What's New at National Women's Anaesthesia

Some cool things that we are doing

Dr Marty Minehan, Anaesthetist, L9

Overview

Sustainability

- Syringe recycling
- Drug trays
- Ditch the Des

Clinical Practice

- Nurse led pain clinics
- IV Iron
- Noradrenaline
- MHP (the new MTP)
- Badgernet

Syringe Recycling - Pilot

Piloted in 2020	• L9, Starship and BD partnership • 296kg recycled
‘Clean’ used drug syringes	• No body fluids, no residual drugs • No sharps
No need to disassemble or remove stickers	
High level of staff engagement	

Syringe Recycling - Processing

Future POST™ .co.nz

Syringe Recycling - Issues

Disposal of unused mediciations

- No pharmaceutical waste stream in New Zealand

Contamination

- Sharps
- Other plastics - polycarbonate
- Not emptied of medications – fenatnyl
- Wrappers and paper

Bins and Process

- Collection bins
- Theatre floor spaces

Syringe Recycling - Volumes

- 2020 – 387kg
- 2021 – 553kg
- 2022 – 843kg
    - 2022 includes Auckland, Counties, Waitemata and Northland

- **1.7 tonnes** of plastic divereted from landfill.
    - ~ 100 x 120L wheelie bins.

Syringe Recycling – Moving Forward

- Expansion
  - Other theatre blocks
  - Other hospitals in Auckland
  - National expansion
- Other partners

- Considerations
  - Only operating theatres
    - Lower risk of contamination
    - Captured user group
  - Contamination
    - Working with Ara Manawa
      - *Ara Manawa is an interdisciplinary research, design and innovation studio inside Te Toka Tumai. We are a team of creative problem solvers who develop solutions to challenges in Papakainga Atawhai (Auckland Hospital) and our wider health sector.*

ARA
MANAWA

Drug Trays

The trays are used for storing drawn up drugs and carrying equipment to the bedside.

Drug Trays – The Old

- *Approximately 17,000 plastic drug trays were used annually at ADHB in theatres, at around $1.30 each.*
- *Most were not being disposed of appropriately and sent directly to landfill.*

Drug Trays - Alternatives

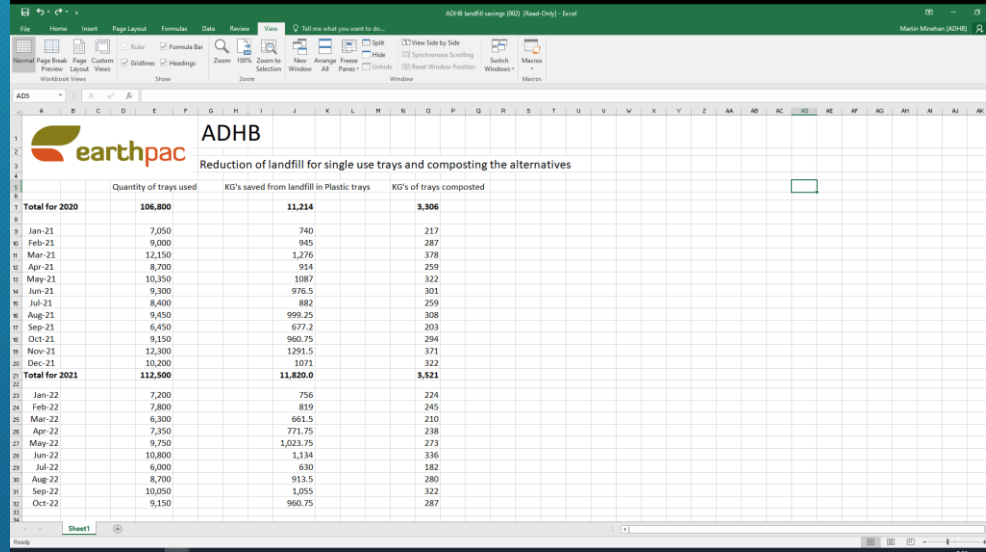
- Several alternatives were explored looking at cost, manufacture, transport and disposal.
- Trialed for several weeks.

Drug Trays – Potato Trays

- A locally made product was selected
  - Manufactured in NZ
  - Made from potato starch, edible
  - 100% compostable – waste stream
  - Available in 2 sizes
- Cost about $0.35 each (a third of the plastic trays)
- Widely accepted by staff
- Now used by all departments
  - > 110,000 per annum

Drug Trays - Outcomes

- ~110,000 trays per annum
- ~**11 tonnes** of plastic avoided per annum
- ~ 3 tonnes composted*
- Significant cost savings



earthpac

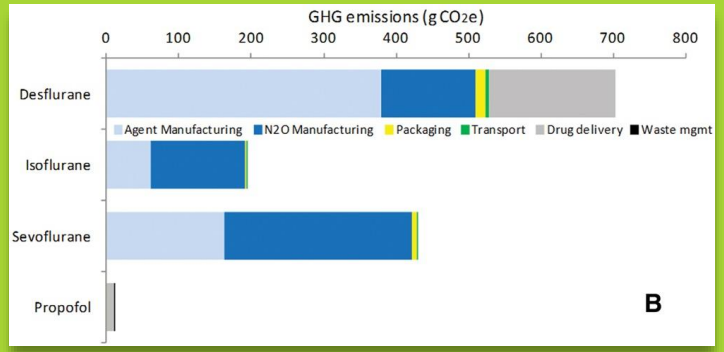
ADHB

Reduction of landfill for single use trays and composting the alternatives

	Quantity of trays used	KG's saved from landfill in Plastic trays	KG's of trays composted
Total for 2020	**106,800**	**11,214**	**3,306**
Jan-21	7,050	740	217
Feb-21	9,000	945	287
Mar-21	12,150	1,276	378
Apr-21	8,700	914	259
May-21	10,350	1087	322
Jun-21	9,300	976.5	301
Jul-21	8,400	882	259
Aug-21	9,450	999.25	308
Sep-21	6,450	677.2	203
Oct-21	9,150	960.75	294
Nov-21	12,300	1291.5	371
Dec-21	10,200	1071	322
Total for 2021	**112,500**	**11,820.0**	**3,521**
Jan-22	7,200	756	224
Feb-22	7,800	819	245
Mar-22	6,300	661.5	210
Apr-22	7,350	771.75	238
May-22	9,750	1,023.75	273
Jun-22	10,800	1,134	336
Jul-22	6,000	630	182
Aug-22	8,700	913.5	280
Sep-22	10,050	1,055	322
Oct-22	9,150	960.75	287

Ditch the Des – The Problem

- Desflurane's GWP100 = 2540 (Sevo 130)
- 240ml Canister of desflurane = 893kg CO2e
  - (250ml Sevo = 41.5kg CO2e)
- 1kg Propofol* (1 million miligrams) = 21kg of CO2e (Parvatker[1])
  - *Propofol's cradle-to-grave is 10,000 times less than desflurane even when hardware, syringe drivers (with fossil fuel energy supply) & 50% waste disposal by incineration is taken into account (Sherman[1]). *Propofol is toxic the aquatic environment and needs to be disposed of appropriately.*

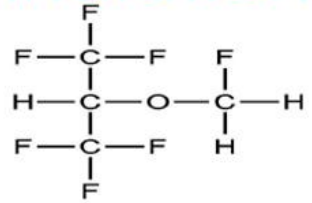


1) Parvatker *et. al.* ACS Sustainable Chemistry & Engineering 2019 7 (7), 6580-6591

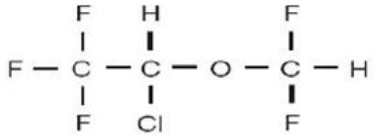
2) Sherman *et. al.* Anesth Analg. 2012 May;114(5):1086-90

Ditch the Des vs Others

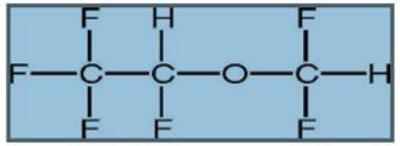
Inhalational anaesthetic agents



Sevoflurane
GWP 130
Bottle (250ml) 44kg CO_2e



Isoflurane
GWP 510
Bottle (250 ml) 190 kg CO_2e



Desflurane
GWP 2540
Bottle (240 ml) 886 kg CO_2e

Nitrous oxide
GWP 310
Cylinder (3.4 kg) 1054 kg CO_2e

RCoA
Royal College of Anaesthetists

Ditch the Des – Removing It

EUROPEAN COMMISSION

Strasbourg, 5.4.2022
COM(2022) 150 final
2022/0099(COD)

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014

(Text with EEA relevance)

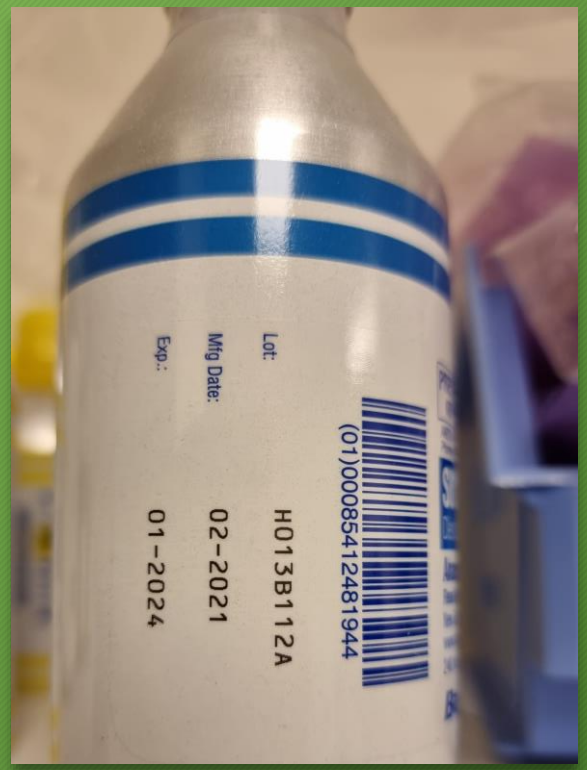
{SEC(2022) 156 final} - {SWD(2022) 95 final} - {SWD(2022) 96 final} - {SWD(2022) 97 final}

4. The use of desflurane as inhalation anaesthetic is prohibited as from 1 January 2026, except when such use is strictly required and no other anaesthetic can be used on medical grounds. The user shall provide evidence, upon request, on the medical justification to the competent authority of the Member State and the Commission.

https://www.tra2sh.org/refuse-desflurane

Ditch the Des – Slow Progress

- L9 removed the vapourisers from the machines
- Still available for use if requested…but
  - Vapouriser servicing overhead
    - NB Dräger serviced in Germany!
  - MOQs and expiry dates
  - Disposal of unused desflurane
- Considering removing it from the formulary



Nurse Led Pain Clinics – Women's Health

- Traditionally nurse-led phone call following hospital discharge
  - Ad-hoc

- Nurse-led outpatient clinics established in July 2020
  - Specialty pain nurses
    - Given training
    - Guidelines for management
    - Guidelines for referral
  - Obstetric and gynaecology patients
  - Clinician oversight (in the room next door)
  - Consistent and comprehensive transitional pain management

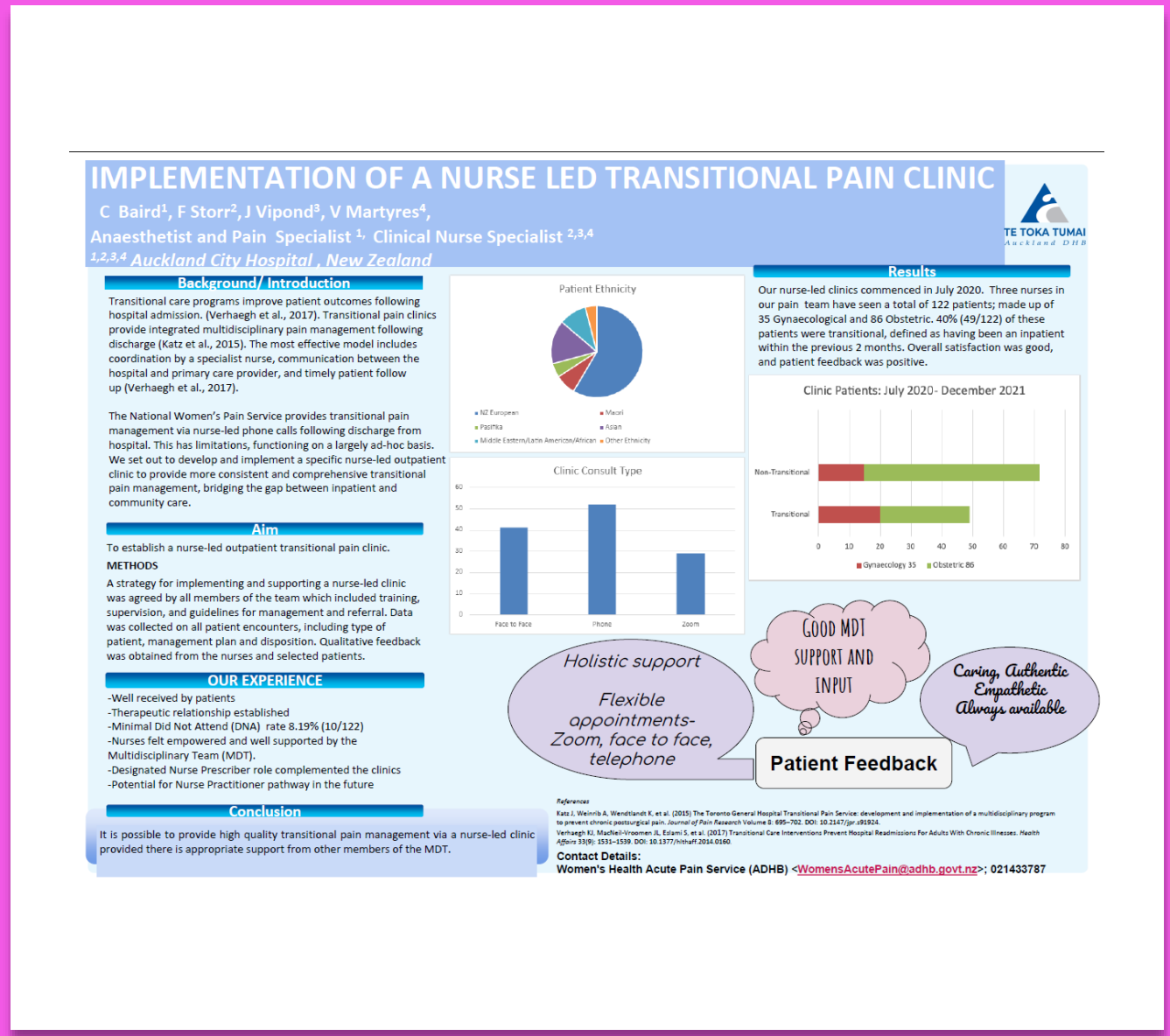
Nurse Led Pain Clinics – Experience

- Well received by patients
- Threaputic relationship established
- Minimal ‘Did Not Attend’ rate (8.2%)
- Nurses felt empowered and well supported by the MDT
- Designated Nurse Prescriber role complemented the clinics
- Potential for Nurse Practitioner pathway in the future

“Implementation of a Nurse Led Transitional Pain Clinic”: C Baird, F Storr, J Vipond, V Martyres

Nurse Led Pain Clinics – Data

- "Implementation of a Nurse Led Transitional Pain Clinic": C Baird, F Storr, J Vipond, V Martyres



IMPLEMENTATION OF A NURSE LED TRANSITIONAL PAIN CLINIC

C Baird[1], F Storr[2], J Vipond[3], V Martyres[4],
Anaesthetist and Pain Specialist [1], Clinical Nurse Specialist [2,3,4]
[1,2,3,4] *Auckland City Hospital , New Zealand*

TE TOKA TUMAI Auckland DHB

Background/ Introduction

Transitional care programs improve patient outcomes following hospital admission. (Verhaegh et al., 2017). Transitional pain clinics provide integrated multidisciplinary pain management following discharge (Katz et al., 2015). The most effective model includes coordination by a specialist nurse, communication between the hospital and primary care provider, and timely patient follow up (Verhaegh et al., 2017).

The National Women's Pain Service provides transitional pain management via nurse-led phone calls following discharge from hospital. This has limitations, functioning on a largely ad-hoc basis. We set out to develop and implement a specific nurse-led outpatient clinic to provide more consistent and comprehensive transitional pain management, bridging the gap between inpatient and community care.

Aim

To establish a nurse-led outpatient transitional pain clinic.

METHODS

A strategy for implementing and supporting a nurse-led clinic was agreed by all members of the team which included training, supervision, and guidelines for management and referral. Data was collected on all patient encounters, including type of patient, management plan and disposition. Qualitative feedback was obtained from the nurses and selected patients.

OUR EXPERIENCE

-Well received by patients
-Therapeutic relationship established
-Minimal Did Not Attend (DNA) rate 8.19% (10/122)
-Nurses felt empowered and well supported by the Multidisciplinary Team (MDT).
-Designated Nurse Prescriber role complemented the clinics
-Potential for Nurse Practitioner pathway in the future

Conclusion

It is possible to provide high quality transitional pain management via a nurse-led clinic provided there is appropriate support from other members of the MDT.

Results

Our nurse-led clinics commenced in July 2020. Three nurses in our pain team have seen a total of 122 patients; made up of 35 Gynaecological and 86 Obstetric. 40% (49/122) of these patients were transitional, defined as having been an inpatient within the previous 2 months. Overall satisfaction was good, and patient feedback was positive.

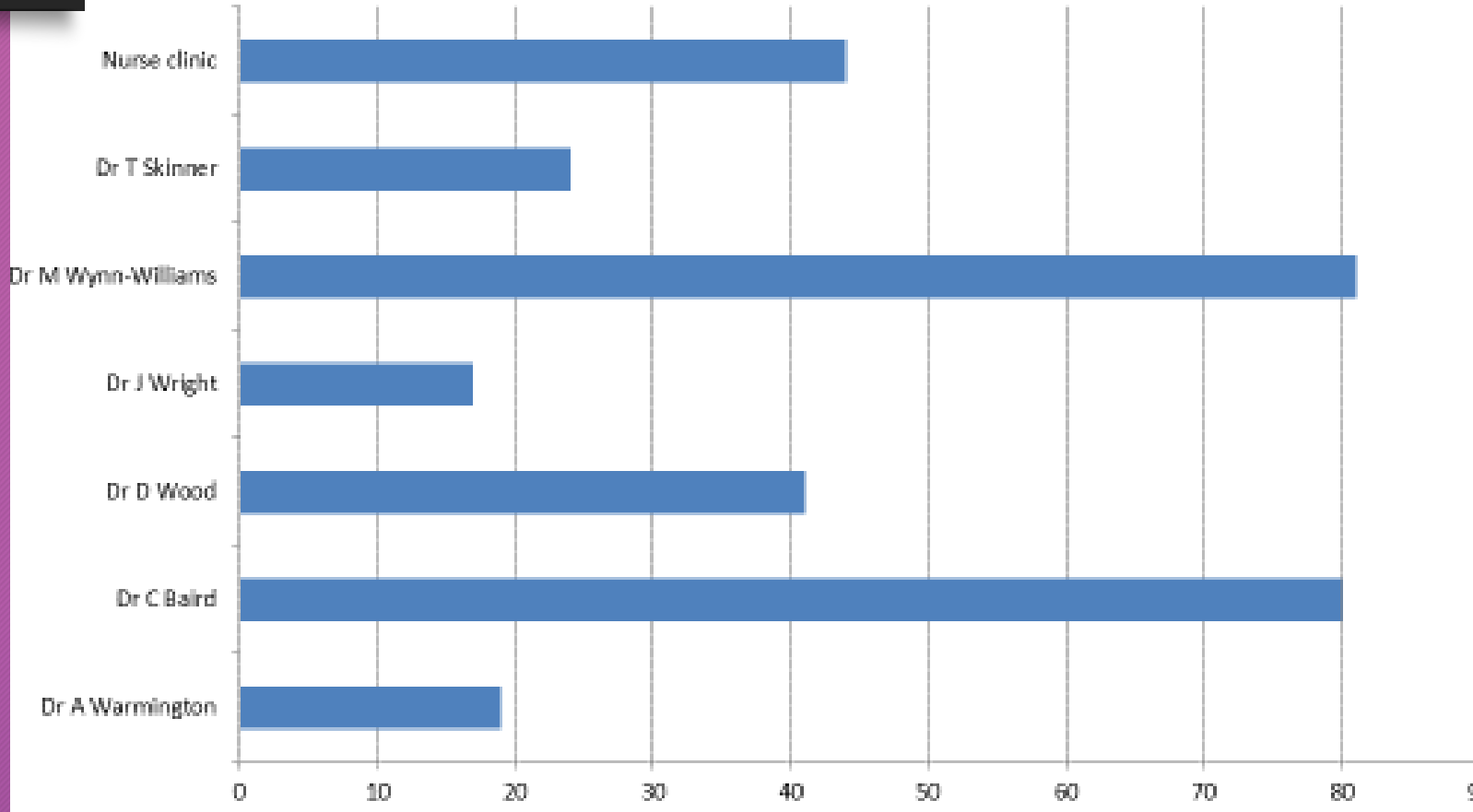
References
Katz J, Weinrib A, Wendtlandt K, et al. (2015) The Toronto General Hospital Transitional Pain Service: development and implementation of a multidisciplinary program to prevent chronic postsurgical pain. *Journal of Pain Research* Volume 8: 695–702. DOI: 10.2147/jpr.s91924.
Verhaegh KJ, MacNeil-Vroomen JL, Eslami S, et al. (2017) Transitional Care Interventions Prevent Hospital Readmissions For Adults With Chronic Illnesses. *Health Affairs* 33(9): 1531–1539. DOI: 10.1377/hlthaff.2014.0160.

Contact Details:
Women's Health Acute Pain Service (ADHB) <WomensAcutePain@adhb.govt.nz>; 021433787

Nurse Led Pain Clinics - Data

- "Implementation of a Nurse Led Transitional Pain Clinic": C Baird, F Storr, J Vipond, V Martyres

Patients seen in 6 months to June 2022



Nurse Led Pain Clinics – Conclusion

Conclusion

It is possible to provide high quality transitional pain management via a nurse-led clinic provided there is appropriate support from other members of the MDT.

"Implementation of a Nurse Led Transitional Pain Clinic": C Baird, F Storr, J Vipond, V Martyres

Nurse Led Pain Clinics – The Team

IV Iron in Pregnancy and Post-Partum

- Implemented IV Iron pathway
- Iron deficiency anaemia (IDA) in pregnancy
  - Estimated the prevalence of anaemia in pregnant women 38% and for all women of reproductive age was 29%.[1]
  - Low infant birth weight.
  - Increased risk of maternal and perinatal mortality.
  - Infants born to anaemic mothers are more vulnerable to anaemia during their first year of life.
  - Can also affect work productivity, cognition, including post-natal depression and effects on bonding, poor wound healing, as well as fatigue.

1) World Health Organization. (2015). The global prevalence of anaemia in 2011.

IV Iron in Pregnancy and Post-Partum

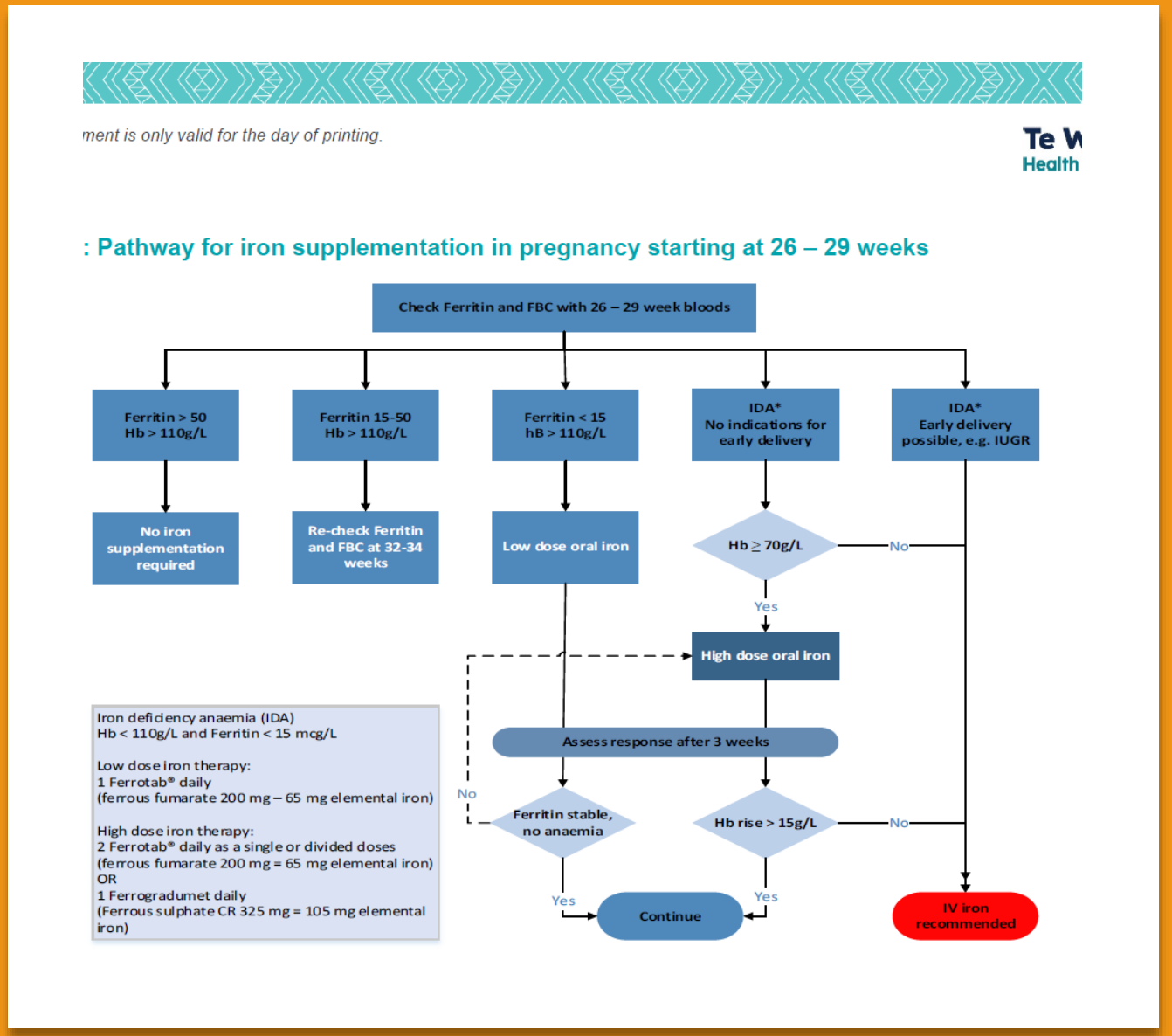
RANZCOG do not currently recommend routine antenatal ferritin screening.

At Te Toka Tumai we suggest ferritin testing at booking, around 28 weeks or at other points in the pregnancy, if there are additional risk factors:

refusal of blood transfusion	RBC antibodies	vegetarian diet	multiple pregnancies	adolescent pregnancies	low socioeconomic status	short pregnancy intervals

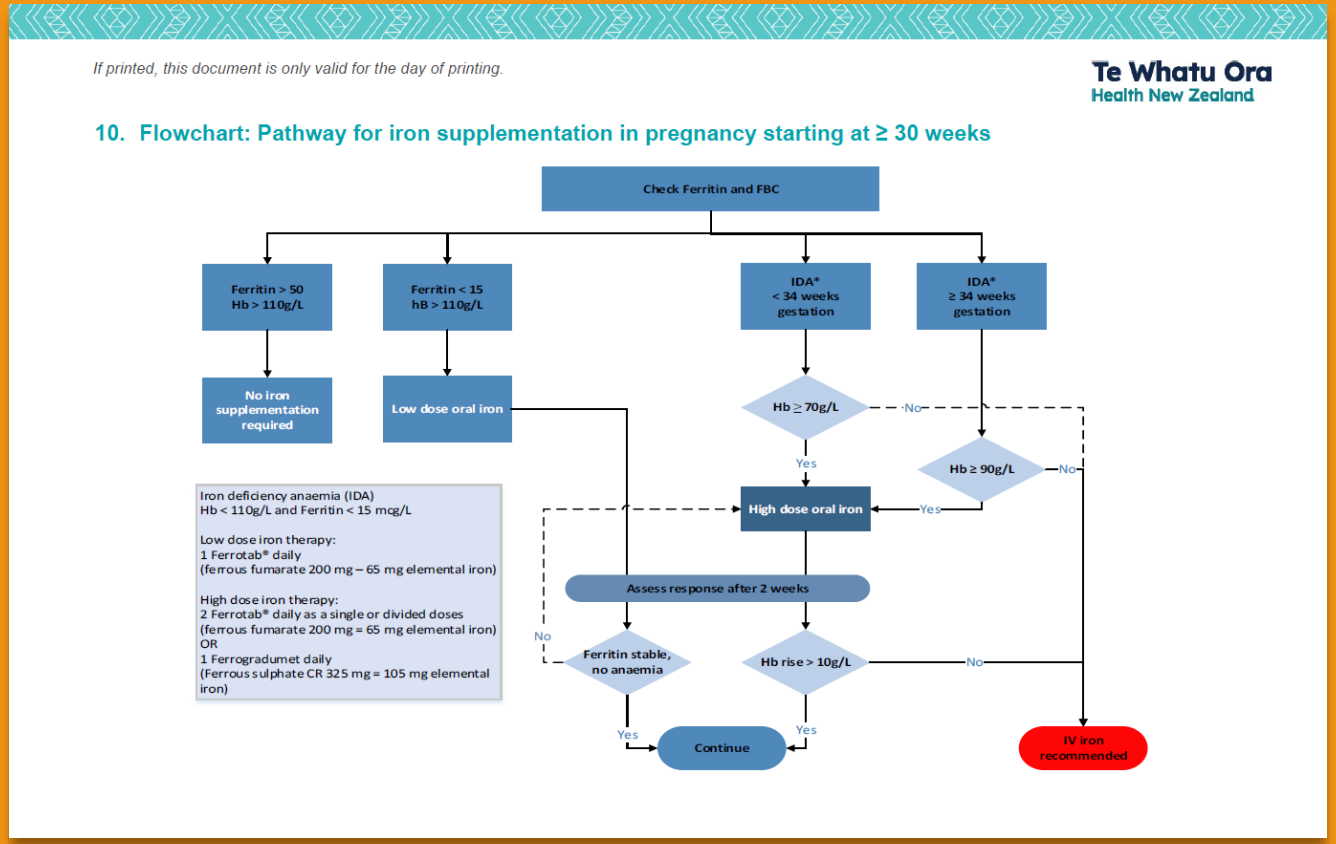
IV Iron in Early Pregnancy

- Pathway for early in preganacy



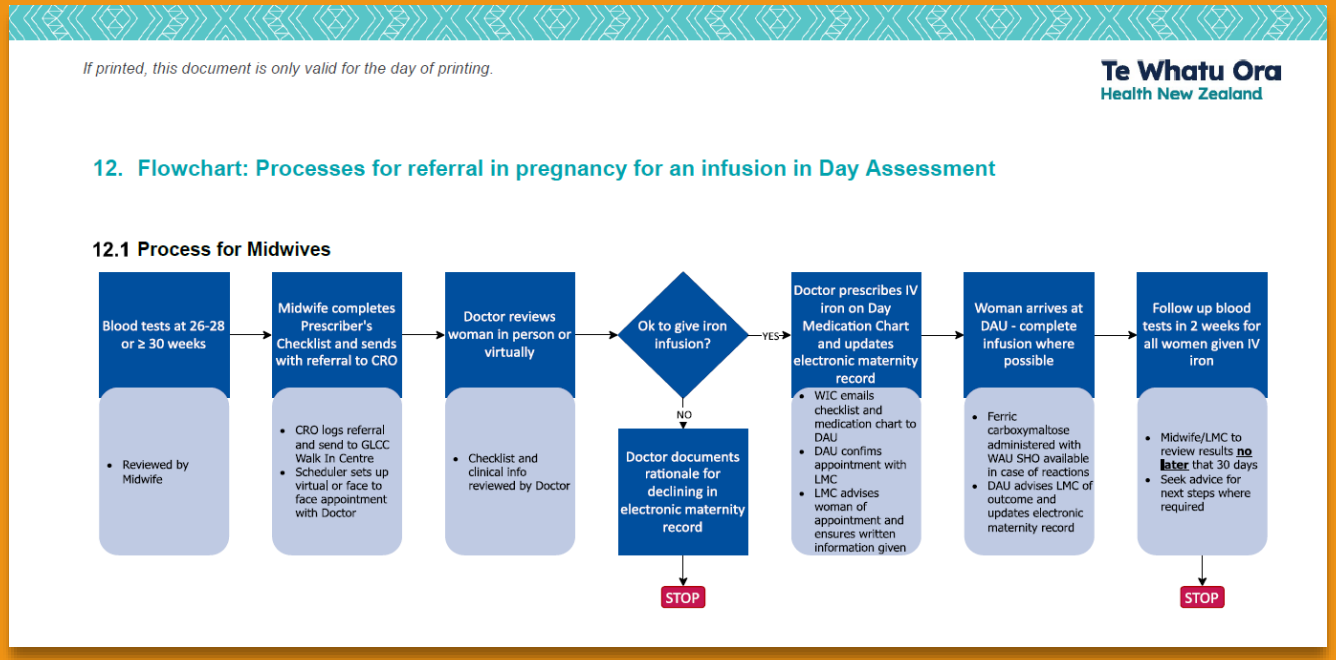
IV Iron in Late Pregnancy

- Pathway for late in preganacy



IV Iron in Pregnancy and Post-Partum

- Easy to follow referral pathway for midwives
- IV Fe administered in Day Admission Unit



If printed, this document is only valid for the day of printing.

Te Whatu Ora
Health New Zealand

12. Flowchart: Processes for referral in pregnancy for an infusion in Day Assessment

12.1 Process for Midwives

IV Iron in Pregnancy and Post-Partum

Cumulative antenatal dose of ferric carboxymaltose

- Hb ≥ 90 g/L - 1000 mg
- Hb < 90 g/L - 1500 mg

Postnatal dose of ferric carboxymaltose

- 0.5 mg of iron is required to replace each 1 mL of blood loss
  - e.g. if 1000 mL blood loss, woman requires extra 500 mg iron

IMPORTANT: The maximum weekly dose of ferric carboxymaltose is 1000 mg. Do NOT exceed this weekly dose.

IV Iron – The Iron Ladies

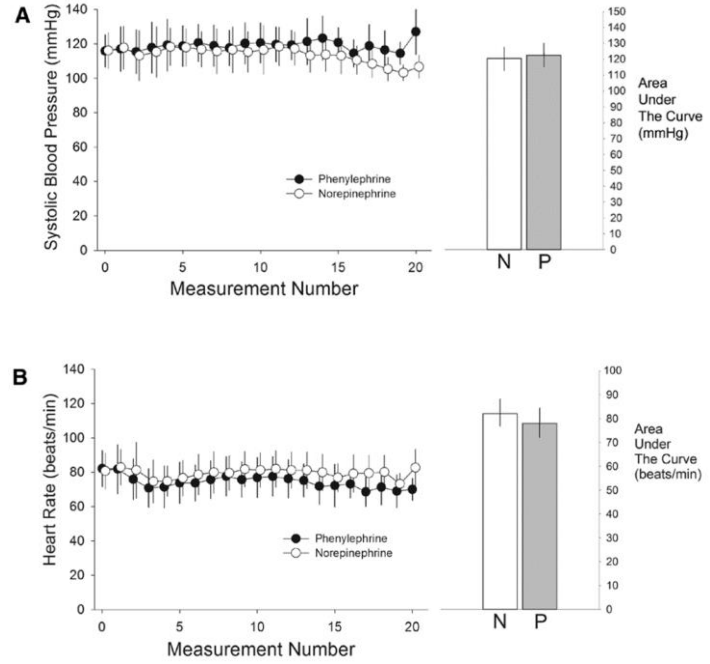
- Liz Dunn
- Justine Wright
- Jay Van Der Westhuizen

Peripheral Noradrenaline

- 104 Elective LSCS under spinal + cohydration
- Randomised to Phenylephrine or Noradrenaline (double blind)
- Computer controlled infusion pumps to maintain SBP near baseline – measured every 1 minute
- Suprasternal doppler every 5 mins – CO, SV, SVR

Randomized Double-blinded Comparison of Norepinephrine and Phenylephrine for Maintenance of Blood Pressure during Spinal Anesthesia for Cesarean Delivery

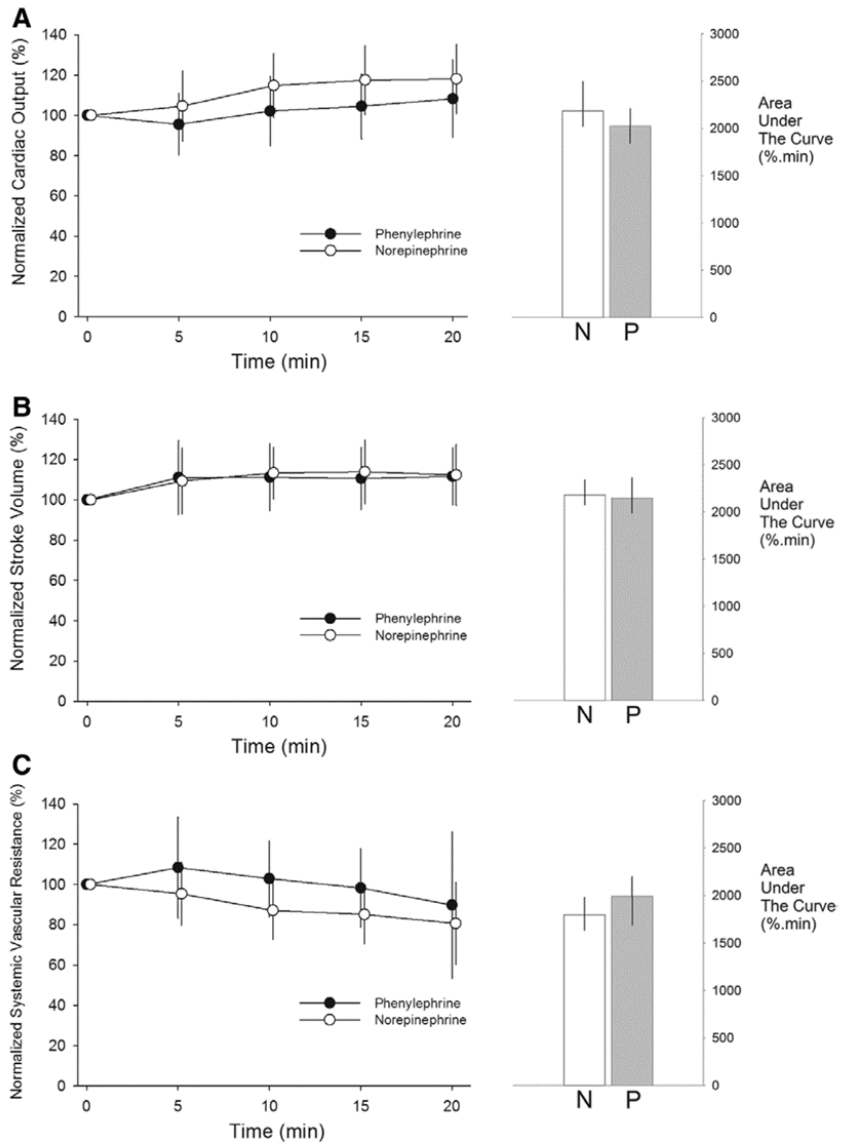
Warwick D. Ngan Kee, M.B.Ch.B., M.D., F.A.N.Z.C.A., F.H.K.A.M.,
Shara W. Y. Lee, B.Sc.(Hons.), M.Sc., Ph.D., Floria F. Ng, R.N., B.A.Sc.,
Perpetua E. Tan, B.Sc., M.Phil., Kim S. Khaw, M.B.B.S., M.D., F.R.C.A., F.H.K.A.M.



Anesthesiology 2015; 122;736-45

Peripheral Noradrenaline

- CO higher in Norad group vs Phenylephrine – $p<0.001$
- SV same in both groups $p=0.44$
- SVR lower in Norad group vs Phenylephrine – $p<0.001$



Anesthesiology 2015; 122;736-45

Peripheral Noradrenaline

Umbilical venous blood gases – Median [IQR]:

Noradrenaline pH 7.35 [7.34-7.37]; Oxygen content 12.7 [11.3-14.4] ml/dl

Phenylephrine pH 7.34 [7.32-7.36]; Oxygen content 11.8 [9.6-13.7] ml/dl

p=0.031 p=0.047

Peripheral Noradrenaline - Review

"Phenylephrine is recommended for the management of hypotension after spinal anaesthesia in women undergoing caesarean section. Noradrenaline, an adrenergic agonist with weak B-adrenergic activity, has been reported to have a more favourable haemodynamic profile than phenylephrine."

- 13 RCTs identified.
- Two trials found a significantly lower incidence of bradycardia.
- Cardiac output was significantly higher after noradrenaline in two studies.
- Secondary outcomes including nausea, vomiting and Apgar scores at 1 and 5 min, no studies found significant differences

"The evidence so far is too limited to support an advantage of noradrenaline over phenylephrine."

Review Article

A systematic review of phenylephrine vs. noradrenaline for the management of hypotension associated with neuraxial anaesthesia in women undergoing caesarean section

M. Heesen ✉, N. Hilber, K. Rijs, R. Rossaint, T. Girard, F.J. Mercier, M. Klimek

First published: 03 February 2020 | https://doi.org/10.1111/anae.14976 | Citations: 18

Anaesthesia Jun 2020; 75(6): 800-808

Peripheral Noradrenaline – More Recent Studies

- 126 patients, HR, SBP, IONV, Apgars, UVBGs
- *"A dilute solution of norepinephrine infusion is comparably efficacious to the current gold standard vasopressor phenylephrine in maintaining blood pressure following spinal anaesthesia for caesarean delivery, with a significantly lower incidence of bradycardia."*

Goel et. al. Indian Journal of Anaesthesia: August 2021 - Volume 65 - Issue 8 - p 600-605

- 200 patients, CO, SBP, HR, IONV
- *"The study advocates the use of intermittent boluses of norepinephrine in the effective management of spinal-induced hypotension during cesarean section. Although the hemodynamic variables are stable with the usage of intravenous boluses of noradrenaline and phenylephrine, the number of doses of vasopressor use was found to be significantly more with the use of phenylephrine. In the noradrenaline group, the episodes of bradycardia are significantly less as compared to the phenylephrine group"*

Tiwari et. al. Cureus 2022 Jul 23;14(7)

› Cureus. 2022 Jul 23;14(7):e27166. doi: 10.7759/cureus.27166. eCollection 2022 Jul.

A Prospective Randomized Study Comparing the Bolus Doses of Norepinephrine and Phenylephrine for the Treatment of Spinal Induced Hypotension in Cesarean Section

J P Tiwari [1], Sarv J Verma [1], Abhishek K Singh [1]

ORIGINAL ARTICLE

Comparison of norepinephrine and phenylephrine infusions for maintenance of haemodynamics following subarachnoid block in lower segment caeserean section

Goel, Kanika; Luthra, Neeru[1]; Goyal, Namrata[1]; Grewal, Anju[1]; Taneja, Ashima[2]

Author Information

Indian Journal of Anaesthesia: August 2021 - Volume 65 - Issue 8 - p 600-605
doi: 10.4103/ija.IJA_185_21

Peripheral Noradrenaline - Safety

7 studies, 1382 ICU patients, Nadr, PE, DA, Ma

- 3.4% extravsation
- Mean duration 22 hrs

"There were no reported episodes of tissue necrosis or limb ischaemia. All extravasation events were successfully managed conservatively or with vasodilatory medications."

14385 surgical patients, Netherlands, 2012-2016

- 0.035% (5 patients) extravasation
- 0 related complications

› Emerg Med Australas. 2020 Apr;32(2):220-227. doi: 10.1111/1742-6723.13406. Epub 2019 Nov 7.

Safety of peripheral administration of vasopressor medications: A systematic review

David H Tian [1], Claire Smyth [1], Gerben Keijzers [2 3 4], Stephen Pj Macdonald [5 6], Sandra Peake [7 8 9], Andrew Udy [8 10], Anthony Delaney [1 8 11 12]

Observational Study › Anesth Analg. 2020 Oct;131(4):1060-1065.
doi: 10.1213/ANE.0000000000004445.

Risk of Major Complications After Perioperative Norepinephrine Infusion Through Peripheral Intravenous Lines in a Multicenter Study

Carlo Pancaro [1], Nirav Shah [1], Wietze Pasma [2], Leif Saager [1], Ruth Cassidy [1], Wilton van Klei [2], Fabian Kooij [3], Dave Vittali [3], Markus W Hollmann [3], Sachin Kheterpal [1], Philipp Lirk [4]

Peripheral Noradrenaline

Should I switch to Noradrenaline?

Yes – if no risk of dilution error

If you currently use phenylephrine – they are essentially interchangeable

If you use it regularly or have a crib sheet to check the dilution

And if you don't mind someone coming into your theatre questioning why you are giving noradrenaline peripherally

Beware current lack of fetal outcome data (though early studies promising)

Neosynephrine - $142.07 1ml

Noradrenaline BNM - $45.00 4ml

Peripheral Noradrenaline – NWH Setup

- Draw up exactly 0.7mL of 4mg/4mL Noradrenaline (in a 1mL syringe)=700mcg
- Inject this into 100ml Saline bag without aspirating/flushing the 1mL syringe
- Shake bag well
- This is 7mcg/mL Noradrenaline
- Treat exactly as 100mcg/mL phenylephrine
  - Start at 20mL/hr when CSF seen
  - Double/halve rate as required
  - Bolus 0.5mL-1mL if needed
  - Wean over 5 mins after baby delivered e.g. 20-12-4-off
- Ensure you have a non-arterial IV cannula ideally with good fluid flush running with the drug

M Drake Sept 2020

Massive Haemorrhage Pathway - MHP

- Adult Massive Haemorrhage Pathway (MHP) is a bundle of care with aims to stop the bleeding, mobilise resources, and early transfer to definitive care
- There is emphasis on **stopping bleeding**
- There is a focus on **communication**
- **Standardising adjuncts** of care

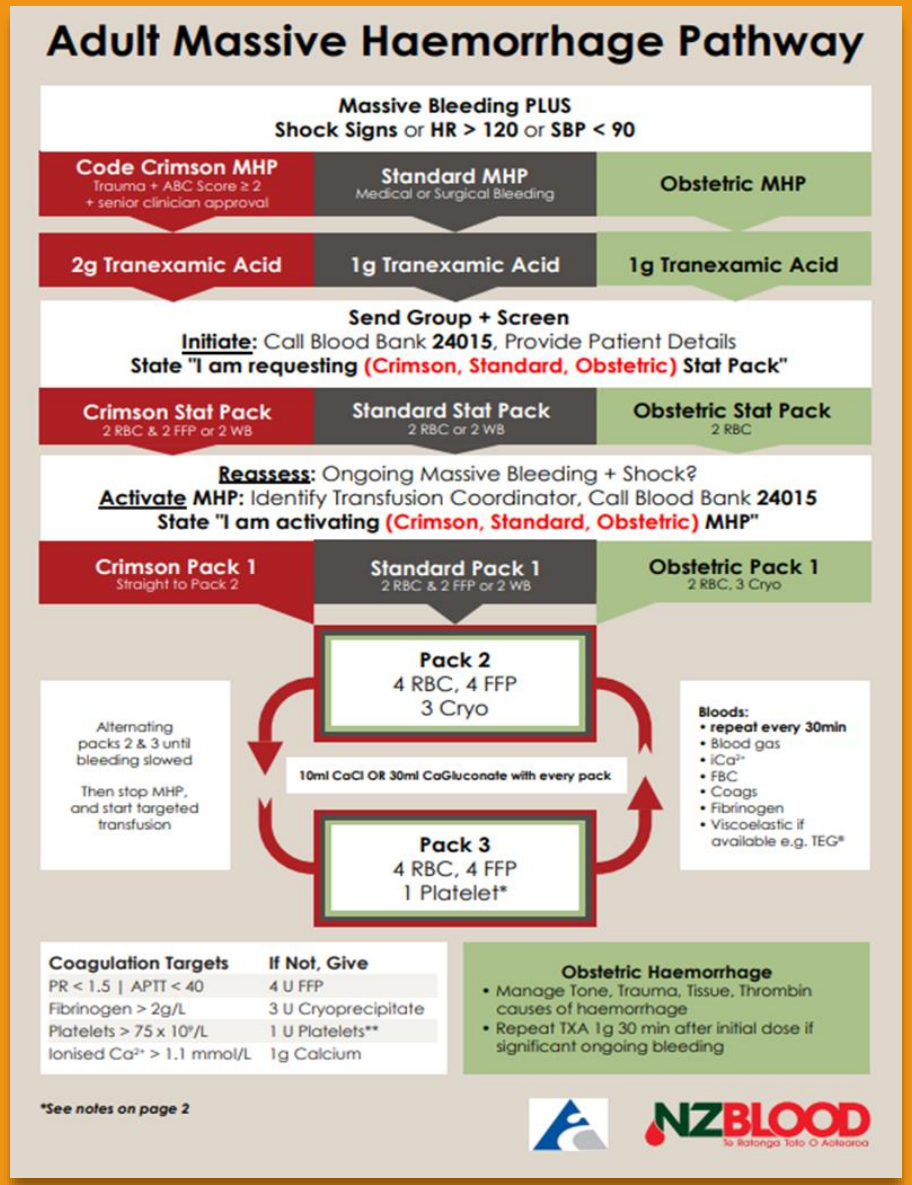
- Replaces the MTP nationwide

Massive Haemorrhage Pathway - MHP

Code Crimson Pathway (trauma)

Standard Pathway

Obstetric Pathway



Massive Haemorrhage Pathway – Obstetric Pathway

Obstetric patients with massive bleeding have important differences in their bleeding, coagulation state and physiology and the MHP obstetric pathway reflects this.

Obstetric Pathway

Obstetric MHP

1g Tranexamic Acid

Send Cross Match
Call Blood Bank and request

Obstetric Stat Pack
2 RBC

Reassess: Ongoing Bleeding + Shock - Call
Activate Massive Haemorrhage Protocol

Obstetric Pack 1
2 RBC, 3 Cryo

Obstetric Haemorrhage

- Manage Tone, Trauma, Tissue, Thrombin causes of haemorrhage
- Repeat TXA 1g 30 min after initial dose if significant ongoing bleeding

- A 1g bolus of TXA as a **slow IV bolus.**
  - Every 15 minute delay in TXA administration decreases the benefit by 10%.
- **Give stat pack then review before calling MHP**
- Coagulation deficits are uncommon initially in PPH
- **Fibrinogen replacement and avoidance of early FFP**
- During a PPH, fibrinogen **falls** before other coagulation factors. The concentration of fibrinogen in FFP is **low** (1-3g/L) so **early** use of FFP can **dilute** the recipient's fibrinogen levels.
- **Unnecessary** use of FFP can lead to complications
  - e.g TRALI, TACO[6]

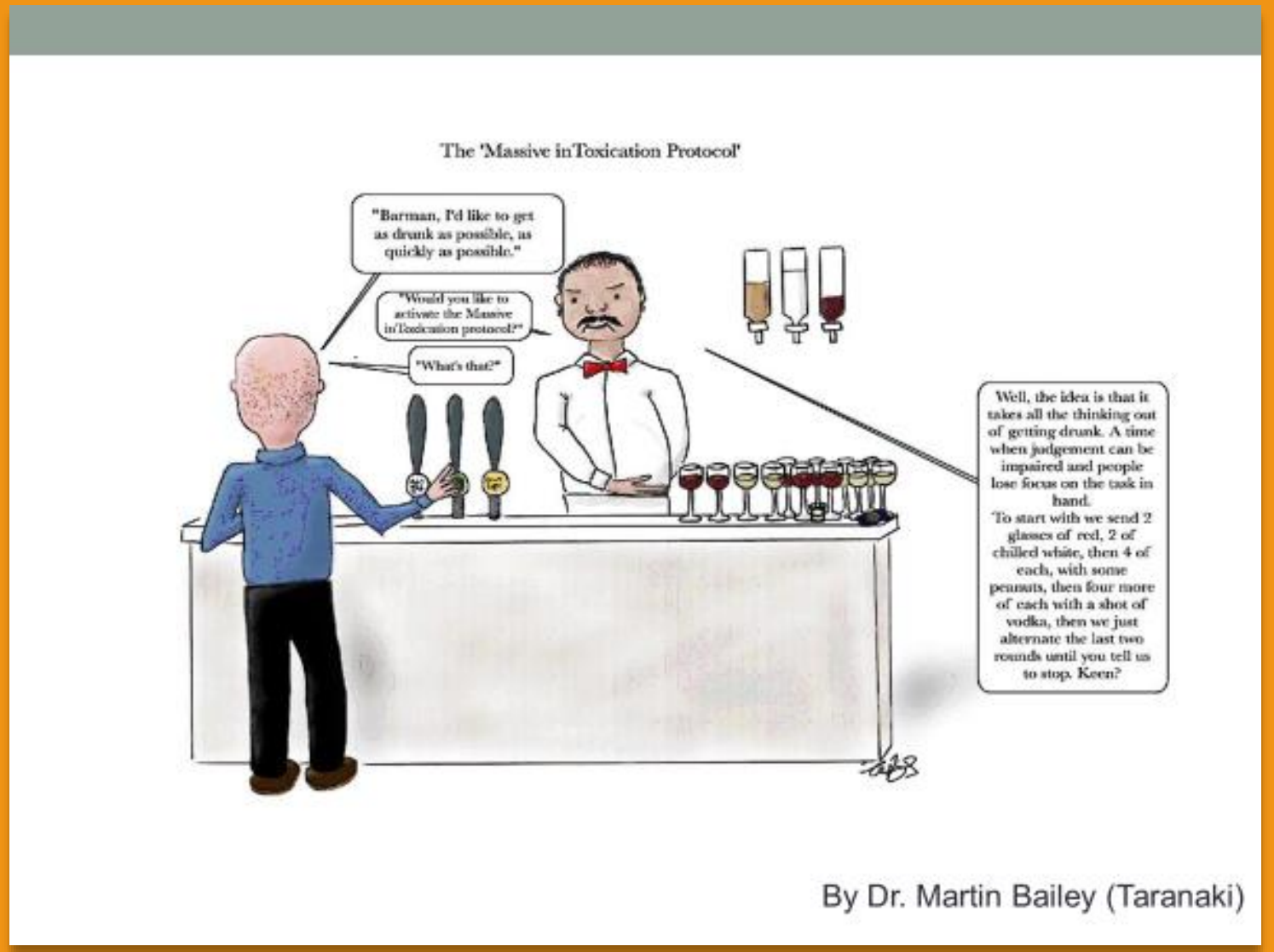
Massive Haemorrhage Pathway - TXA

2g Tranexamic Acid | 1g Tranexamic Acid | 1g Tranexamic Acid

Tranexamic Acid (TXA)

- TXA is an anti-fibrinolytic. It is now recommended for all major haemorrhage
  - 1g slow IV push for massive obstetric haemorrhage & standard pathway
  - 2g slow IV push recommended for code crimson (trauma) pathway
- **Early modulation** of the fibrinolytic system is important in major bleeding.
  - This may be given in divided doses of 1g or as a single 2g dose.
- The **greatest** benefit comes when TXA is administered **within 1 hour** of trauma but definitely within 3 hours [3].
- The recommendation is to change to a **slow push bolus** rather than an infusion.

Massive Intoxication Pathway



BadgerNet

BadgerNet

Trying to use the COW

Questions

- Sustainability – Marty
- Pain Clinics – Colin and Fran
- IV Iron – Liz, Justine, Jay
- Noradrenaline – Matt
- MHP – Liz, Justine, Jay
- Badgernet – Emily and Matt

"Have you guys got food? I love food." *Loki*