



Patient Blood Management

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Disclosure of COI

The scientific planning committee (SPC) :

has reviewed all disclosed financial relationships of speakers, moderators, facilitators and/or authors in advance of this CPD activity and has implemented procedures to manage any potential or real conflicts of interest.

The SPC members

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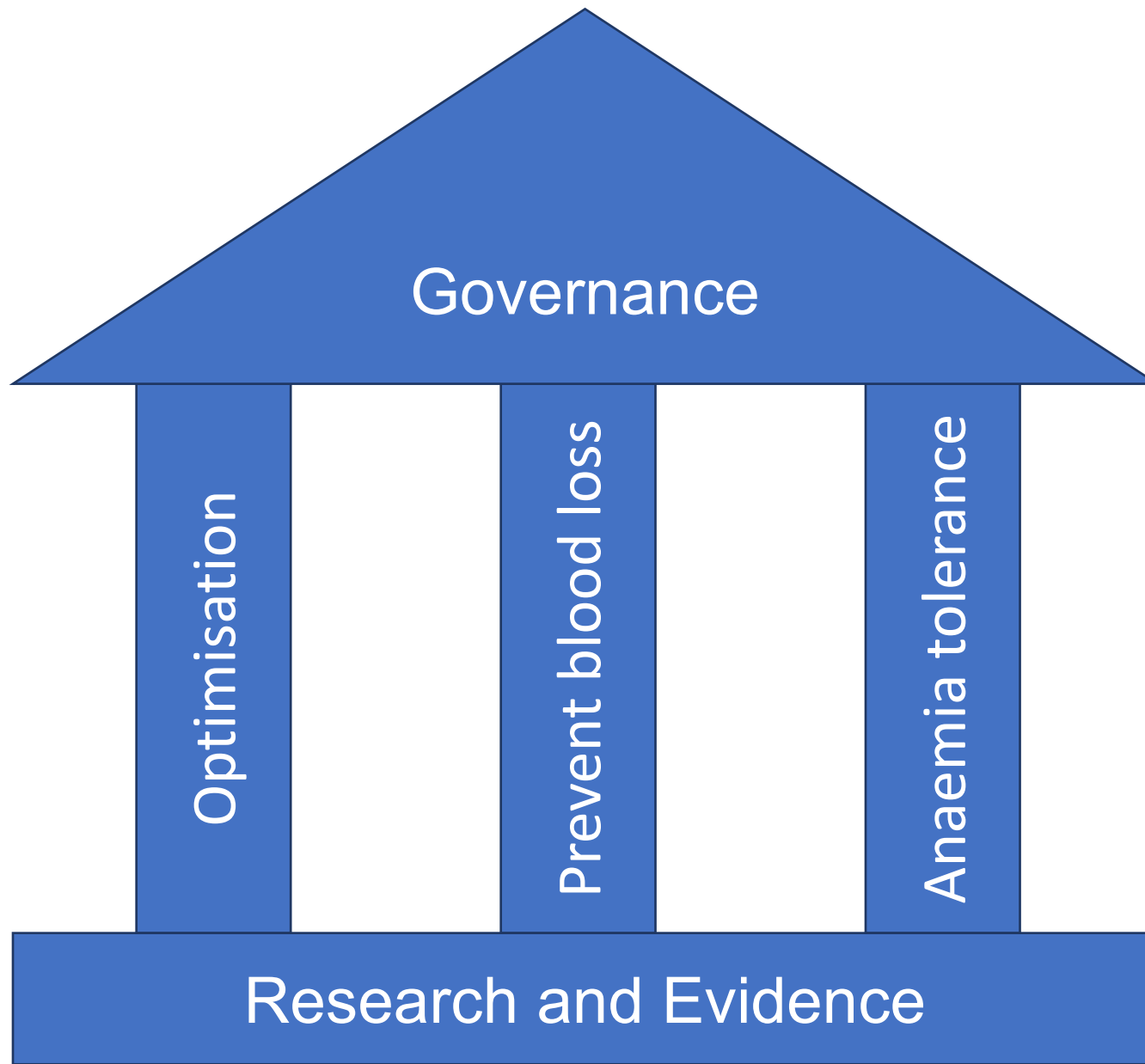
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Objectives

- Identify opportunities for patient blood management (PBM) in a hospital setting
- Describe quality improvement methodologies to implement PBM
- Utilise current workflows for PBM
- Determine strategies for change based on PBM pillars and local resources



James Isbister

Patient Blood Management (PBM)

	PILLAR ONE	PILLAR TWO	PILLAR THREE
	Optimise RBC Mass	Minimise Blood Loss	Manage Anaemia
PREOPERATIVE	> detect/treat anaemia & iron deficiency > treat underlying causes > optimise haemoglobin > cease medications	> identify, manage & treat bleeding/bleeding risk > minimise phlebotomy > plan/rehearse procedure	> patient's bleeding history & develop management plan > estimate the patient's tolerance for blood loss > optimise cardiopulmonary function
INTRAOPERATIVE	> time surgery with optimisation of erythropoiesis & red blood cell mass	> meticulous haemostasis/ surgical/anaesthetic techniques > cell salvage techniques > avoid coagulopathy > patient positioning/warming > pharmacological agents	> optimise cardiopulmonary function > optimise ventilation & oxygenation > restrictive transfusion strategies
POSTOPERATIVE	> manage anaemia & iron deficiency > manage medications & potential interactions	> monitor & manage post op bleeding > keep patient warm > minimise phlebotomy > awareness of drug interactions & adverse events > treat infections promptly	> maximise oxygen delivery > minimise oxygen use > treat infections promptly > tolerance of anaemia > restrictive transfusion strategies

Adapted from Spahn DR, Goodnough LT. *Alternatives to Blood Transfusion*. Lancet 2013; 381:1855-65; Hofman A, Farmer S, Towler SC. *Strategies to preempt and reduce the use of blood products: an Australian perspective*. Curr Opin Anaesthesiol. 2012; 25:66-73; Isbister JP. *The three-pillar matrix of patient blood management – an overview*. Best Pract Res Clin Anaesthesiol. 2013; 27:69-84.

Why do we miss iron deficiency?

PILLAR ONE

Optimise RBC Mass

PREOPERATIVE

- > detect/treat anaemia & iron deficiency
- > treat underlying causes
- > optimise haemoglobin
- > cease medications

PILLAR TWO

Minimise Blood Loss

- > identify, manage & treat bleeding/bleeding risk
- > minimise phlebotomy
- > plan/rehearse procedure

PILLAR THREE

Manage Anaemia

- > patient's bleeding history & develop management plan
- > estimate the patient's tolerance for blood loss
- > optimise cardiopulmonary function

THREE PILLARS OF PATIENT BLOOD MANAGEMENT

PBM crosses a spectrum

It must be multifaceted bringing together diverse approaches into a common goal

POSTOPERATIVE

- > manage anaemia & iron deficiency
- > manage medications & potential interactions

- > monitor & manage post op bleeding
- > keep patient warm
- > minimise phlebotomy
- > awareness of drug interactions & adverse events
- > treat infections promptly

- > maximise oxygen delivery
- > minimise oxygen use
- > treat infections promptly
- > tolerance of anaemia
- > restrictive transfusion strategies

How to measure?

Why only perioperative?

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Australian National University

History ignored the dangers of transfusion

- James Blundell: first transfusions in 1818
- The donors were the husbands of women with post partum haemorrhage
- A mixture of success and dramatic failure
- No adverse transfusion reactions were reported, although he described what to look out for
- John Soden summarised 51 reported transfusion cases in 1851 – only one adverse transfusion reaction



- Crispin Hektoen 2014

And relied on (misrepresented) opinion

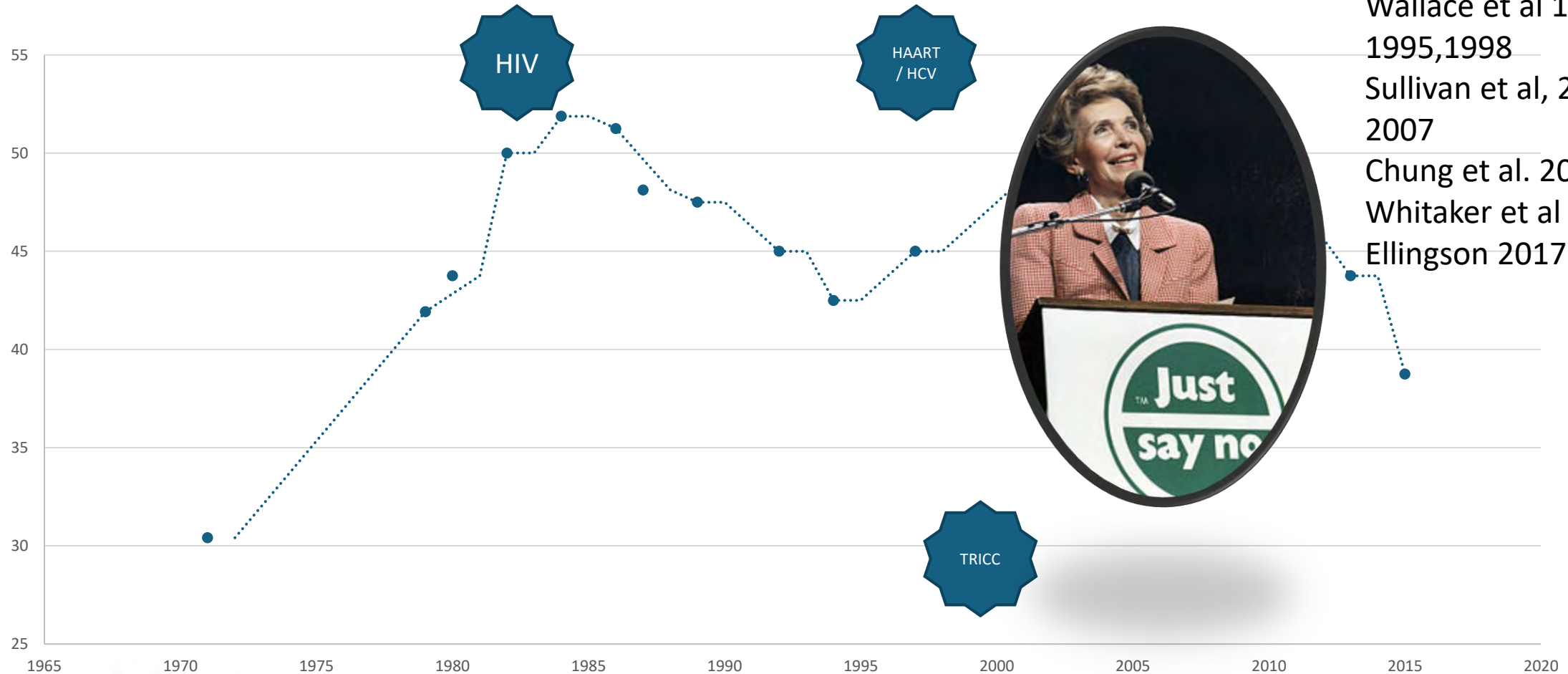
“Anemia frequently accompanies pathological lesions of the respiratory system and is present often when the patient is debilitated and when the risk of operation and anesthesia is great. This condition, owing to the lowered oxygen carrying capacity of the blood, interferes with adequate transportation of oxygen to the tissues. When concentration of hemoglobin is less than 8 to 10 grams per 100 cubic centimeters of whole blood, it is wise to give a blood transfusion before

- Adams and Lundy, Anesthesia in cases of poor surgical risk: Some suggestions for decreasing the risk Surg, Gynec, Obst 74: 1011-1019, 1942

“A pale, cold, clammy patient is in a state of shock and needs fluids, blood, or both. In the management of patients for whom the risk of operation is great it is safest to start an infusion of physiological saline solution or a 5 per cent solution of dextrose in physiological saline solution at the beginning of the operation. . . . Transfusion of blood is the best means of combating shock. The amount necessary will depend on preoperative level of hemoglobin, the amount of blood lost during the operation, and the response of the blood pressure, pulse rate, blood volume, color, and skin. . . . The use of plasma, which can be stored in the desiccated state and redissolved before use, provides all the elements of whole blood for treating shock, with the exception of erythrocytes. By its use, shock may be controlled for several hours, even after marked hemorrhage has occurred.” 46 references.



Estimated red cell transfusions in USA by year (/1000 population)



Surgenor, et al. 1990
Wallace et al 1993,
1995,1998
Sullivan et al, 2002, 2005
2007
Chung et al. 2016,
Whitaker et al 2016,
Ellingson 2017

Practice change: start with a team

- **Clinical leaders** in the area (may not be the head of department)
- People from involved teams
 - Other medical teams
 - Nursing
 - Administrative support
 - Quality improvement expertise
 - Someone to do the legwork
- Patients



Practice change: start with a team

- Qualities
 - Enthusiasm
 - Collegiality and openness
 - Perseverance
 - Subject matter experts
 - Quality improvement
 - PBM
 - Clinical setting (trauma, O&G, anaesthetics)
- Organisational knowledge
 - Workflow
 - Culture and politics



Create motivation for change

- Evidence based improved patient care
- Low value or harmful care programs
- Audits
- Incidents
- Cost
- Executive support
- Patient
- For team members
 - New skills
 - Trainees
 - Leadership



Practice change: start small

	PILLAR ONE	PILLAR TWO	PILLAR THREE	THREE PILLARS OF PATIENT BLOOD MANAGEMENT
	Optimise RBC Mass	Minimise Blood Loss	Manage Anaemia	
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Consider the tools that best suit



- NSW Clinical Excellence Commission
- <https://www.cec.health.nsw.gov.au/CEC-Academy/quality-improvement-tools>
- Hughes R. Patient Safety and Quality: An Evidence-Based Handbook for Nurses.
<https://www.ncbi.nlm.nih.gov/books/NBK2651/>

“SWOT”

Strengths

- What is being done well

Weaknesses

- What is not working well

Opportunities

- Where do you see potential

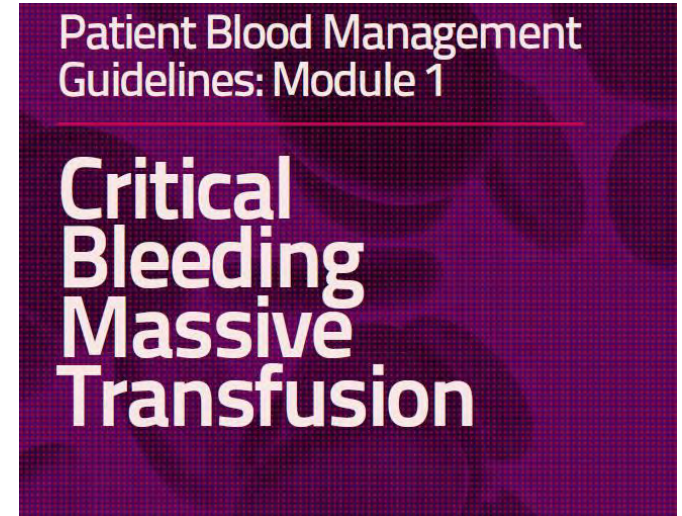
Threats

- What are the likely barriers

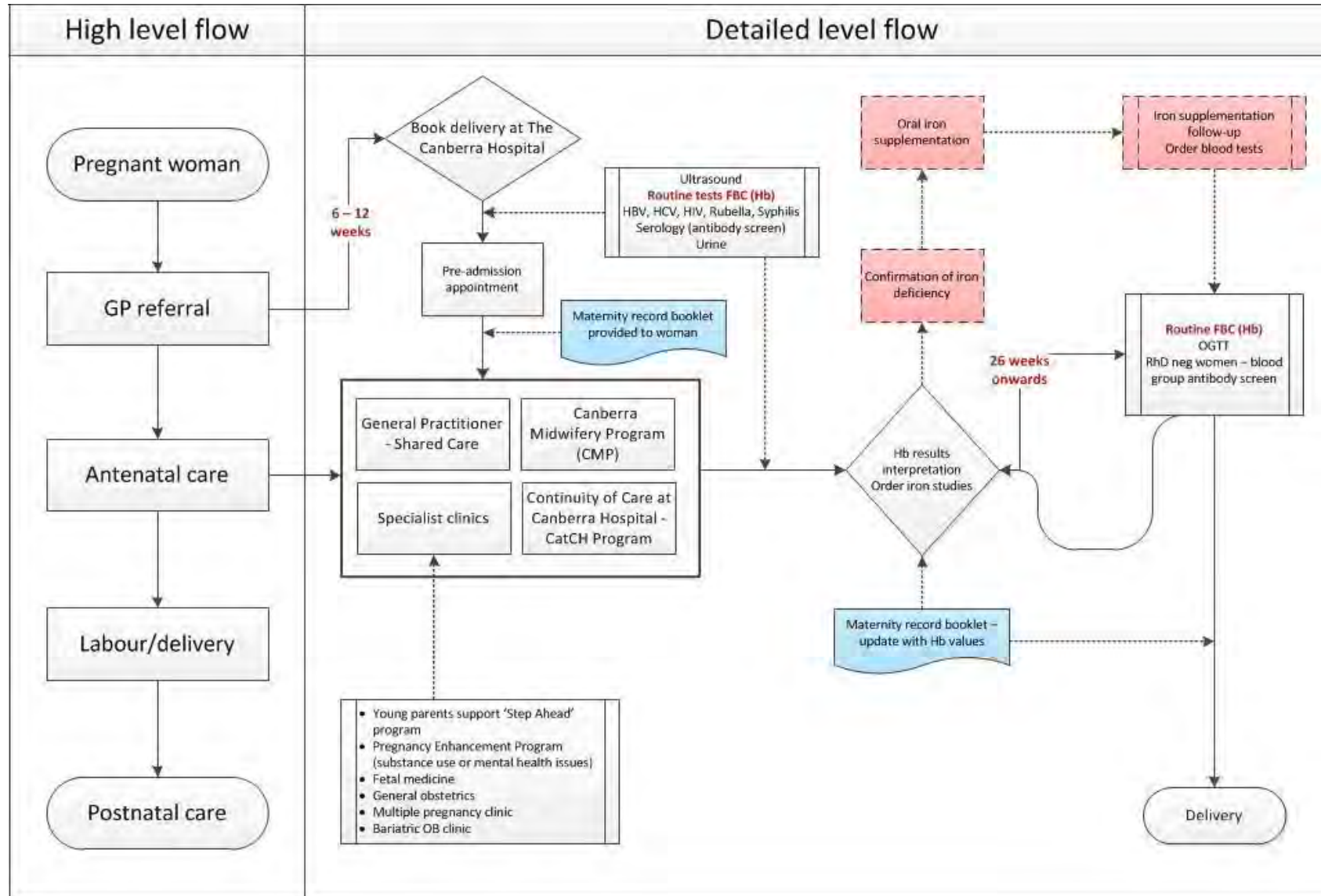


Governance as a strength

- Clinical practice improvement units
- Incident reporting and management
- Investment
- National standards: compliance vs improvement
- Guidelines

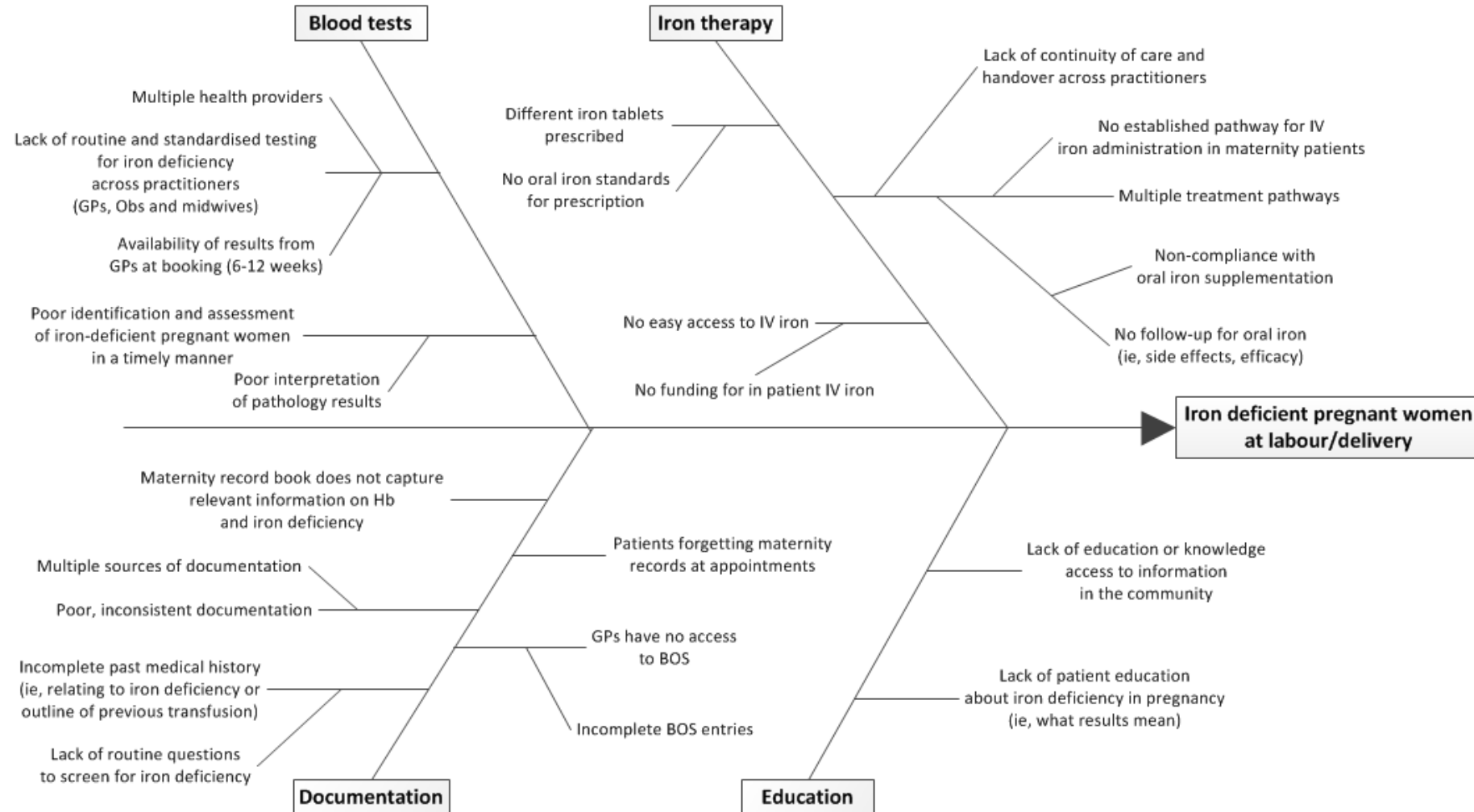


Tools: Flow chart of the antenatal care

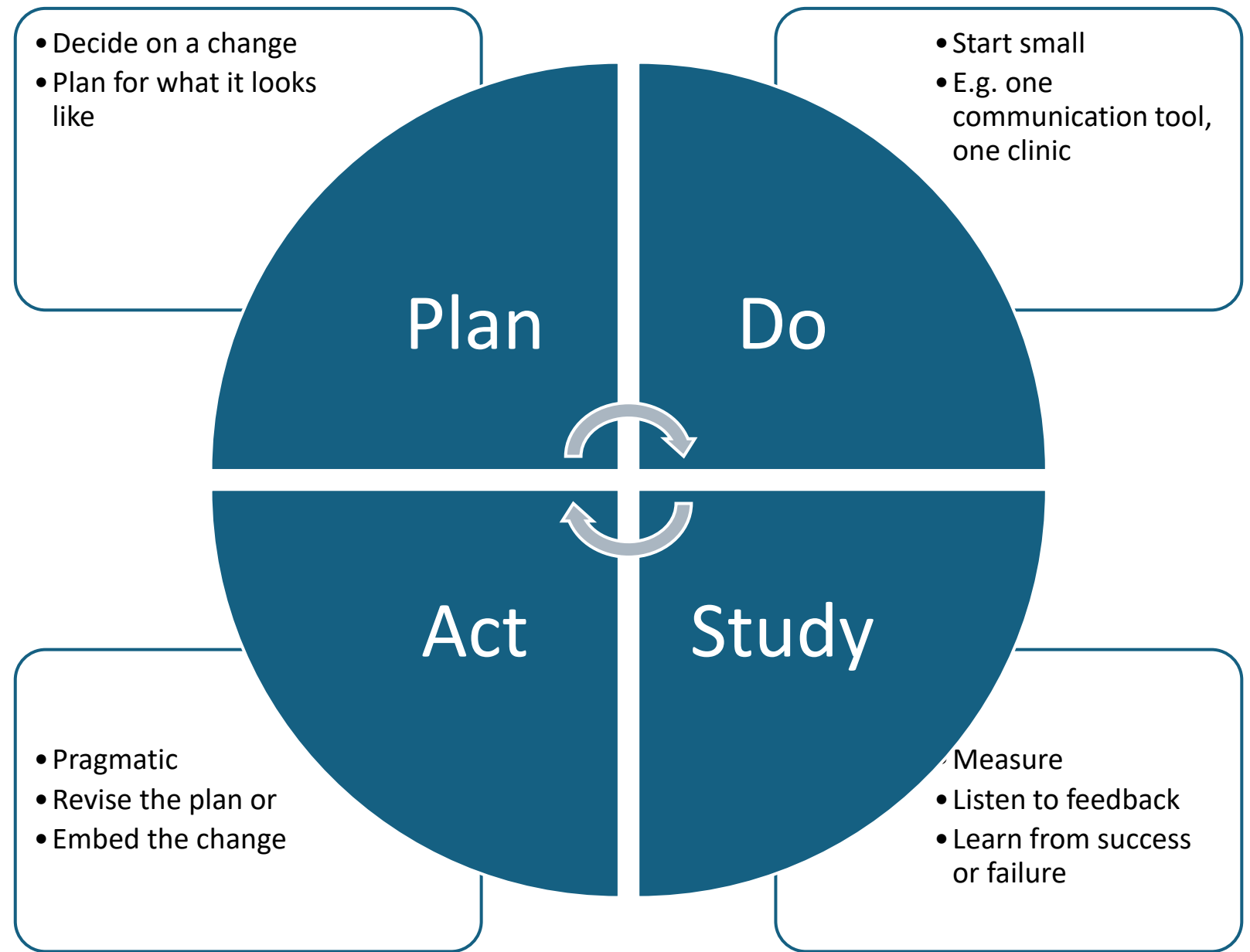


Tools: Cause and effect diagram antenatal care

Cause and effect of iron deficient pregnant women at labour/delivery



Tools: PDSA



Good ideas don't always work: Pre-admission clinic letters

- Problem: Very little time to correct iron deficiency after pre-admission review
- Solution: send letters / forms to patients or general practitioners
- 10 patients each round
- Didn't get bloods
- Had additional bloods
- Didn't save time

To
Address
|
Dear

Getting as fit as possible for your surgery

Patient name
Patient address
DOB

You have been placed on the elective surgery waiting list for your Hip/Knee joint replacement surgery.

Anaemia (low red blood cells) is known to adversely affect surgical outcomes, so we would like to test your blood cells and iron levels early to allow time to correct any abnormalities. For this reason, we request that you have additional blood tests in the next 2 weeks, so that appropriate investigation and therapy can be set up if needed.

Please find enclosed a form for blood tests to be completed. These include:

- Full blood count-FBC
- Iron studies including ferritin levels
- Renal (kidney) function tests

A copy of the results from these tests will be automatically sent to your GP; Dr

We have informed your GP you are on the elective surgery waiting list for your planned surgery and to request their follow up care.

Please call and make an appointment to see your GP after you have had your blood collected for follow up of your results.
Please ensure that you take this letter with you to your appointment with your GP.

PO Box 11 Woden ACT 2606 | phone: 02 6244 2222 | www.health.act.gov.au

If your test results are normal, there will be no need for further tests. If your results show that you are iron deficient your GP will be able to start appropriate management prior to surgery.

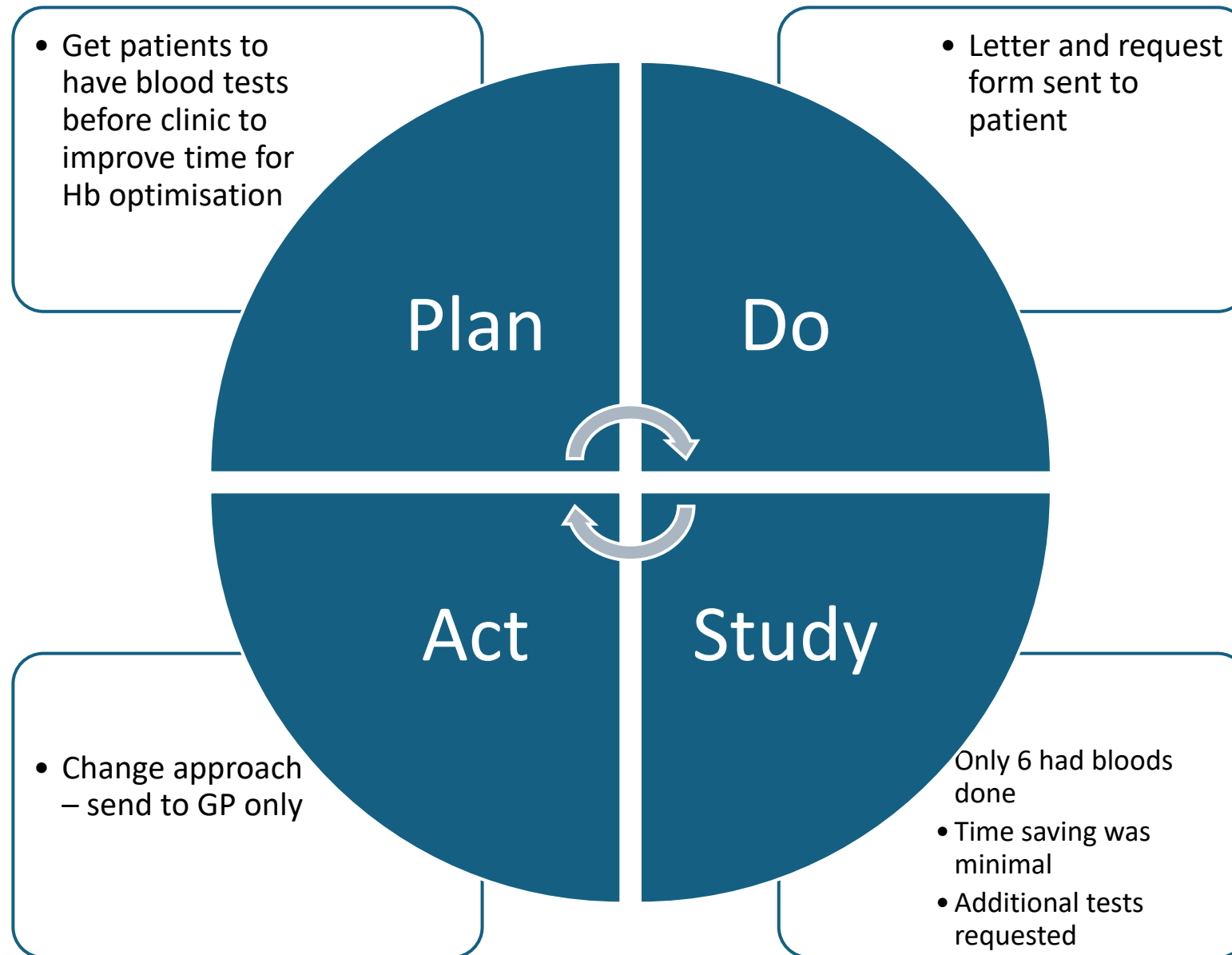
Your GP will communicate your results any management Canberra Hospital. This will ensure you are in the best health for your planned operation.

We welcome feedback from you and your patients about this process. To provide feedback or if you have any questions regarding this process, please contact:

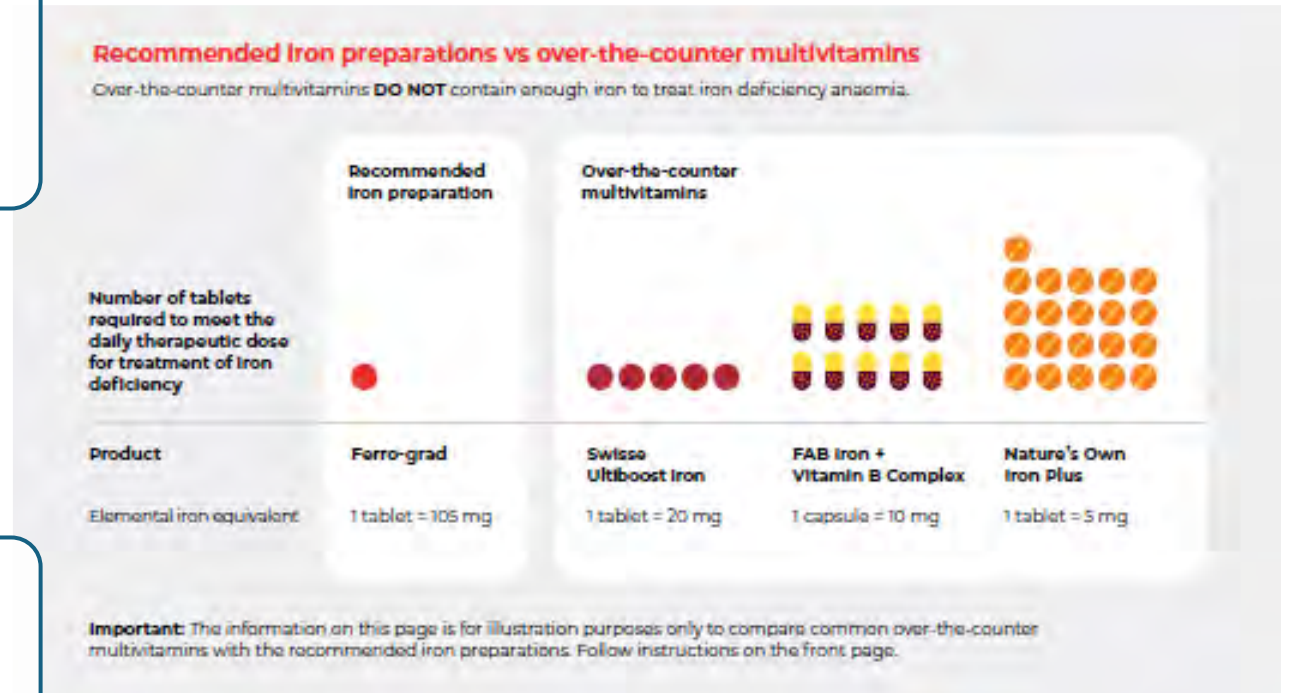
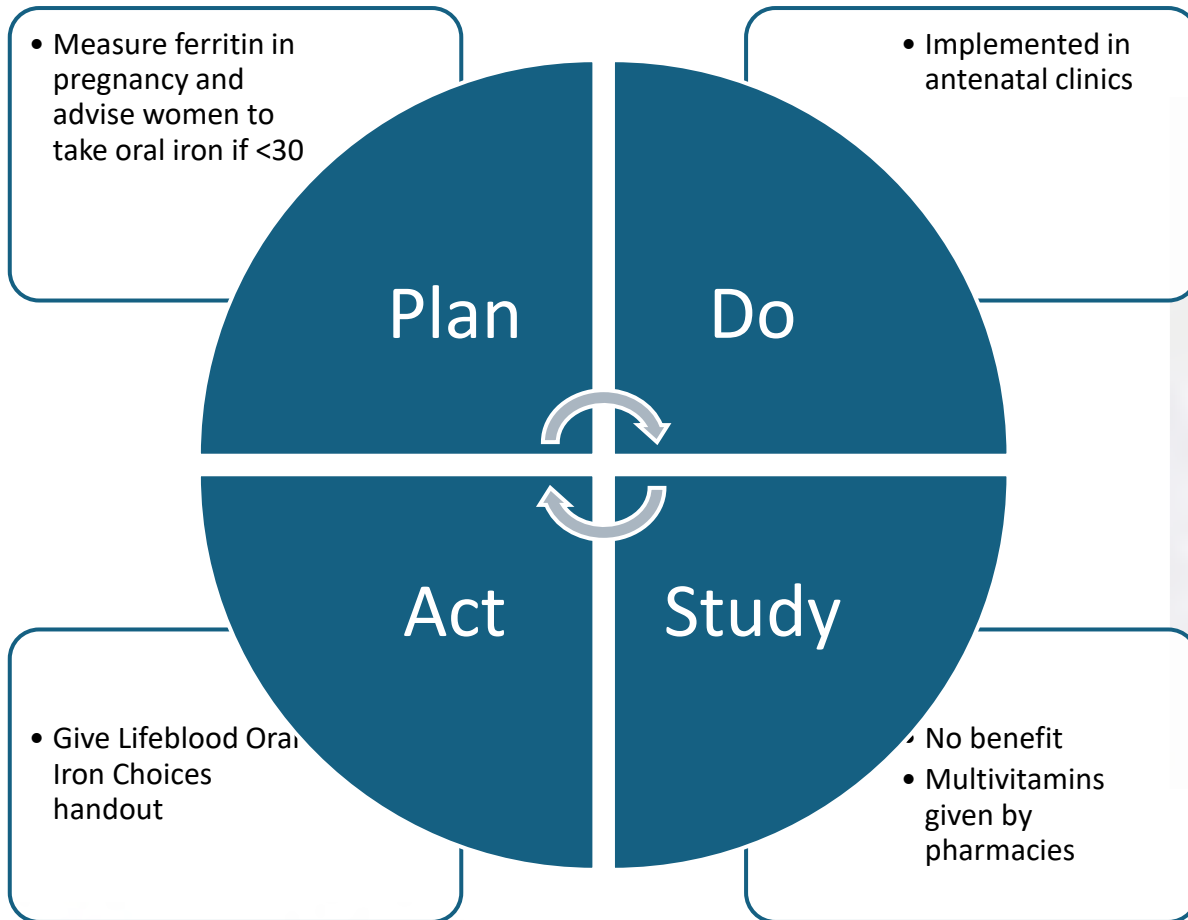
GP Liaison Admin
Ph: 6244 4183
Fax: 6205 2826
Email: gpliaison@act.gov.au

Dr Philip Crispin
Haematology Dept
Canberra Hospital
PO Box 11
WODEN ACT 2606

Date August 2015



Those that do work may need optimising – antenatal iron management



Date:/...../.....

Dear

Based on your test results, it is recommended you begin oral iron supplementation with (☐ 100–200 mg / ☐ 60 mg) of elemental iron content.

Recommended iron preparations include:

NAME (Manufacturer)	TABLET	FORMULATION	ELEMENTAL IRON CONTENT	OTHER ACTIVE INGREDIENTS
FERRO-GRADUMET (Abbott)		325 mg Ferrous Sulphate Controlled release tablet	105 mg	nil
FERROGRAD C (Abbott)		325 mg Ferrous Sulphate Controlled release tablet	105 mg	Ascorbic acid 500 mg
Ferro- <i>f</i> -tab (AFT pharmaceuticals)		310 mg Ferrous Fumarate Non-controlled release tablet	100 mg	Folic acid 350 mcg
FERPOL Iron & Folate Supplement (Pharm-a-care)		270 mg Ferrous Sulphate Controlled release capsule	87.4 mg	Folic acid 300 mcg
FGF (Abbott)		250 mg Ferrous Sulphate Controlled release tablet	80 mg	Folic acid 300 mcg
Ferro-tab (AFT pharmaceuticals)		200 mg Ferrous Fumarate Non-controlled release tablet	65.7 mg	nil
FERRO-LIQUID (AFT pharmaceuticals)		Ferrous Sulphate Oral liquid	30 mg/5 mL	nil

Adapted from BloodSafe. Oral preparations for the treatment of Iron Deficiency Anaemia in Australia. South Australia, 2011.

Please take ONE tablet of oral iron (☐ ONCE / ☐ TWICE) a day for a minimum of 12 weeks.

Take tablet on an empty stomach (1 hour before or 2 hours after a meal) with water or juice.

Read important information on 'Taking iron tablets' attached.

Follow-up with your (☐ Maternity Care Provider / ☐ GP) for a repeat blood test at (☐ weeks gestation / ☐ 6 weeks postpartum).

Continue taking pregnancy multivitamins.

Health professional's signature: Print name and designation

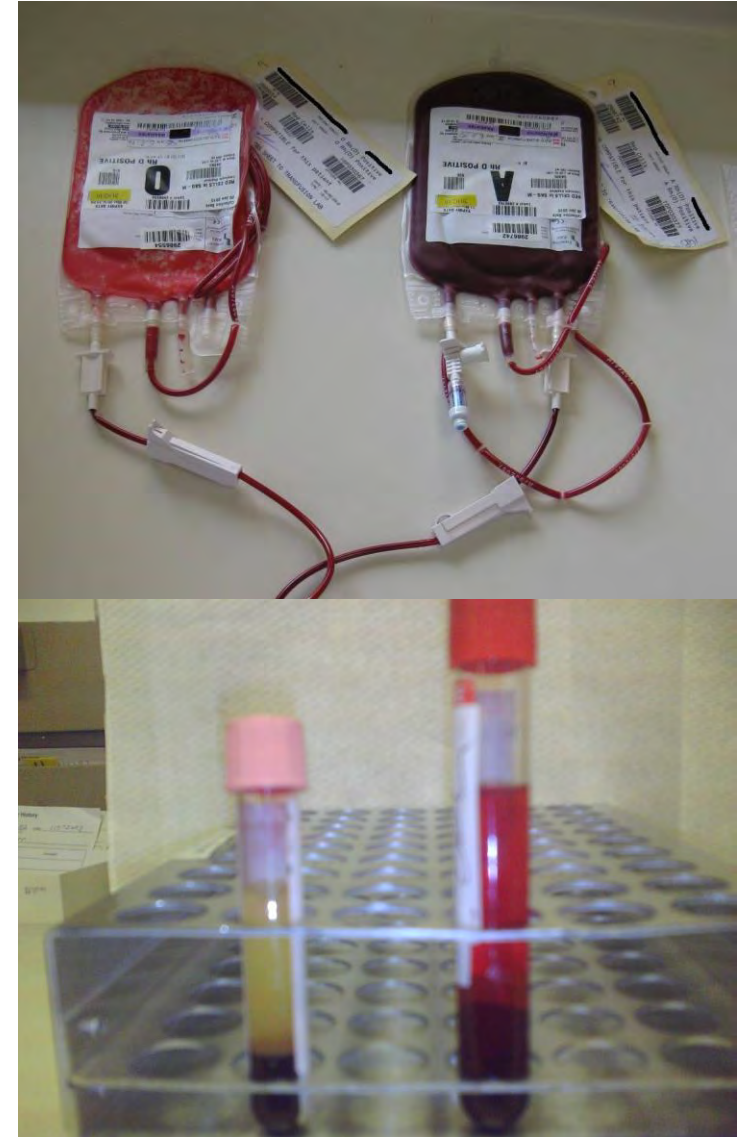
INFORMATION

Patient handout



Incidents

- Never let a crisis go to waste
- An effective incident investigation and management process:
 - Identifies a need for immediate action
 - Brings stakeholders together in a non-confrontational way
 - Investigates and implements process changes to prevent recurrence
 - Is mandated top down
 - Has actions developed by people involved



Incidents: Delays during massive transfusion

- Did not affect patient outcome
- Rapid Incident Assessment raised – given <4 days to investigate and agree on a plan



Where's the blood?

It's been sent.



Incidents: Delays during massive transfusion

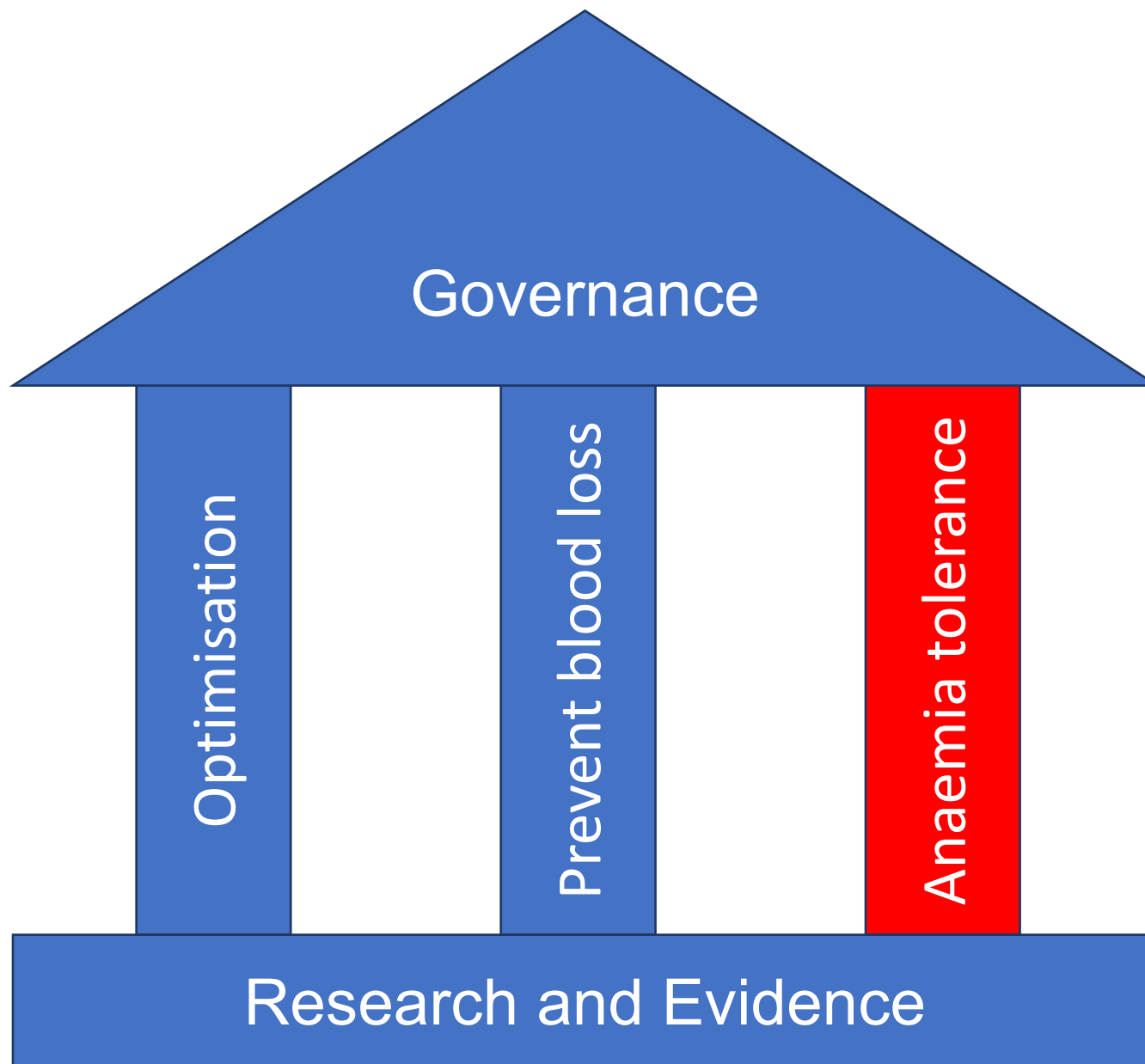


What actions work?

- Structural changes preferred as they embed improvement into workflow
 - Often multiple actions are needed
 - Education is essential but usually results in transient effects
 - Posters may be used but seldom sufficient – short term effect
-
- What has worked for others?
 - Understand your own environment

Collaboratives

- Simultaneous efforts to improve the same problem
- Rapid cycle interventions
- Share resources and data
- Take from other centres what might work for you
- Australia: <https://www.safetyandquality.gov.au/national-priorities/pbm-collaborative> (pre operative iron optimisation)
- British Columbia: Metzner M. et al Can J Anaesth. doi: 10.1007/s12630-024-02870-7. (peri-operative optimisation in general)



The third pillar

- Relies heavily on transfusion decision making
- Therefore needs to target physicians and achieve lasting cultural change

Re-frame

- Remember when 2 units was the minimum number to transfuse?
- Needs to be sustained
- New Zealand Blood Service

WHY USE TWO? WHEN ONE WILL DO

Transfusing one unit of blood at a time reduces the risk of an adverse event – **Transfuse one then reassess**



BLOOD IS A GIFT
USE IT WISELY

To find out more go to <http://excellence.adhb.govt.nz/bloods>

Target decision makers

- Post graduate trainees are easy to identify and target
- They may be writing the requests and orders
- Not decision-makers

Blood transfusion prescribing in the ACT: an insight into clinical decision making

Philip J Crispin, Bethany J Crowe and
Anne M McDonald

What is known about the topic?

Inappropriate decisions to transfuse patients are relatively common (16% to 35% in Australian studies). Quality of transfusion practice is related to knowledge.



- Australian Health Review 2005

Design to encourage intended practice

Prepare RBC (Units): 1 Units, Irradiated ✓ Accept ✗ Cancel — Remove

Prepare: 1 Units 1 Units

Special requirements: ☒ Irradiated ☐ CMV Negative ☐ Washed ☐ Directed ☐ Autologous ☐ None

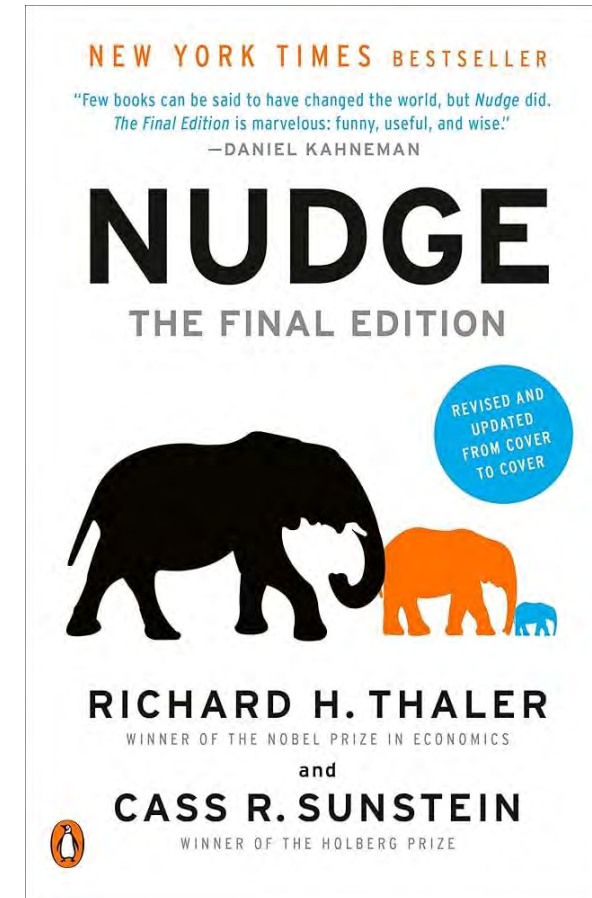
☒ Save as patient's requirements

Reason for transfusion ☐ Critical Bleeding ☐ Symptomatic Anaemia ☐ Anaemia ☐ Acute Coronary Syndrome ☐ Thalassaemia ☐ Myelodysplasia ☐ Chemotherapy ☐ Haematopoietic Stem Cell Transplantation ☐ Intraprocedure ☐ Other - Specify in Comments

Is the patient currently pregnant?
Yes No Unsure

Comments: [+ Add Comments](#)

✓ Accept ✗ Cancel — Remove



Novelty as an agent for change

- Many interventions adopted in medicine without adequate evidence

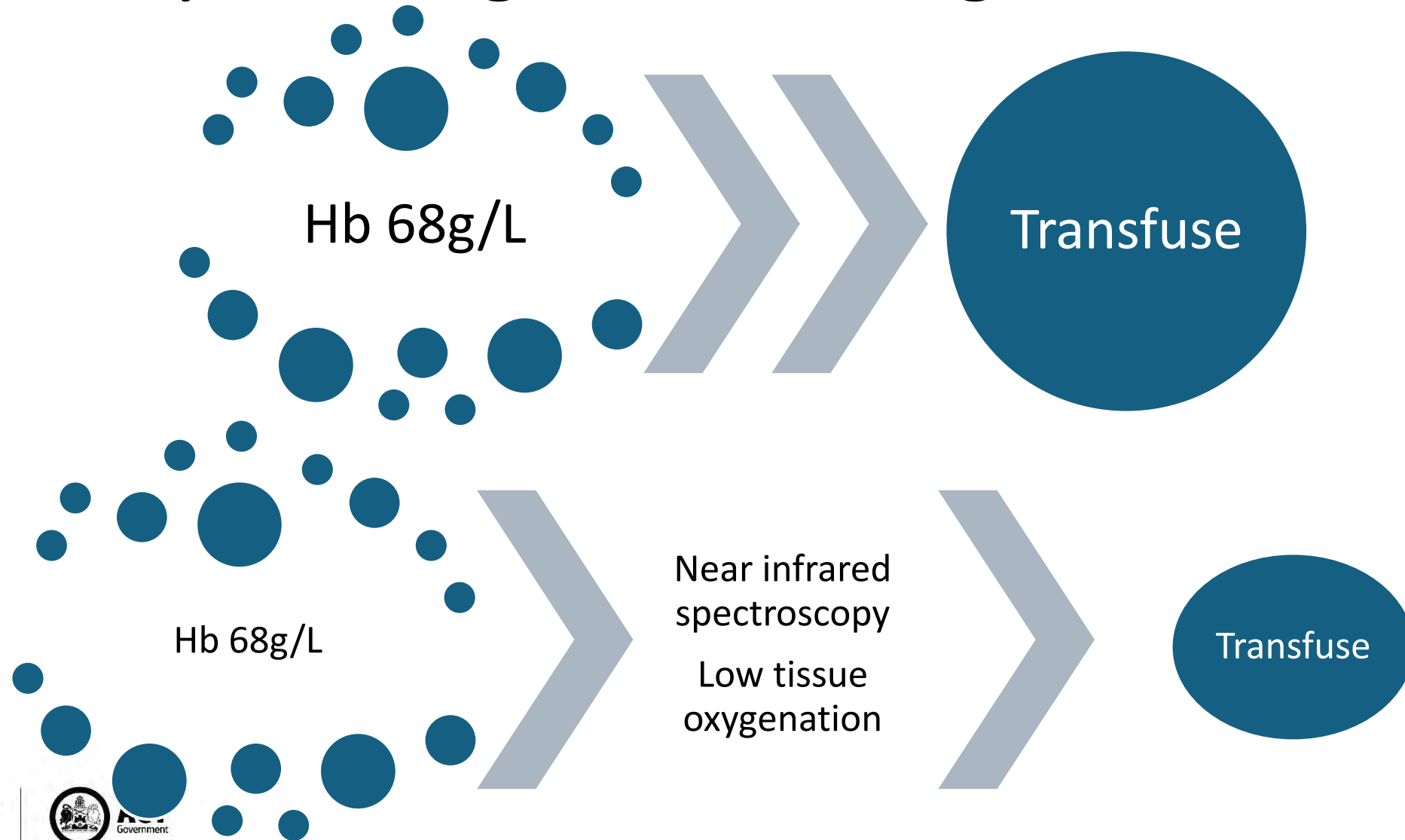
INR doesn't predict
bleeding in liver
disease

But what do I do
about it?

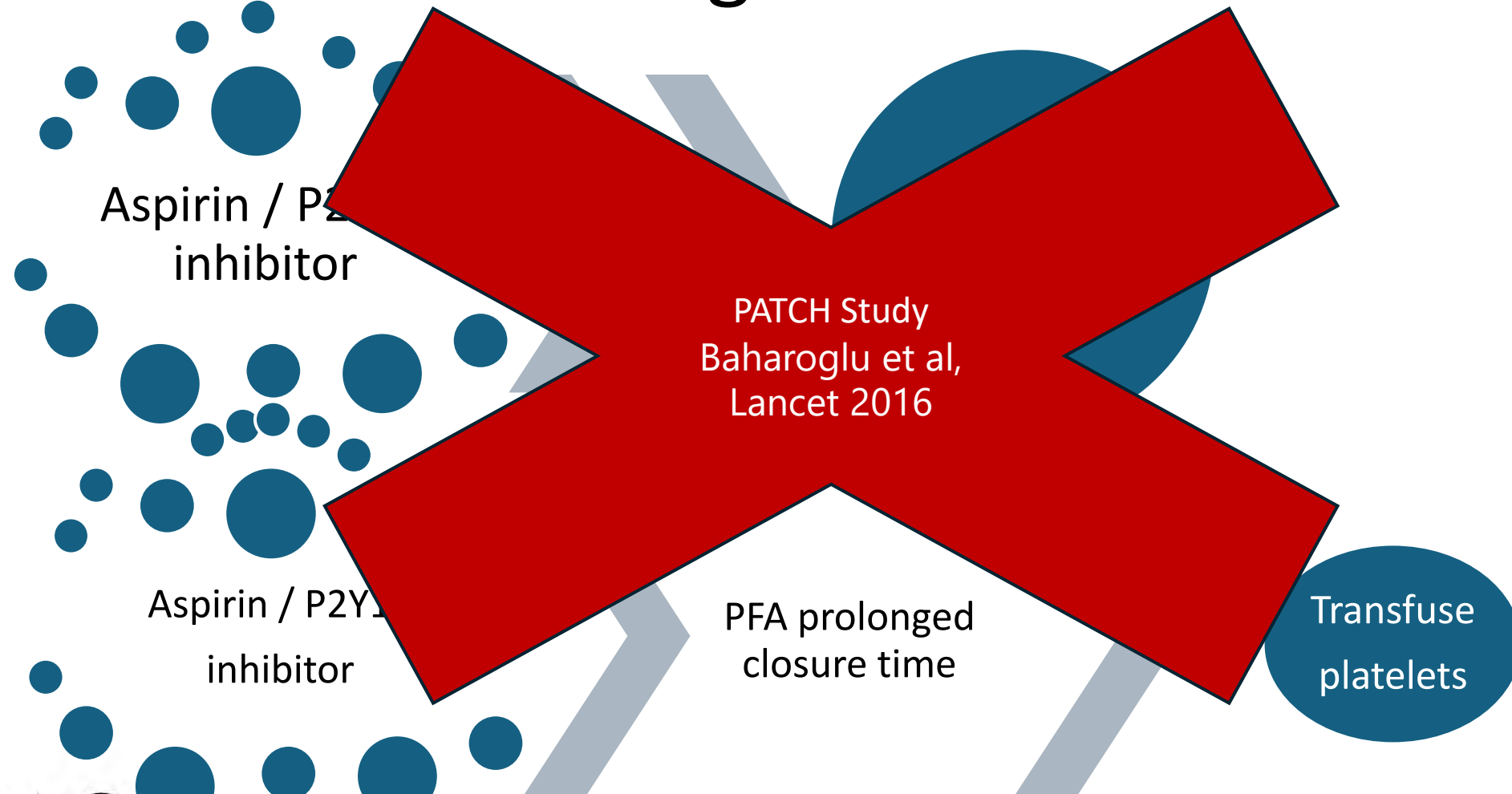
- “Don't give blood,” sounds obstructive
- Viscoelastic testing will often reassure – although there is no current evidence that viscoelastic detected coagulopathy warrants correction



Novelty as an agent for change



Novelty as an agent for change: PFA in intra-cerebral haemorrhage



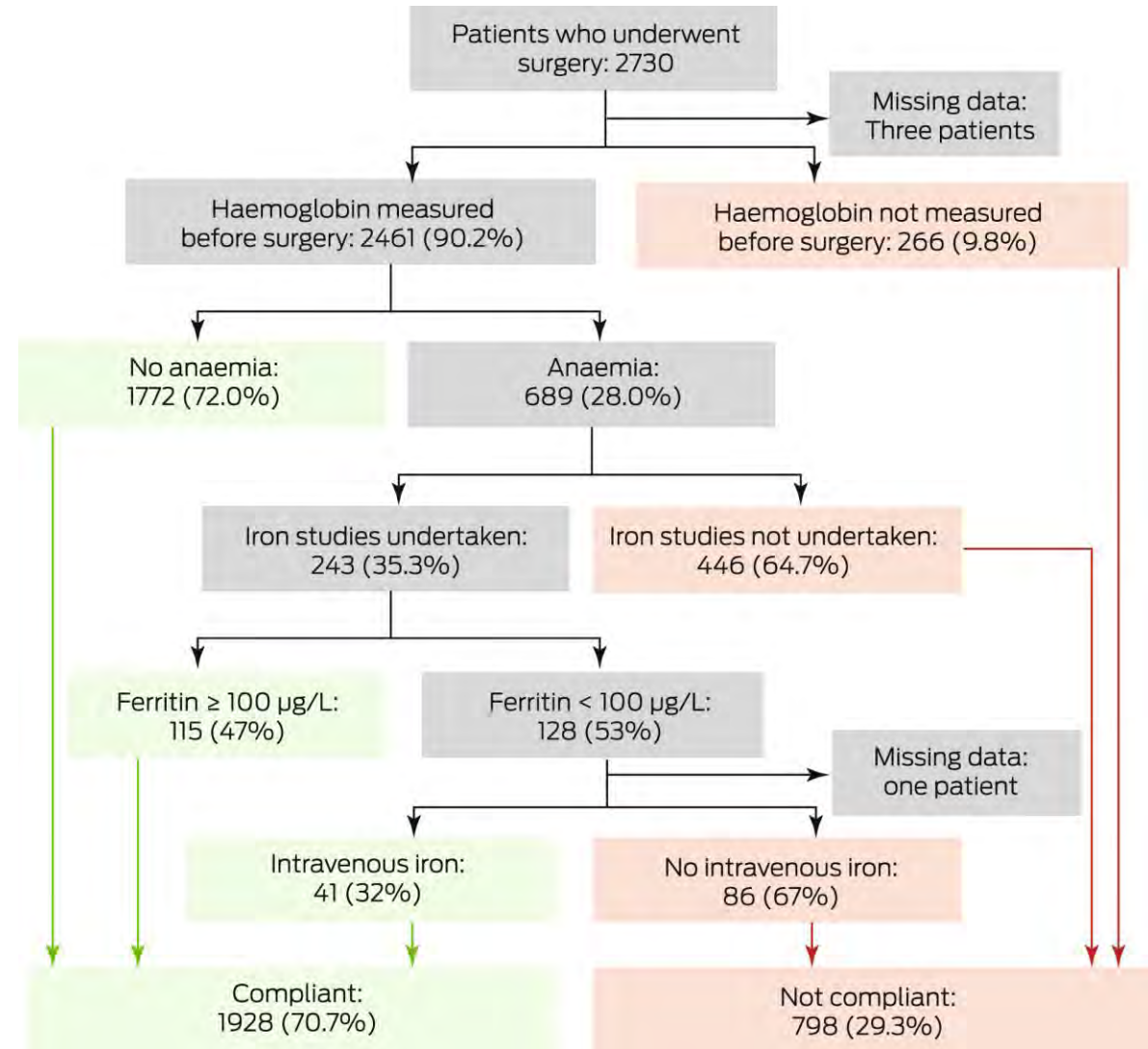
Perseverance

- Postventt Med J Aust. 2022
- Observational study of across 56 Australian and New Zealand Hospitals in 2021
- Assessment and management of perioperative anaemia for major abdominal surgery



Perseverance

- Postventt Med J Aust. 2022



Key messages

- Not one size fits all
- Identify key collaborators
- Work with what you've got – make the most of opportunities, including failures
- Have a variety of tools ready
- Keep going – it never stops
- PBM – it's all about the patients



Acknowledgements

- ACT Blood Counts Program
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