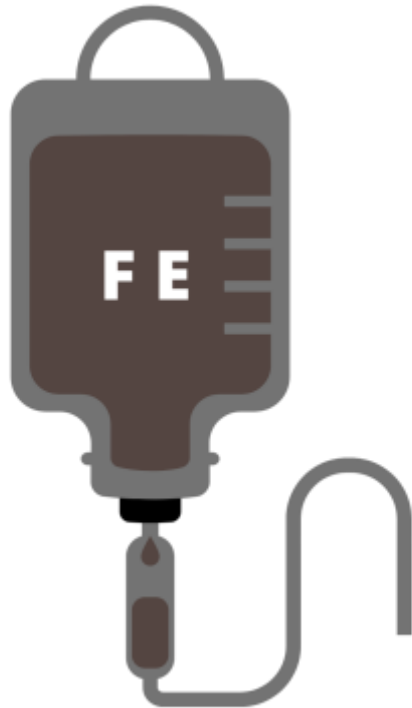


RM 87.70 (iron dextran)



RM 240

Safe



<1 in 200,000
at risk of serious
adverse events
(SAE) ⁷



~ 1 in 21,413
at risk for non-
infectious SAE⁷



5%
increased
risk of
**hospital
mortality**⁸

Reasons For Selection

S

- Only **10%** of IDA patients received parenteral iron → **poor clinical outcomes**
- Unnecessary blood transfusion → **reduction in blood bank stock** and risk of adverse effects from transfusion

M

- % IDA patients receive parenteral iron

A

- Evidence based medicines, **safe and effective**
- Achieve optimal treatment outcomes → **reduce cost of rehospitalization**

R

- **Remediable** by appropriate strategies of change and multidisciplinary approach

Reasons For Selection

S

- Only **10%** of IDA patients received parenteral iron → **poor clinical outcomes**
- Unnecessary blood transfusion → **reduction in blood bank stock** and risk of adverse effects from transfusion

M

- % IDA patients receive parenteral iron

A

- Evidence based medicines, **safe and effective**
- Achieve optimal treatment outcomes → **reduce cost of rehospitalization**

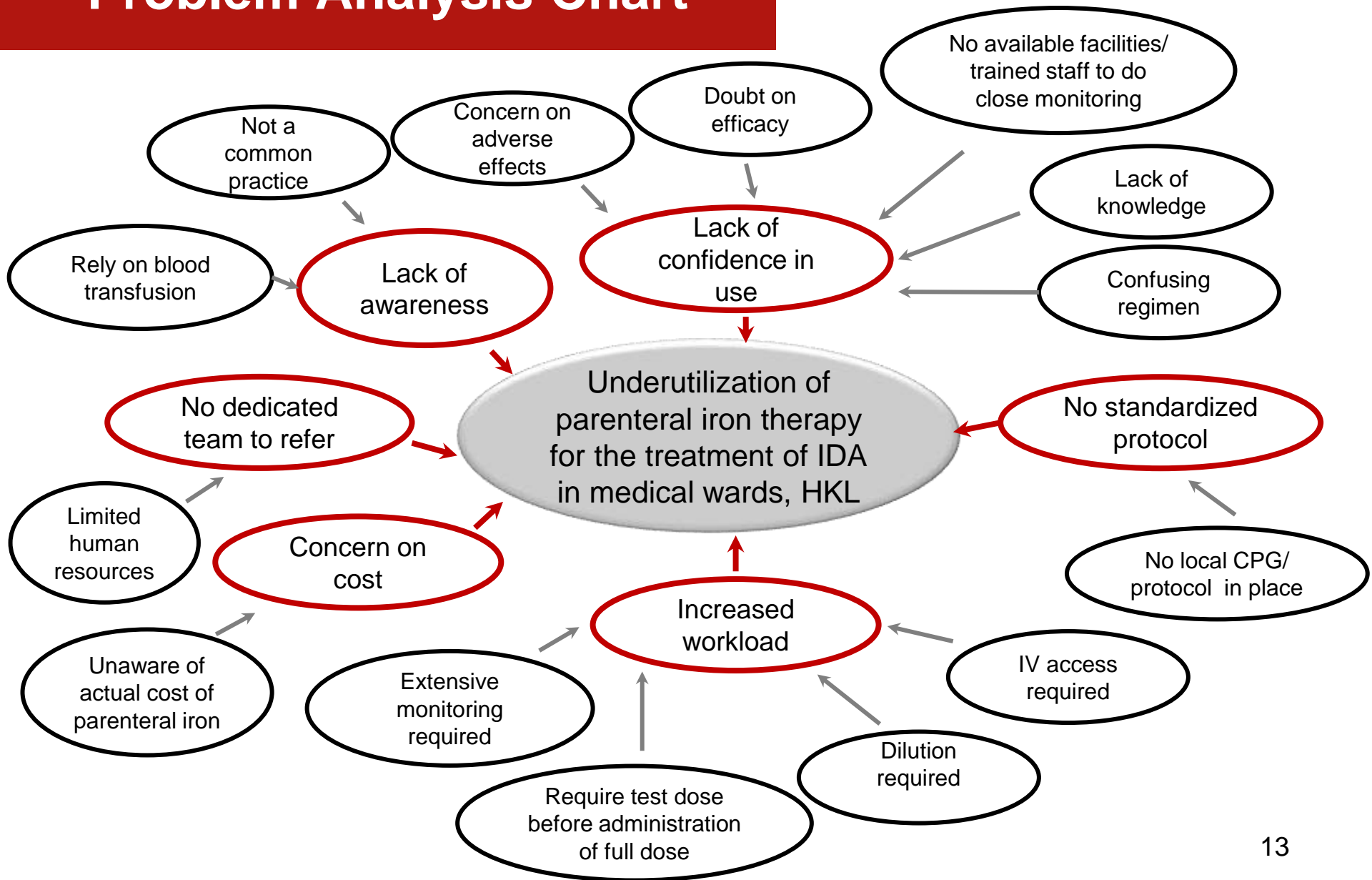
R

- **Remediable** by appropriate strategies of change and multidisciplinary approach

T

- Can be completed in a timely manner

Problem Analysis Chart



Problem Statement

- A survey conducted in June 2019 among 20 IDA patients in 3 selected medical wards showed that only **10%** of them were treated with parenteral iron therapy.
- The underutilization of parenteral iron is associated with **unnecessary use of blood transfusion** and **poor clinical outcomes** for IDA patients.
- **Multiple factors** including lack of confidence in use, lack of knowledge and experience on the dosage and administration of parenteral iron may lead to this problem.
- This study aims to **improve the utilization of parenteral iron** in management of IDA in which if properly utilized, may help to reduce the number of blood transfusions and achieve optimal treatment outcomes.

Study Objectives

General Objective

- To improve the utilization of parenteral iron therapy for the treatment of IDA in medical wards, HKL

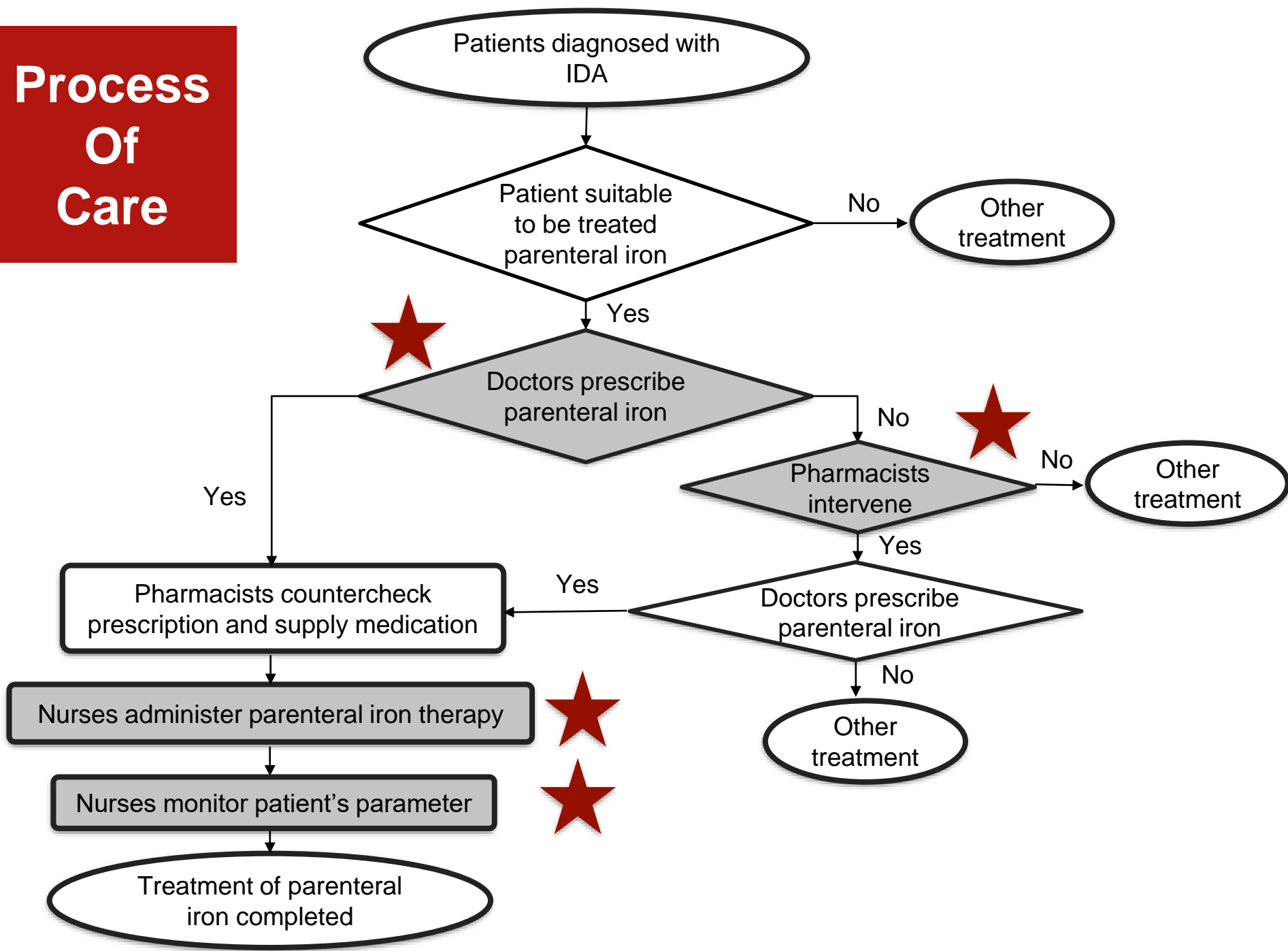
Specific Objectives:

1. To determine magnitude and severity of underutilization of parenteral iron therapy for the treatment of IDA in medical wards, HKL
2. To identify contributing factors to the underutilization of parenteral iron administration for the treatment of IDA in medical wards, HKL
3. To formulate and implement proper remedial action
4. To evaluate the effectiveness of remedial action

Key Measurement For Improvement



Process Of Care



Indicator & Standard



Indicator

% of IDA patients treated with parenteral iron



Formula

$$\frac{\text{Number of IDA patients treated with parenteral iron}}{\text{Total number of patients diagnosed with IDA}}$$

Standard

40%



	39.8% ⁹
	41.7% ¹⁰

Based on **expert consensus (hematologists)** and **practices in tertiary hospital abroad**

Model Of Good Care (1)

No	Critical Step	Criteria	Standard
1	Prescribing of parenteral iron	<ul style="list-style-type: none"> Doctors aware of parenteral iron as one of the treatment options for IDA. 	100%
		<ul style="list-style-type: none"> Doctors competent with the knowledge on management of IDA and parenteral iron therapy. 	100%
2	Pharmacist's intervention	<ul style="list-style-type: none"> Pharmacists aware of parenteral iron as one of the treatment options for IDA. 	100%
		<ul style="list-style-type: none"> Pharmacists competent with the knowledge on management of IDA and parenteral iron therapy. 	100%

Model Of Good Care (2)

No	Critical Step	Criteria	Standard
3	Administration of parenteral iron	<ul style="list-style-type: none"> Nurses administer parenteral iron therapy with correct dilution and rate of infusion. 	100%
4	Monitoring of patient's parameter	<ul style="list-style-type: none"> Patient's vital signs, signs and symptoms of allergy and infusion site reactions are monitored and documented. 	100%
		<ul style="list-style-type: none"> These parameters are monitored every 15 minutes during the test dose and documented. 	100%
		<ul style="list-style-type: none"> These parameters are monitored every 30 minutes for the remaining dosage and documented. 	100%

Process Of Gathering Information



Methodology

Study Design

Prospective
interventional



Sampling Technique

Convenience
sampling



Source of Data

- HKL Lab Investigation System (LIS)
- Medical record review
- Pharmacy item movement record (KEW.PS-4/ bin card) of all parenteral iron preparations

Compiled with data collection form

Inclusion Criteria

Patient diagnosed with IDA proven by iron profile



Exclusion Criteria

Patients whom medical record could not be traced

Study sample

Patients admitted into selected medical wards (without hematologists):

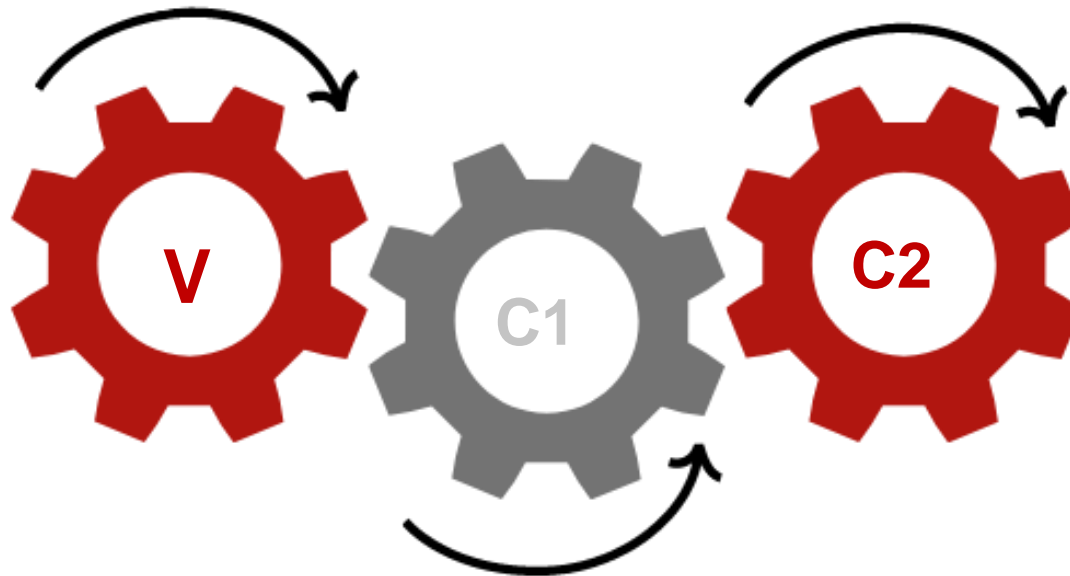
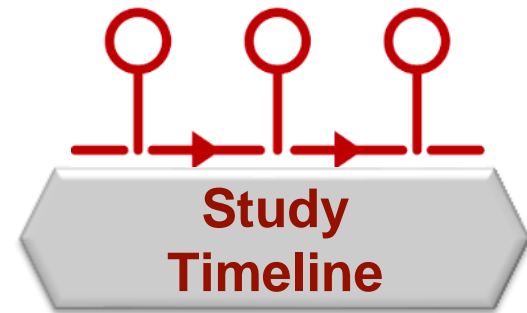
Verification: NW24, KK1, KK3, KK4, KK6

Cycle 1: KK1, KK3, KK4, KK5, KK6

Cycle 2: KK1, KK2, KK3, KK4, KK5, KK6, KK7



Methodology



Terms And Definitions

Term	Definition
Underutilization (medical)	<p>The failure to provide a medical intervention when it is likely to produce a favorable outcome</p> <p style="text-align: right;">McGraw-Hill Concise Dictionary of Modern Medicine</p>
Iron deficiency anemia (IDA)	<p>A decrease in the number of red blood cells or the amount of hemoglobin in the blood caused by a lack of iron in the body, which is confirmed by iron studies.</p> <ul style="list-style-type: none"> • Ferritin > 100ng/mL plus TSAT < 20% • Ferritin < 30ng/mL • Ferritin < 100ng/mL plus TSAT < 20% <p style="text-align: right;">National Heart, Lung and Blood Institute Munoz et al, Blood Transfus, 2017 Sept 15(%):424-437</p>
Parenteral iron	<p>Iron injections that are administered either directly into the blood stream through an IV line or into the muscle</p> <p style="text-align: right;">National Heart, Lung and Blood Institute</p>

Data collection form



Ward & Bed:		Subject ID	
Subject name:		Gender :	<input type="checkbox"/> Male <input type="checkbox"/> Female
Weight: (kg)		IC:	
Age:		RN:	
Race:	<input type="checkbox"/> Malay <input type="checkbox"/> Chinese <input type="checkbox"/> Indian <input type="checkbox"/> Others		
Iron Studies Results:	Date		
	Iron		Ferritin
	TIBC		TSAT (%)
IDA treatment (can tick >1)	<input type="checkbox"/> (A) Blood Transfusion <input type="checkbox"/> (C) Oral Iron, Name & dose: _____ <input type="checkbox"/> (D) No treatment		<input type="checkbox"/> (B) Parenteral Iron <input type="checkbox"/> Cosmofer <input type="checkbox"/> Venofer <input type="checkbox"/> Monofer Dosage regimen: _____

NO	CRITERIA	YES / NO	COMMENT (IF ANY)
1	Iron studies traced and documented	<input type="checkbox"/> YES <input type="checkbox"/> NO	
2	Correct dilution	<input type="checkbox"/> YES <input type="checkbox"/> NO	
3	Correct infusion rate	<input type="checkbox"/> YES <input type="checkbox"/> NO	
4	Monitoring of patient's parameters during infusion documented	<input type="checkbox"/> YES <input type="checkbox"/> NO	
5	Monitoring of patient's parameters every 15 min during test dose	<input type="checkbox"/> YES <input type="checkbox"/> NO	
6	Monitoring of patient's parameters every 30min for the remaining dose	<input type="checkbox"/> YES <input type="checkbox"/> NO	

Questionnaires



Questionnaires: Management of IDA and Parenteral Iron Therapy

This set of quiz consists of 15 multiple choice questions to be answered by physicians and pharmacists. Please answer all the questions in 10 minutes and thanks for your participation.

* Required

1. Email *

2. Mobile number (to follow up on post-test) *

3. Designation *

Mark only one oval.

- Consultant
 Specialist
 Medical officer
 House officer
 Pharmacist

4. Current place of practice *

Mark only one oval.

- Medical ward
 Non-medical ward
 Other: _____

5. Years of working in current place of practice *

Mark only one oval.

- < 1 year
 2-5 years
 6-10 years
 > 10 years

6. Have you read on HKL Parenteral Iron Infusion Protocol before? *

Mark only one oval.

- Yes
 No

7. Are you aware of the availability of parenteral iron therapy as one of the treatment options for iron deficiency anemia? *

Mark only one oval.

- Yes
 No

Which of the following parenteral iron formulations are currently available in HKL?

- I. Iron Sucrose
II. Iron Polymaltose
III. Iron Dextran
IV. Sodium Ferric Gluconate

Data Analysis And Interpretation (Verification Study)



Verification Study

Sept 2020



V

Total number of patients diagnosed with IDA (A)	Number of IDA patients treated with parenteral iron (B)	Percentage of IDA patients treated with parenteral iron [(B/A) X100%]
43	4	[(4/43) X 100%] = 9.3%



Goal for improvement

To increase percentage of IDA patients treated with parenteral iron from **9.3%** to **40%**

Model Of Good Care (1)

No	Critical Step	Criteria	Standard	Verification
1	Prescribing of parenteral iron	<ul style="list-style-type: none"> Doctors aware of parenteral iron as one of the treatment options for IDA. 	100%	79.7%
		<ul style="list-style-type: none"> Doctors competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	24.6%
2	Pharmacist's intervention	<ul style="list-style-type: none"> Pharmacists aware of parenteral iron as one of the treatment options for IDA. 	100%	96.8%
		<ul style="list-style-type: none"> Pharmacists competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	35%

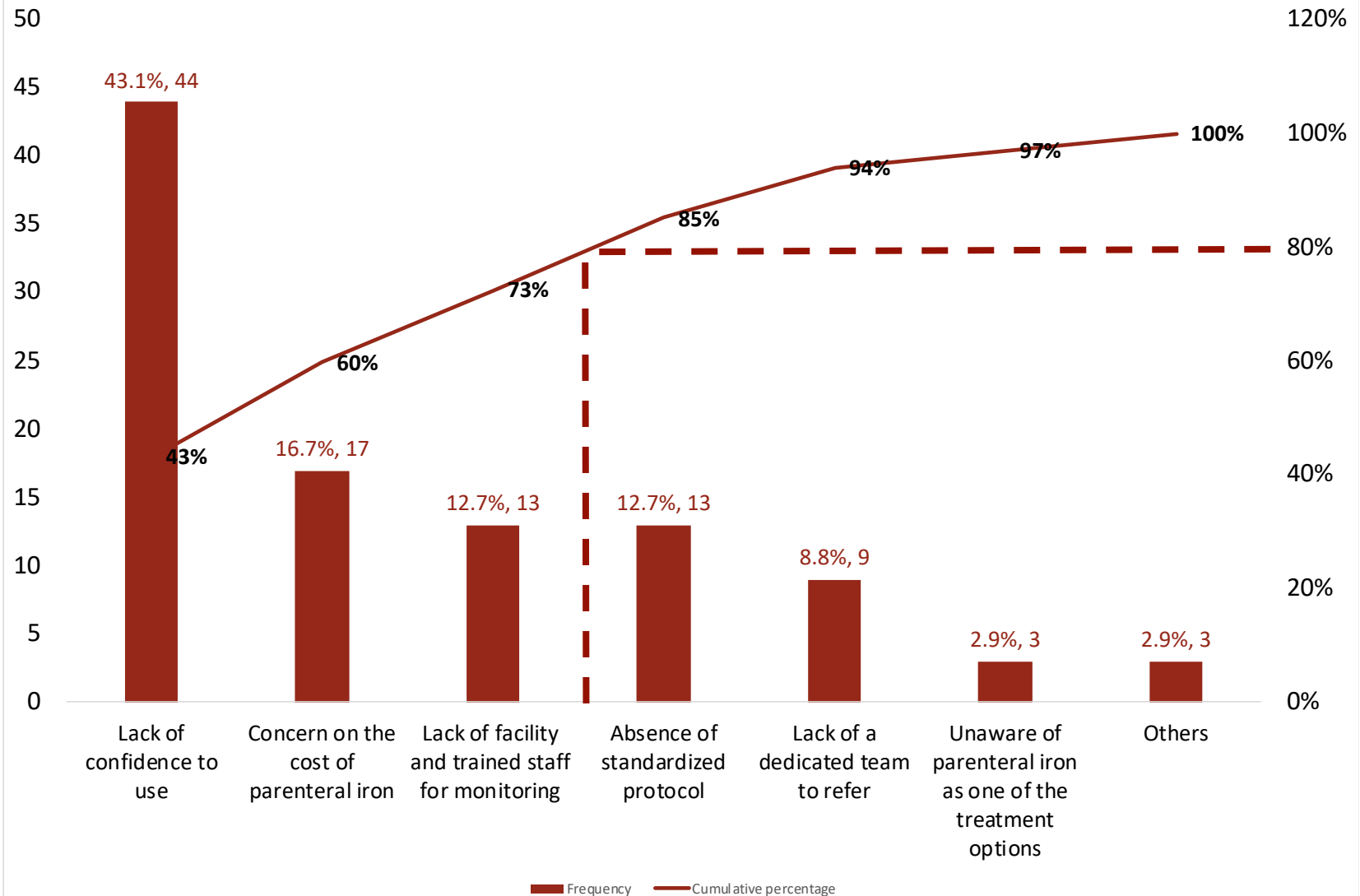
Model Of Good Care (2)

No	Critical Step	Criteria	Standard	Verification
3	Administration of parenteral iron	<ul style="list-style-type: none"> Nurses administer parenteral iron therapy with correct dilution and rate of infusion. 	100%	100%
4	Monitoring of patient's parameter	<ul style="list-style-type: none"> Patient's vital signs, signs and symptoms of allergy and infusion site reactions are monitored and documented. 	100%	0%
		<ul style="list-style-type: none"> These parameters are monitored every 15 minutes during the test dose and observation period and documented. 	100%	0%
		<ul style="list-style-type: none"> These parameters are monitored every 30 minutes for the remaining dosage and documented. 	100%	0%

Doctors And Pharmacist Survey Findings

N = 102

Contributing factors to underutilization of parenteral iron therapy



Main Findings From Verification Study



Doctors & Pharmacists

- **Lack of confidence**
- **Lack of knowledge**
- Concern on costs



Nurses

- **Lack of training and awareness to do close monitoring**



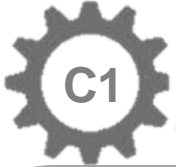
Hospital

- **Absence of standardized protocol**

Strategies For Change



Strategies For Change



Cycle 1

1. Development of Parenteral Iron Infusion Protocol
2. Distribution and promotion of protocol
3. Conduct continuous medical education (CME) to doctors and pharmacists
4. Conduct continuous nursing education (CNE) to nurses

Cycle 2



1. Conduct more CME session
2. Update, redesign and rebrand protocol to PREFER
3. Build website for PREFER
4. Invent a dose calculator for different regimen of parenteral iron
5. Display posters in all medical wards
6. Keep copies of monitoring charts in wards
7. Add Ferric Derisomaltose (Monofer) into HKL Drug List

Strategies For Change

Cycle 1



Main Findings From Verification Study



Doctors & Pharmacists

- **Lack of confidence**
- **Lack of knowledge**
- Concern on costs



Nurses

- **Lack of training and awareness to do close monitoring**



Hospital

- **Absence of standardized protocol**

1. Development of protocol

PROTOCOL

PARENTERAL IRON INFUSION IN MEDICAL WARDS



Hospital Kuala Lumpur
First Edition, 2020

Hospital Kuala Lumpur Jalan Pahang 50586 Wilayah Persekutuan Kuala Lumpur



Expert reviewer

Hematologist	Chief Clinical Pharmacist
Dr. Sharifah Suryani	Dr. Rahela Ambaras Khan
Dr. Jameela Sathar (Former Head of National Hematology Services - external reviewer)	

1. Development of protocol

Contents

- ✓ Indication
- ✓ Contraindication
- ✓ Precaution
- ✓ Dosage
- ✓ Dilution
- ✓ Administration
- ✓ Monitoring



Feature 1: Quick dosage reference table

Actual Hb (g/dL)	6	7	8	9	10	11	12
Body weight (kg)							

Calculation based on Ganzoni formula¹²:

[Body weight (kg) x (target Hb - actual Hb) (g/dL) x 2.4] + mg iron for iron stores

- Body weight: Actual Weight if BMI < 30kg/m²
- Ideal Body Weight if BMI > 30kg/m²
- Pre-pregnant weight for pregnant women

Iron Stores:

- <35 kg body weight = 15 mg/kg body weight
- >35 kg body weight = 500 mg

Main Findings From Verification Study



Doctors & Pharmacists

- **Lack of confidence**
- **Lack of knowledge**
- Concern on costs



Nurses

- **Lack of training and awareness to do close monitoring**



Hospital

- **Absence of standardized protocol**

1. Development of protocol

Feature 2: Monitoring charts

Carta Pemantauan IV Cosmofer® ('Total dose infusion')

Nama: _____

No IC/RN: _____

Diagnosis: _____

Tarikh: _____

Masa selepas infusi bermula (minit)	Masa	Kesan Sampingan							
		Tekanan darah (mm/Hg)	Suhu badan (°C)	'Chills & rigors'	Sakit dada	Sesak Nafas	Ruam	Bengkak 'Angioedema'	'Extravasation' *
Test Dose									
0									
15									
30									
45									
60									

2. Distribution, promotion and accessibility of protocol

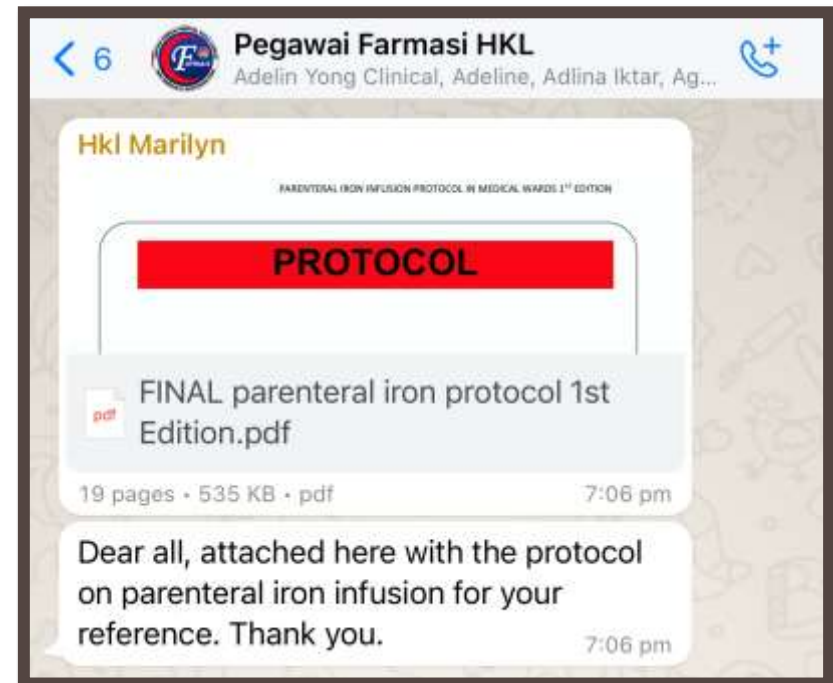
Hard copy

- Printed and distributed to all the medical wards



E-protocol

- Broadcasted via whatsapp to specialist groups, MO and pharmacist groups



Main Findings From Verification Study



Doctors & Pharmacists

- **Lack of confidence**
- **Lack of knowledge**
- Concern on costs



Nurses

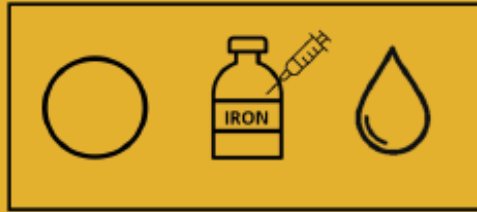
- **Lack of training and awareness to do close monitoring**



Hospital

- **Absence of standardized protocol**

3. Virtual CME



YOU ARE INVITED

MEETING ID: 741 9144 3021
PASSCODE: IRON

ZOOM LINK:
<https://uso4web.zoom.us/j/74191443021?pwd=aWphK25RejVZbTRhZFpGYitCcys4Zzo9>

**21
OCT
21**

2 - 3 PM

PARENTERAL IRON: YAY OR NAY?

*Do you know **500mg** of parenteral iron has the same amount of iron in **2 pints** of blood?*

Our speakers

Dr Sharifah Suryani
Consultant Hematologist
Adelin Yong Sue Wen
Ward pharmacist

2 Sessions

- 21 Oct 21
- 28 Oct 21

Mode

Virtual (COVID-19 pandemic)

Audience

- Doctors
- Pharmacists

No. participants

102




Feature

Pre- and post-CME tests with awards

- **Identify local champion**
- Assess improvement in knowledge

Virtual CME



FINAL TASK 

Please complete the quiz.

No. of questions: 15MCQs
Time limit: 10min

Are you our
LOCAL CHAMPION?

Awards will be given to 4 participants who scored
highest in the shortest time!

<https://forms.gle/VSH32LPp9vLgjmWx5>



Congratulations

1. Dr. Goh Shiau Fui
2. Dr. Asma
3. Vivien Sow (Pharmacist)
4. Chin Mei Yu (Pharmacist)

Main Findings From Verification Study



Doctors & Pharmacists

- **Lack of confidence**
- **Lack of knowledge**
- Concern on costs



Nurses

- **Lack of training and awareness to do close monitoring**



Hospital

- **No available protocol or guideline**

4. CNE



Hands on
IV Cosmofer
dilution
demonstration
by SN

2 Sessions

- 18 Nov 21
- 1 Dec 21

Venue

Auditorium IPHKL

Audience

- Nurses from all medical wards

No. participants

61

Feature

Pre- and post-CME tests with awards

- **Identify local champion**
- Assess improvement in knowledge

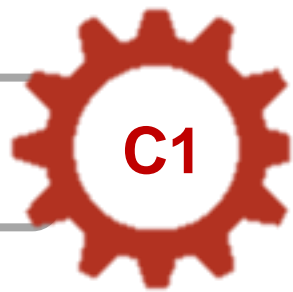
Effects Of Change

Cycle 1



Effects Of Change

Dec 2021



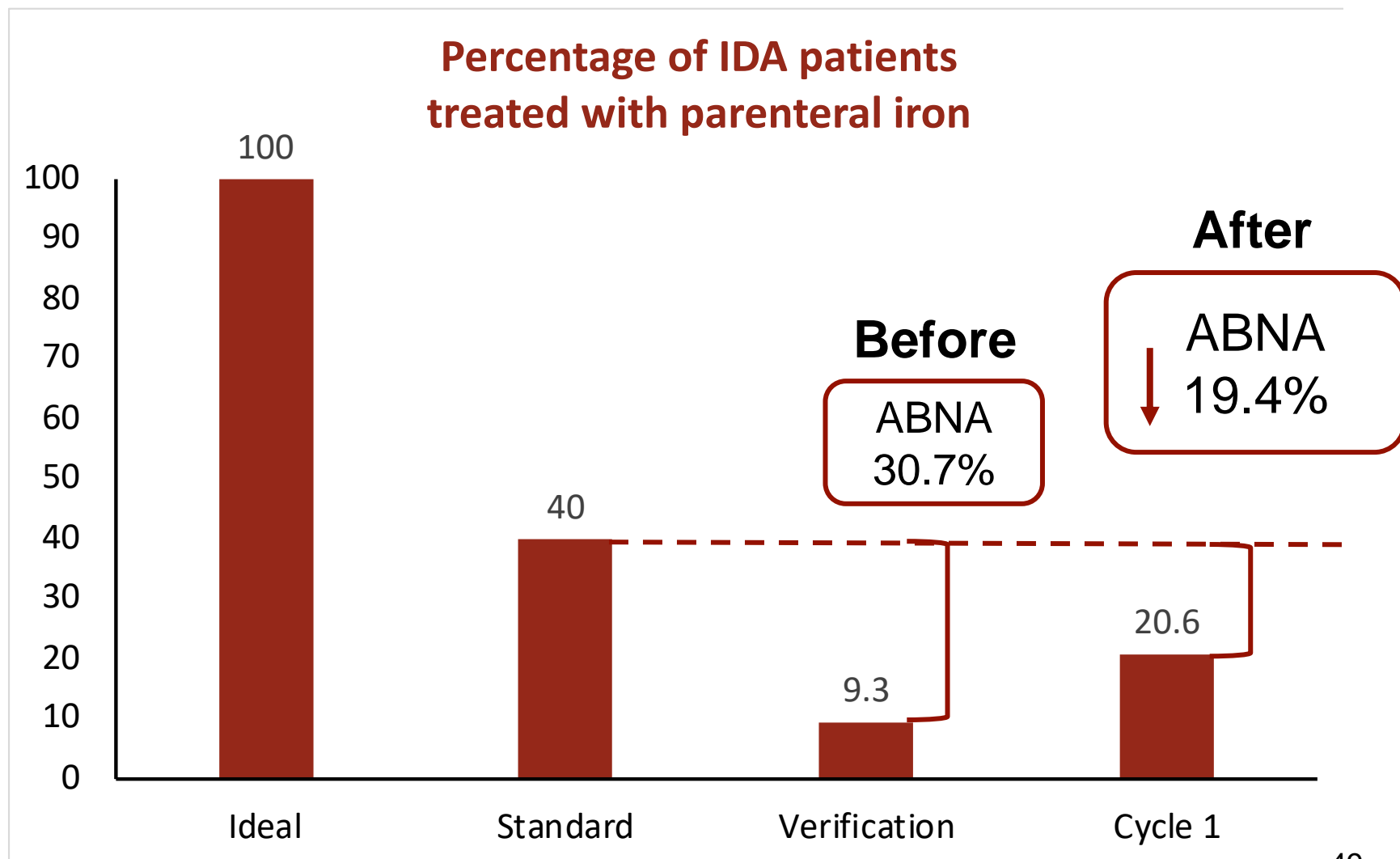
Stage	Total number of patients diagnosed with IDA (A)	Number of IDA patients treated with parenteral iron (B)	Percentage of IDA patients treated with parenteral iron [(B/A) X100%]
Verification	43	4	9.3%
Cycle 1	58	12	20.6%



Goal for improvement

To increase percentage of IDA patients treated with parenteral iron from **20.6%** to **40%**

Achievable Benefit Not Achieved (ABNA)



Model Of Good Care (1)

No	Critical Step	Criteria	Standard	Verification	Cycle 1
1	Prescribing of parenteral iron	<ul style="list-style-type: none"> Doctors aware of parenteral iron as one of the treatment options for IDA. 	100%	79.7%	98.1% ↑
		<ul style="list-style-type: none"> Doctors competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	24.6%	67.9% ↑
2	Pharmacist's intervention	<ul style="list-style-type: none"> Pharmacists aware of parenteral iron as one of the treatment options for IDA. 	100%	96.8%	100% ↑
		<ul style="list-style-type: none"> Pharmacists competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	35%	85% ↑

Model Of Good Care (2)

No	Critical Step	Criteria	Standard	Verification	Cycle 1
3	Administration of parenteral iron	<ul style="list-style-type: none"> Nurses administer parenteral iron therapy with correct dilution and rate of infusion. 	100%	100%	100%
4	Monitoring of patient's parameter	<ul style="list-style-type: none"> Patient's vital signs, signs and symptoms of allergy and infusion site reactions are monitored and documented. 	100%	0%	66.7% ↑
		<ul style="list-style-type: none"> These parameters are monitored every 15 minutes during the test dose and observation period and documented. 	100%	0%	66.7% ↑
		<ul style="list-style-type: none"> These parameters are monitored every 30 minutes for the remaining dosage and documented. 	100%	0%	33.3% ↑

Strategies For Change

Cycle 2



Findings From Cycle 1

No	Critical Step	Criteria	Standard	Verification	Cycle 1
1	Prescribing of parenteral iron	<ul style="list-style-type: none"> Doctors aware of parenteral iron as one of the treatment options for IDA. 	100%	79.7%	98.1%
		<ul style="list-style-type: none"> Doctors competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	24.6%	67.9%
2	Pharmacist's intervention	<ul style="list-style-type: none"> Pharmacists aware of parenteral iron as one of the treatment options for IDA. 	100%	96.8%	100%
		<ul style="list-style-type: none"> Pharmacists competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	35%	85%

Survey Findings



Doctors & Pharmacists

1

- **50%** of them did not read Parenteral Iron Infusion Protocol before.

2

- **80.4%** of them did not attend the CME sessions during Cycle 1.

1. Conduct more CME



1 Session

19 May 22

Mode

Hybrid (Virtual +
Physical at Audi
Utama HKL)

Audience

- Doctors
- Pharmacists

**No.
participants**

100+



Feature

Pre- and post-CME tests with awards

- **Identify local champion**
- Assess improvement in knowledge

Survey Findings



Doctors & Pharmacists

1

- **50%** of them did not read Parenteral Iron Infusion Protocol before.

2

- **80.4%** of them did not attend the CME sessions during Cycle 1.

2. Update, redesign and rebrand protocol



2. Update, redesign and rebrand protocol

PROTOCOL

PARENTERAL IRON INFUSION IN MEDICAL WARDS



Hospital Kuala Lumpur
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Protocol

**Parenteral
R
E
F
E
R
Iron
R
Infusion**

In Medical Wards
Hospital Kuala Lumpur

Second Edition
July 2022

Hospital Kuala Lumpur
Jalan Pahang
50586 Wilayah Persekutuan Kuala Lumpur

Protocol
Calculator
Monitoring

3. Build website for PREFER

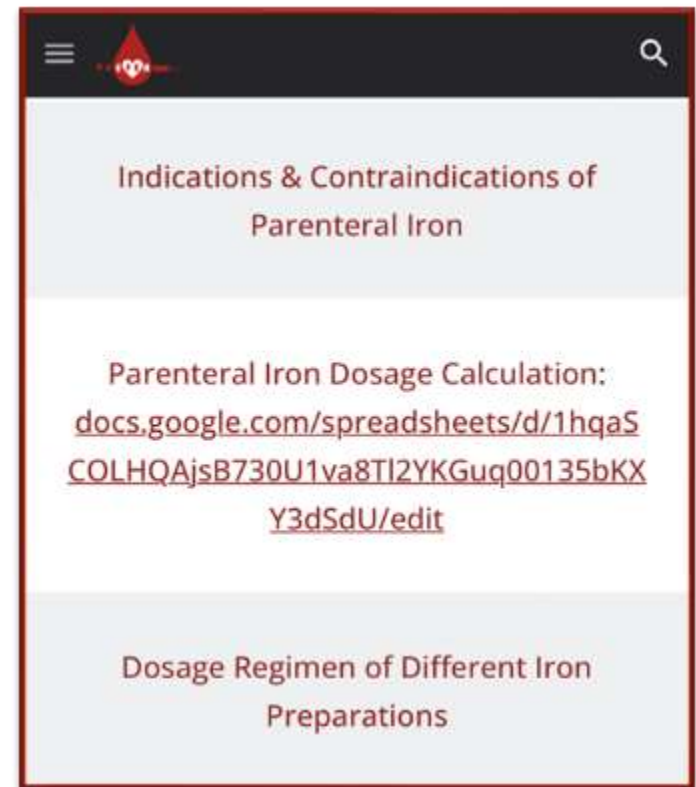
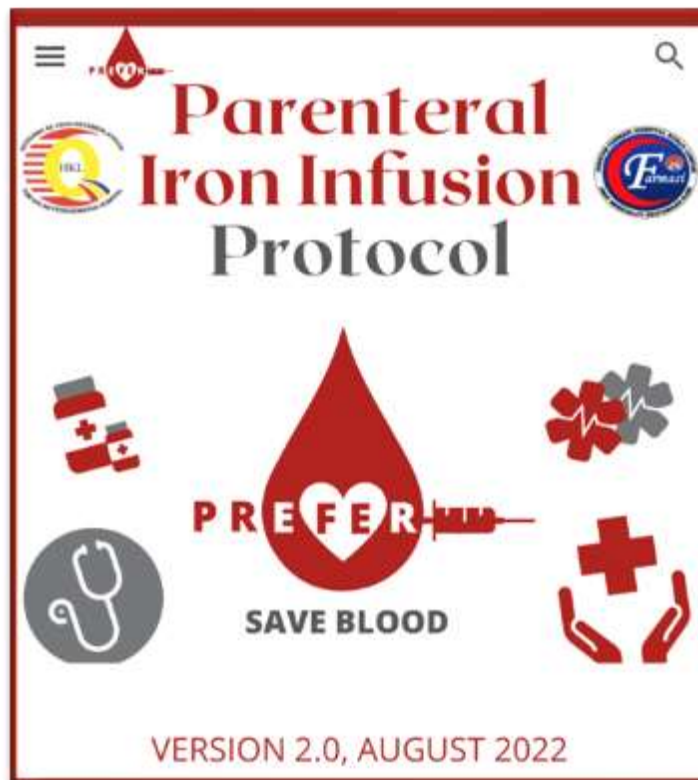
Attractive
interface

Easy content
navigation

Innovative

Updated
content

<https://sites.google.com/view/parenteral-iron-protocol-hkl/home>



4. Invent a smart dose calculator

Easy

Quick

Answer available for 3 different formulations

SCAN ME!



Based on Ganzoni's formula: (Body weight (kg) x (target Hb - actual Hb) (g/dl) x 2.4) + mg iron for iron stores

Kindly fill in:		Note:
Body weight (kg)	70	Use Ideal Body weight if BMI > 30kg/m ² ; Use pre-pregnancy weight for pregnant women
Current Hb or Initial Hb (g/dl)	9.8	
Target Hb (g/dl)	12	12 for female, 13 for male
Iron stores (mg)	500	< 35 kg body weight = 15 mg/kg body weight > 35 kg body weight = 500 mg
Exact Iron dose Calculated (mg)	869.6	
TOTAL IRON DOSE NEEDED (MG) (Rounded up/down to the nearest 100mg)	900	

**Maximum Iron dose / day for this patient: 1400 (Maximum: 20mg/kg/day)

Iron preparations & dosage regimen (Choose 1)


- a. **IV Cosmofer** 25 mg test dose in 100ml NS over 30minutes infusion, then observe for 1 hour (200ml/H)
(Total Dose Infusion) 875 mg* in 1 pint Normal Saline infused over 4 hours (125ml/H)

*note: Maximum iron per DAY for this patient is 1400 mg/day (20mg/kg/DAY)
 If total iron dose is > 20mg/kg, kindly split the dose and serve the remaining dose the next day.
- b. **IV Cosmofer Split doses** 25 mg test dose in 20cc NS over 20 minutes infusion (60ml/H) , then observe for 1 hour (for first dose only)
(Patient with ROF): 200mg 1 - 3 times per week for 4 doses (First dose is 175mg after minus test dose 25mg)
 Dilution: Withdraw 200mg & dilute in 100ml NS infused over 1 hour (100ml/H)
- c. **IV Venofer** 20 mg test dose in 20cc NS over 15 minutes infusion (80ml/H), then observe for 1 hour (prior first dose only)
(JKUT Hematologi & Nephrologi) 200mg 1 - 3 times per week for 4 doses (First dose is 180mg after minus test dose 20mg)
 Dilution: withdraw 200mg & dilute in 100ml NS infused over 1 hour (100ml/H)
 Maximum Venofer dose per week: < 45kg: 7mg/kg/week > 45kg: 600mg/week
- d. **IV Monofer** 900 mg (#) in 100 ml NS over 1 hour (100ml/H)
(JKUT Hematologi & Cardiology)
 # note: Maximum iron PER WEEK for this patient is 1400 mg/Week (20mg/kg/WEEK)
 If total iron dose is > 20mg/kg, kindly split dose and serve the remaining dose after 1 week interval.



5. Display poster in all medical wards

Guidance on Prescribing Parenteral Iron Therapy



Indications

Iron deficiency anaemia

- Hb < 13g/dL (male), 12g/dL (female) with MCV < 75fL
- TSAT < 20% or < 30% (CKD)
- Serum ferritin < 30ng/mL (may be elevated in certain clinical conditions)

Support the use of erythropoiesis-stimulating agents (including patients on renal dialysis)

As an alternative to blood transfusion when a rapid increase in Hb is required

Formulations available

C Low molecular weight iron dextran (Cosmofer®)

- Can be given as total dose infusion

V Iron sucrose (Venofer®)

- To be given in divided doses

M Ferric derisomaltose (Monofer®)

- Can be given as total dose infusion with smaller volume

Monitoring

- Vital signs
- Skin rashes
- Chest pain
- Angioedema
- Shortness of breath
- Infusion site reaction

Dosage

Calculate based on Ganzoni formula

$$(\text{Body weight (kg)} \times (\text{target Hb} - \text{actual Hb}) (\text{g/dL}) \times 2.4) + \text{mg iron for iron stores}$$

- Body weight: Actual Weight if BMI < 30kg/m²
- Ideal Body Weight if BMI > 30kg/m²
- Pre-pregnant weight for pregnant women

Iron Stores:

- <35 kg body weight = 15 mg/kg body weight
- >35 kg body weight = 500 mg

Target Hb level 12g/dL (Female)

Body Weight (kg)	Actual hemoglobin (g/dL)				
	6	7	8	9	10
35kg	1030	1025	1025	720	675
40 kg	1075	1075	1075	800	700
45 kg	1150	1050	1025	825	725
50 kg	1225	1100	1075	875	750
55 kg	1300	1150	1025	900	750
60 kg	1375	1225	1075	925	775
65 kg	1450	1300	1100	950	800
70 kg	1500	1350	1175	1000	825

Target Hb level 13g/dL (Male)

Body Weight (kg)	Actual hemoglobin (g/dL)				
	6	7	8	9	10
35kg	1100	1080	1025	850	750
40 kg	1175	1075	1075	900	775
45 kg	1250	1150	1050	950	825
50 kg	1300	1225	1100	975	850
55 kg	1425	1300	1150	1025	900
60 kg	1500	1350	1225	1075	925
65 kg	1600	1450	1275	1125	975
70 kg	1675	1500	1350	1175	1000

Kindly scan the QR code and refer to HKL Parenteral Iron Infusion Protocol for more information.

By HKL Parenteral Iron QA project team
 (In partnership with Hematology & Medical Pharmacy Department)

Dr. Shafiq Ahmad
 Head of Pharmacy Department
 Dana Utama Hospital / Cipto Mangrove Hospital

Dr. Nur Hafidha
 Head of Hematology
 Dana Utama Hospital / Cipto Mangrove Hospital



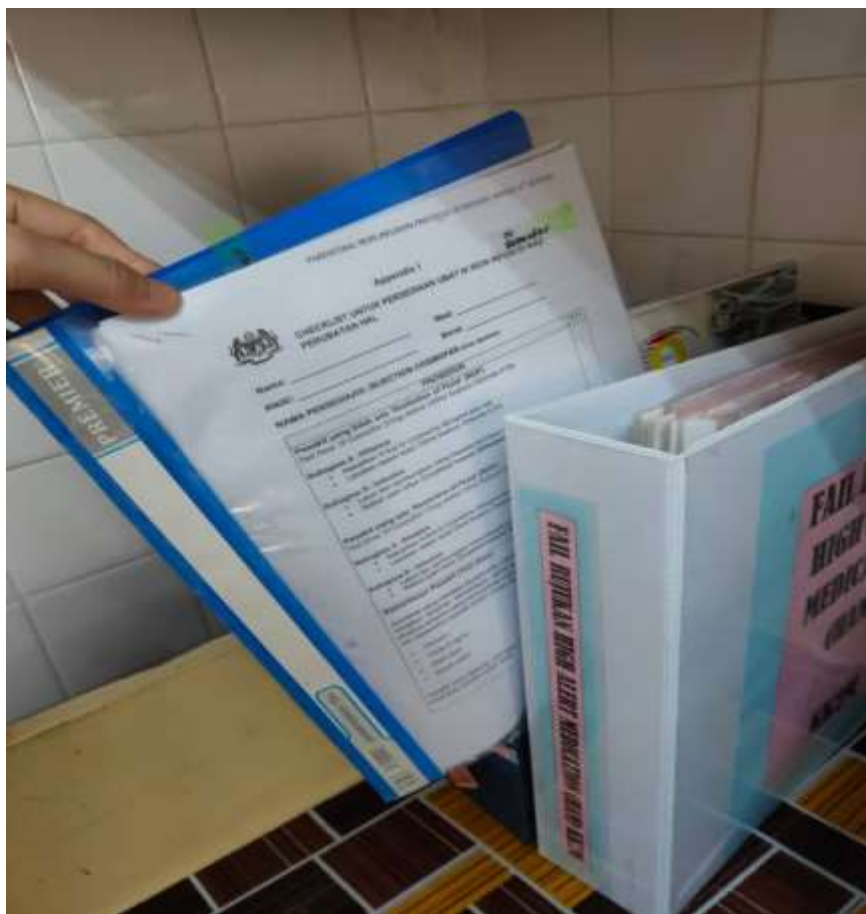
Parenteral Iron Infusion Protocol



VERSION 2.0, AUGUST 2022



6. Keep copies of monitoring charts in ward



**Kept at
medication
reference corner
of wards**

- Enhance awareness
- More accessible
- Ready to to used

Contributing Factors And Ideas For Remedial Actions



Barriers

- Lack of knowledge
- Lack of experience
- Concern on cost
- Prefer to use oral iron or blood transfusion
- Potential risks of allergy and anaphylaxis

Facilitators

- Availability of suitable location and trained staff
- Streamlined system of referral
- Availability of newer preparations requiring shorter infusion times
- Concern on the risk of blood transfusion



7. Add Ferric Derisomaltose (Monofer) into HKL Drug List



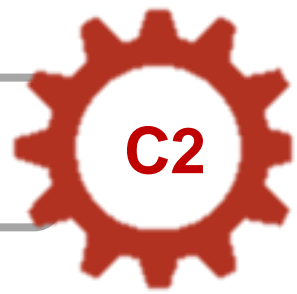
Effects Of Change

Cycle 2

Effects Of Change

July 2022

C2



Stage	Total number of patients diagnosed with IDA (A)	Number of IDA patients treated with parenteral iron (B)	Percentage of IDA patients treated with parenteral iron [(B/A) X100%]
Verification	43	4	9.3%
Cycle 1	58	12	20.6% ↑
Cycle 2	81	27	33.3% ↑↑

9.3%



20.6%



33.3%

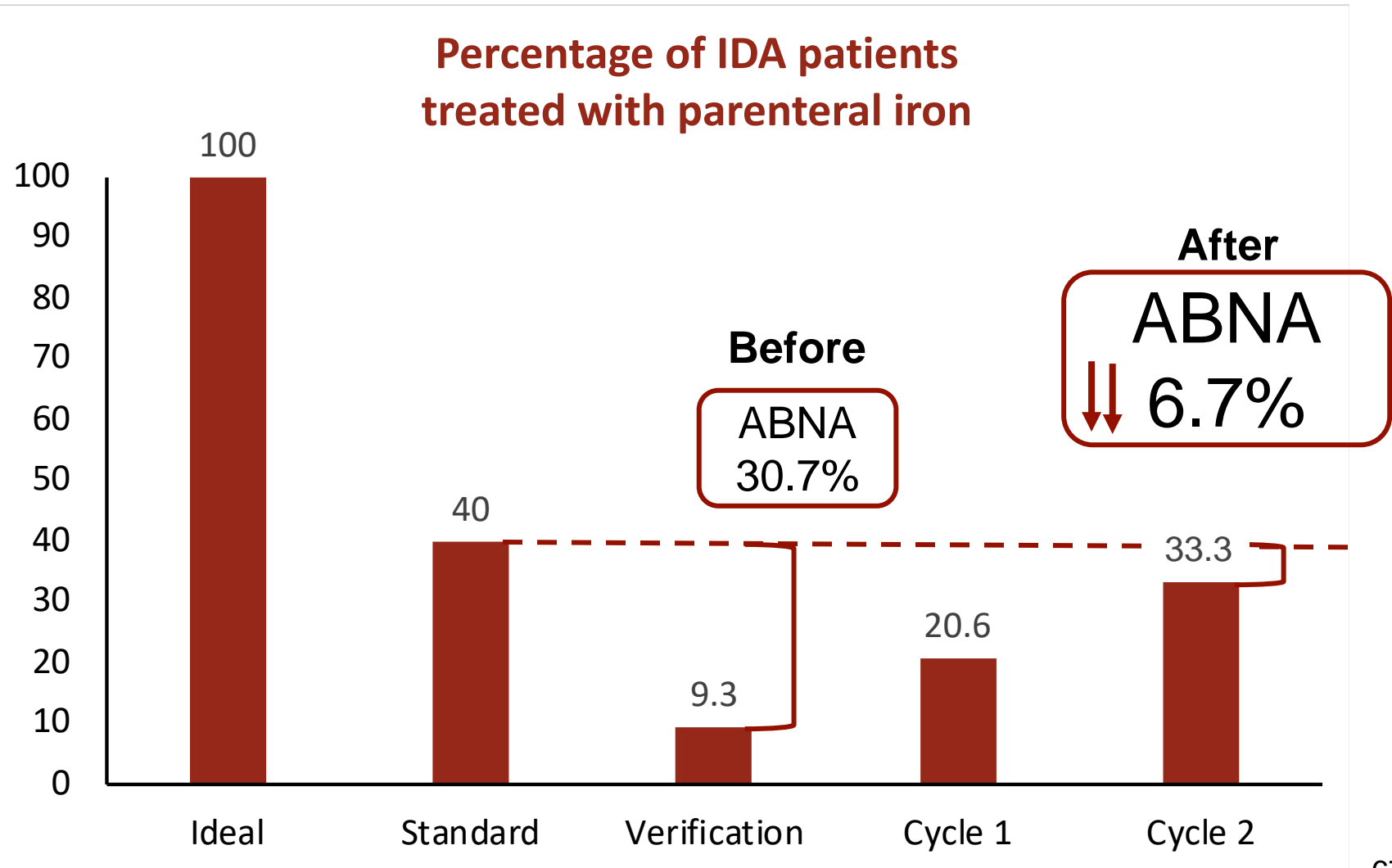


40%



Achievable Benefit Not Achieved (ABNA)

Percentage of IDA patients
treated with parenteral iron



Model Of Good Care (1)

No	Critical Step	Criteria	Standard	Verification	Cycle 1	Cycle 2
1	Prescribing of parenteral iron	<ul style="list-style-type: none"> Doctors aware of parenteral iron as one of the treatment options for IDA. 	100%	79.7%	98.1%	100% ↑
		<ul style="list-style-type: none"> Doctors competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	24.6%	67.9%	81.3% ↑
2	Pharmacist's intervention	<ul style="list-style-type: none"> Pharmacists aware of parenteral iron as one of the treatment options for IDA. 	100%	96.8%	100%	100%
		<ul style="list-style-type: none"> Pharmacists competent with the knowledge on management of IDA and parenteral iron therapy. 	100%	35%	85%	81.8%

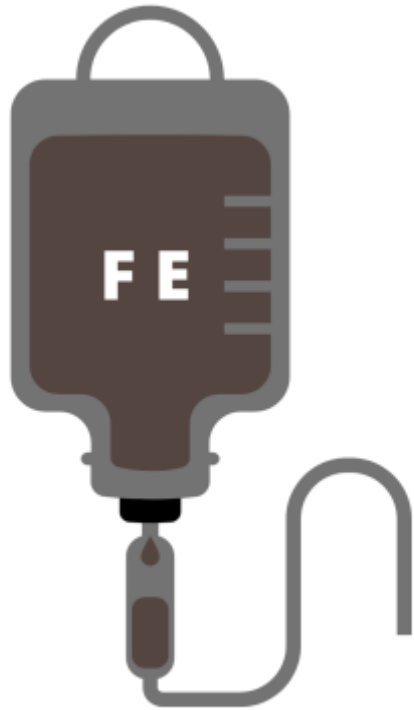
Model Of Good Care (2)

No	Critical Step	Criteria	Standard	Verification	Cycle 1	Cycle 2
3	Administration of parenteral iron	<ul style="list-style-type: none"> Nurses administer parenteral iron therapy with correct dilution and rate of infusion. 	100%	100%	100%	100%
4	Monitoring of patient's parameter	<ul style="list-style-type: none"> Patient's vital signs, signs and symptoms of allergy and infusion site reactions are monitored and documented. 	100%	0%	66.7%	100% ↑
		<ul style="list-style-type: none"> These parameters are monitored every 15 minutes during the test dose and observation period and documented. 	100%	0%	66.7%	88% ↑
		<ul style="list-style-type: none"> These parameters are monitored every 30 minutes for the remaining dosage and documented. 	100%	0%	33.3%	76% ↑

Impact On Institution



Impact On Institution



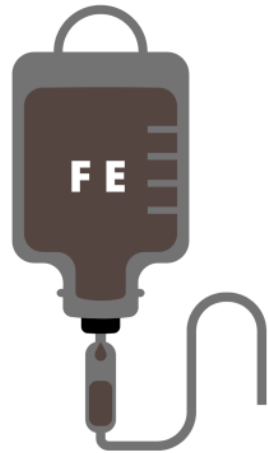
=



25175mg
parenteral iron given
over a month

100 pints
of blood saved
per month

Impact On Institution



25175mg
parenteral iron
= **RM 4420**

=



100 pints
of **blood**
= **RM 12000**



Cost saved:
RM7580 per month

Impact On Patients



Clinical improvement

N= 120
Jan 21 – Dec 21



Hb

8.3 g/dL
(± 1.1)



↑↑ 10.5 g/dL
(± 1.8)

Improvement in safety



q15 min



q30 min

**Close
monitoring**



Early detection

**12 ADR cases
detected**

From Oct 2020 – July 2022



**Prompt
management**

**Fully
recovered**

No permanent disability
or death

Lesson Learnt



Problem analysis

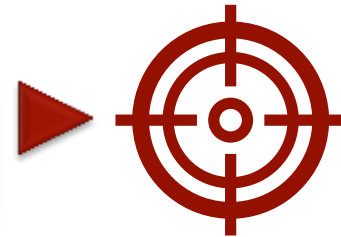


Multi-factorial



Targeted remedial actions

- Multi-disciplinary
- Technology
- Accessibility
- Promotion



Conclusion

No.	Objective	Conclusion
1	To determine magnitude and severity of underutilization of parenteral iron therapy for the treatment of IDA in medical wards, HKL	Pre-remedial data showed that only 9.3% of IDA patients received parenteral iron therapy , which was way below the standard of 40%.
2	To identify contributing factors to the underutilization of parenteral iron administration for the treatment of IDA in medical wards, HKL	The main contributing factor to this problem is lack of confidence among HCP in using parenteral iron . Other factors include concern about cost, lack of facilities and trained staff to do close monitoring.
3	To formulate and implement proper remedial action	Strategies formulated include development of PREFER protocol, website, dose calculator, standardized dilution worksheet and monitoring charts, display of poster in wards and continuous training to staff.
4	To evaluate the effectiveness of remedial action	Post-remedial, percentage of IDA patients received parenteral iron therapy increased from 9.3% to 33.3% .

The Next Step



Hospital level

Expanded to all
medical wards
(22 in total)

Expand the
study to
other
disciplines

- A&E
- Nephrology
- O&G
- Surgery
- Outpatient referral

CME pharmacists conducted
& protocol shared.

State level



Publish
PREFER
protocol &
website to
state level

Publish
PREFER
protocol &
website to
national
level



National level

References

1. Krishnan DB. Concerns rise as Malaysia's blood supply at risk of depleting. *New Straits Times*. 2020 Aug 25.
<https://www.nst.com.my/news/nation/2020/08/619283/concerns-rise-malaysias-blood-supply-risk-depleting>
2. Treatment of iron deficiency anemia in nonpregnant adults: In: UpToDate. Accessed Aug 15, 2020.
3. Choosing Wisely. American Society of Hematology. Accessed Aug 15 2020.
<https://www.hematology.org/education/clinicians/guidelines-and-quality-care/choosing-wisely>
4. The three-pillar matrix of patient blood management – an overview. *Best Pract Res Clin Anaesthesiol*. 2013; 27:69-84.
5. Willmann PA, Dean A. Retrospective Review of Total-Dose Iron Dextran in Iron-Deficiency Anemia of Chronic Disease and Relevance to Blood Transfusion Requirements: An Individual Institution Experience. *Blood* 2008; 112 (11): 2876.
doi: <https://doi.org/10.1182/blood.V112.11.2876.2876>
6. Medscape. Red blood cells (Blood Component): Dosing & Uses. Accessed May 15, 2022.

References

7. Auerbach M, Macdougall IC. Safety of intravenous iron formulations: facts and folklore. *Blood Transfus.* 2014;12(3):296-300. doi:10.2450/2014.0094-14
8. Chaiwat O et. Al. Early packed red blood cell transfusion and acute respiratory distress syndrome after trauma. *Anesthesiology* 2009; 110:251-60.
9. Patel K, Memon Z, Mazurkiewicz R. Management of Iron-Deficiency Anemia on Inpatients and Appropriate Discharge and Follow-Up. *J Hematol.* 2020;9(1-2):5-8. doi:10.14740/jh626
10. Ibañez, Gysell & Santoyo-Sánchez, Adrián & Collazo-Jaloma, J. & Ramos-Peñafiel, Christian. (2015). Retrospective analysis of therapeutic response obtained with enteral and parenteral iron in adults with iron deficiency anaemia. *Revista Médica Del Hospital General De México.* 78. 112-8. 10.1016/j.hgmx.2015.08.005.
11. Mayson E, Ampt AJ, Shand AW, Ford JB. Intravenous iron: barriers and facilitators to its use at nine maternity hospitals in New South Wales, Australia. *Aust N Z J Obstet Gynaecol.* 2016;56(2):162-172. doi:10.1111/ajo.12417

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Pn Chan Tay Yen

En Royson Lai

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11th National QA Convention



Thank You

because



PREFER

PARENTERAL IRON

SAVE BLOOD