Patient Blood Management: Treating Anemia

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Quality Utilization Efficacy Safety Transfusion



Disclosures

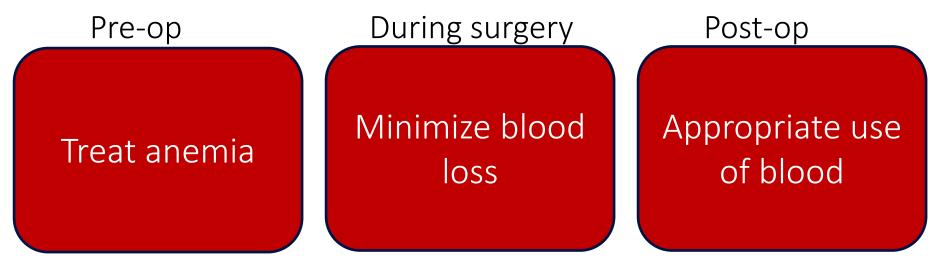
- Research: Canadian Blood Services, Octapharma
- Consulting: Choosing wisely Canada

Objectives

- 1. Advocate for the importance of patient blood management
- 2. Diagnose and treat iron deficiency anemia
- 3. Decide which patients should receive preoperative erythropoietin

Patient Blood Management

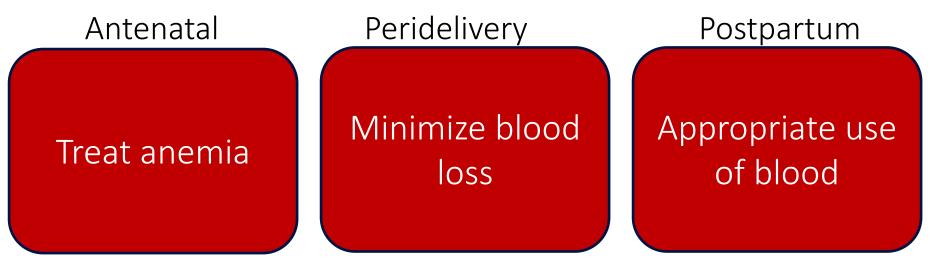
• PBM is a patient-centered and organized approach in which the entire health care team coordinates efforts to improve results by managing and preserving a patient's own blood.



Shander et al. Global Definition of PBM. Anesth Analg 2022 Feb 10 epub ahead of print

Patient Blood Management

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Why is treating preoperative anemia so important?

#1 Preoperative anemia is associated with increased mortality 2018 PBM Consensus Conference OR 2.09 (95%Cl, 1.48-2.95) 2014 Europe N= 39,309 pts OR 1.99 (95%Cl, 1.67-2.37) 2011 US NSQIP N= 227, 425 pts OR 1.42 (95% Cl, 1.31-1.54)

Mueller et al. JAMA 2019;321(10):983-97; Baron et al. BJA 2014;113:416-23; Mussallam et al. Lancet 2011;378:1396-1407

#2 Preoperative anemia is potentially modifiable

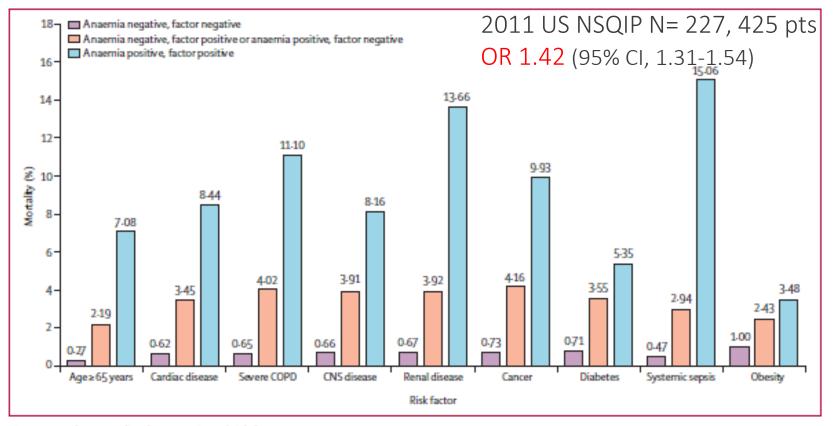
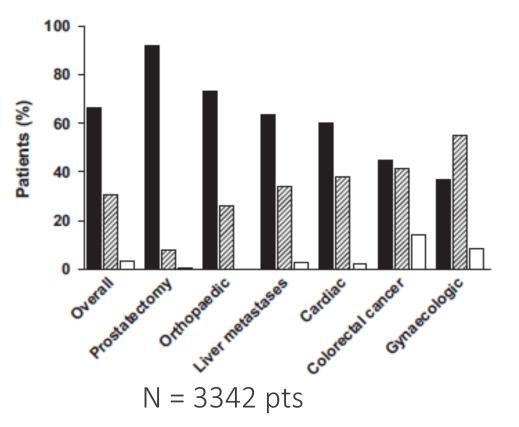


Figure 1: 30-day mortality, by anaemia and risk factor status COPD--chronic obstructive pulmonary disease.

Mussallam et al. Lancet 2011;378:1396-1407

#3 Preoperative anemia is common (25-40%)!

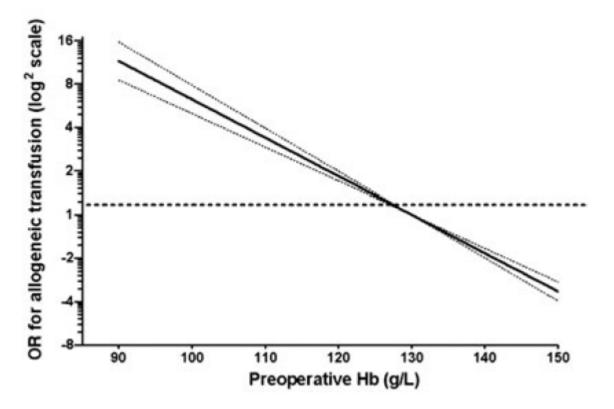


Anemia in 36% (1/3)

Hb ≥ 130 g/L
Hb 100-129 g/L
Hb < 100 g/L

Fowler et al. BJS 2015;102:1314-24. Baron. BJA 2014; Musallam. Lancet 2011; Munoz et al. Anaesthesia 2017;72:826-34

#4 Pre-op anemia associated with \uparrow transfusion





Freedman et al. Transfusion 2008;48:237-50

	Restrictive		Liberal		Risk Ratio		Risk Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI	
Bergamin 2017	84	151	67	149	11.8%	1.24 [0.99 , 1.55]		
Blair 1986	0	26		24				
Bush 1997	4	50		49	1.1%			
Carson 1998	1	42	1	42	0.3%			
Carson 2011	43	1009	52	1007	7.4%		1	
Carson 2013	7	55	1	55	0.5%			
Cooper 2011	2	23	1	21	0.4%			
de Almeida 2015	23	101	8	97	3.0%			
DeZem 2016	1	59	2	30	0.4%			
Ducrocg 2021	19	342	25	324	4.6%	0.72 [0.40, 1.28]		
Foss 2009	5	60	0	60	0.2%			
Gillies 2020	2	26	1	36	0.4%			
Gobatto 2019	7	23	1	21	0.5%	6.39 [0.86, 47.70]		
Gregersen 2015	21	144	12	140	3.6%	1.70 [0.87 , 3.32]	L	
Grover 2006	0	109	1	109	0.2%	0.33 [0.01 , 8.09]		
Hajjar 2010	15	249	13	253	3.2%	1.17 [0.57 , 2.41]		
Hébert 1995	8	33	9	36	2.6%	0.97 [0.42 , 2.22]		
Hébert 1999	78	418	98	420	10.7%	0.80 [0.61 , 1.04]	-	
Holst 2014	168	502	175	496	13.5%	0.95 [0.80 , 1.13]	-	
Jairath 2015	14	257	25	382	4.0%	0.83 [0.44 , 1.57]		
Lacroix 2007	14	320	14	317	3.2%	0.99 [0.48 , 2.04]		
Laine 2018	0	40	0	40		Not estimable		
Lotke 1999	0	62	0	65		Not estimable		
Mazer 2017	74	2427	87	2429	9.6%	0.85 [0.63 , 1.15]	4	
Møller 2019	1	29	1	29	0.3%	1.00 [0.07 , 15.24]		
Murphy 2015	26	1000	19	1003	4.5%	1.37 [0.76 , 2.46]		
Palmieri 2017	16	168	15	177	3.6%	1.12 [0.57 , 2.20]	<u> </u>	
Parker 2013	5	100	3	100	1.0%	1.67 [0.41 , 6.79]	_ .	
Villanueva 2013	19	416	34	417	5.0%	0.56 [0.32 , 0.97]	-+-	
Walsh 2013	12	51	16	49	3.9%	0.72 [0.38, 1.36]		
Webert 2008	1	29	2	31	0.4%	0.53 [0.05 , 5.58]		
Total (95% CI)		8321		8408	100.0%	0.99 [0.86 , 1.15]		
Total events:	670		689					
Heterogeneity: Tau ² = 0.03; Chi ² = 40.06, df = 28 (P = 0.07); I ² = 30%								
Test for overall effect: Z	L = 0.07 (P =	0.94)				F	avours restrictive Favours liberal	
Test for subgroup different	ences: Not a	pplicable					_	

31 trials 16,729 pts 30 day mortality OR 0.99 (0.86, 1.15)

*Comparing hb thresholds not transfusion vs. no transfusion

Carson et al. Cochrane Database of Sys Rev 2021

Advocate for PBM because...

- 1. Preoperative anemia is bad
- 2. Preoperative anemia is modifiable
- 3. Preoperative anemia is common
- 4. Transfusion does not correct effect & has risks
- 5. The donor supply is a precious resource

What are strategies to treat anemia and preserve the patient's own blood?

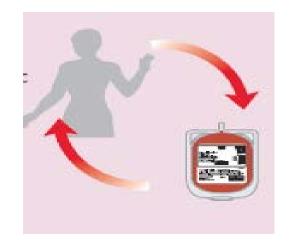
Poll Question

- Which of the following interventions have you prescribed before?
 - Autologous blood
 - Oral iron
 - Intravenous iron
 - Epoetin alfa or darbepoetin

Quick point: Autologous blood donation is to be considered only in rare circumstances!

What is Autologous Donation?

- Patient donates own blood before surgery with sufficient time to allow patient to make up loss
- Goal: to provide <u>additional</u> RBC units for surgery (个 red cell mass)



Pitfalls of Autologous Donation

- Takes at least 4 wks to re-generate autologous blood
- Preop Hb was 11 g/L lower in autologous group (systematic review 14 RCTs)
- More expensive due to 50% wastage rate
 - 1 allogeneic unit costs \$422 (CBS 2018-19)

Henry DA et al. Cochrane Database Syst Rev 2001;(4):CD003602. Update Apr 2010

Summary – Autologous Blood

• Preop autologous blood donation NOT recommended

- Exceptions
 - Patients with <u>very</u> rare blood type not easily met by donor base (e.g. unusual or multiple antibodies)
 - Contact the transfusion service in these cases!

Objective #2: Diagnose and Treat Iron Deficiency Anemia (early)

What is Preop Anemia?

- WHO: Hb < 130 g/L males; Hb < 120 g/L females
- NEW: Hb < 130 g/L used for all (high blood loss surgery)
 - Both sexes lose same amount of blood
 - Lower Hb in females may simply reflect iron deficiency

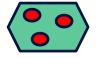
 - NSQIP data: risk increases as hemoglobin levels < 130 g/L with no sex differential

Detection

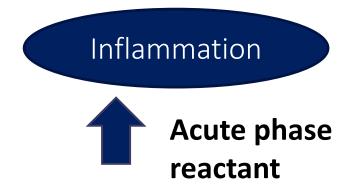
- Who should be screened?
 - All high blood loss surgery (> 500 mL): ortho, cardiac, cancer
 - All high risk for severe anemia: colorectal, gyne
- When?
 - 4-8 weeks before surgery
- How?
 - CBC, ferritin, TSAT, B12, creatinine
 - Focus on iron deficiency anemia (common & treatable)

How to diagnose IDA?

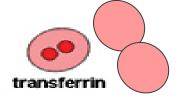
• Ferritin



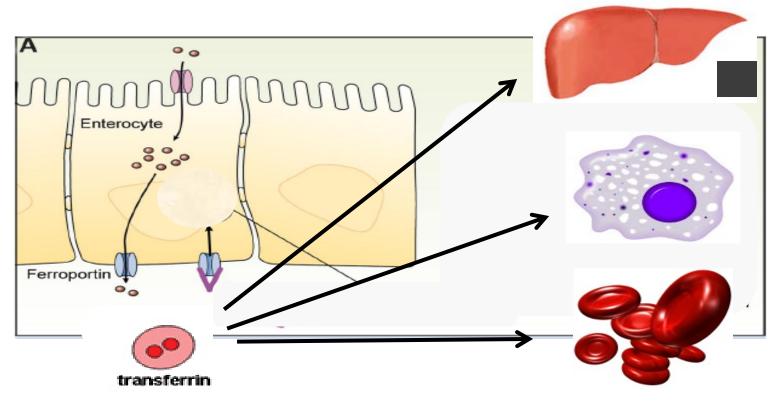
- Reflection of iron stores
- Ferritin < 30 ug/L = Iron deficiency</p>
- Serum Fe 🗧
- Transferrin (TIBC)
 - Transport protein of Fe
- Transferrin saturation
 - Serum Fe / TIBC





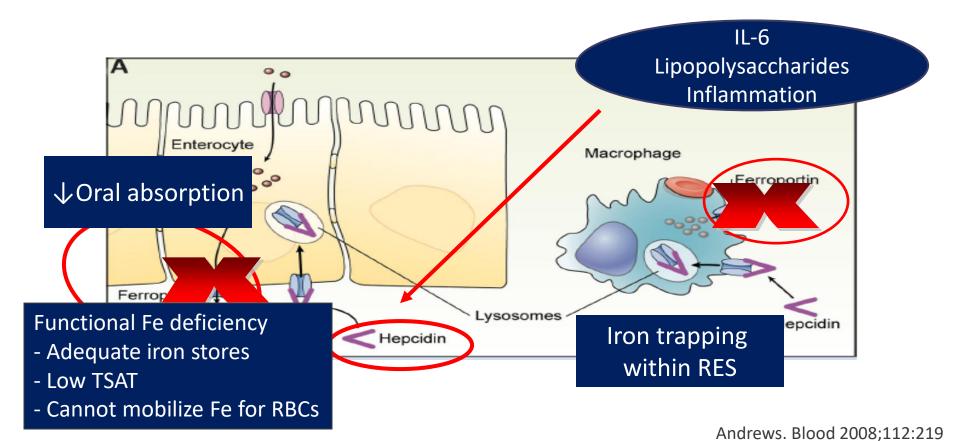


Iron Pathway



Andrews. Blood 2008;112:219

Anemia of Chronic Disease – Hepcidin

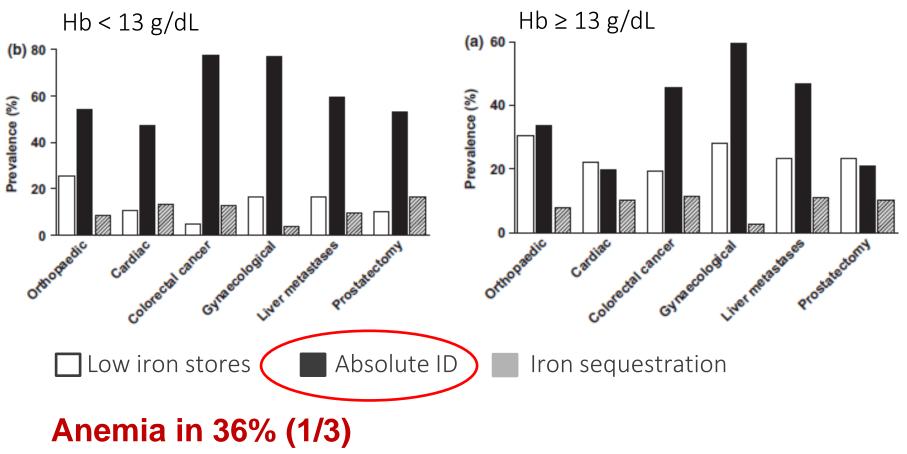


Defining iron deficiency anemia

Absolute Iron Deficiency: Ferritin < 30 mcg/L; or Ferritin < 100 + TSAT < 20% ± CRP > 5 mg/L

Low iron stores: Ferritin 30-100 mcg/L + TSAT > 20%

Munoz et al. International Consensus. Anaesthesia 2017;72:233-47 Kotze et al. BCSH guidelines . BJH 2015;17-322-31; Goodnough et al. NATA guidelines. BJA 2011;106:13-22



Munoz et al. Anaesthesia 2017;72:826-34

Table 1. Causes of iron-deficiency anemia in the preoperative setting

Causes of preoperative iron-deficiency anemia

Too much iron OUT

Increased loss

- Blood loss, eg, gastrointestinal, gynecological bleeding
- Blood donation
- Increased requirements
 - Rapid growth in infants and children
 - Pregnancy
 - Use of ESAs

Too little iron IN

Decreased iron intake

- Iron-poor diet
- Vegetarian or vegan

Decreased absorption

- Celiac disease
- · Gastrectomy, gastric bypass, gut resection
- Helicobacter pylori
- Inflammatory bowel disease
- Drugs: antacids, proton pump inhibitors
- · Foods: calcium, tannins (tea, coffee), phytates

GI lesions in IDA: Colon 5-10% Upper GI 1-5%

Lin Y. ASH Education Book. Hematology 2019

Oral Iron

Guidelines recommend oral iron if at least 6-8 weeks preop



- Greater benefit if given for
 - Longer course (> 14 days vs. < 14 days)
 - Patients with anemia (vs. no anemia)

Postoperative: no benefit

Preoperative

Okuyama et al. Surg Today 2005;35:36-40; Lidder et al. Ann R Coll Surg Engl 2007;89:418-21 Quinn et al. Ann R Coll Surg Engl 2010; 92:569-72; Parker et al. J Bone Joint Surg Am 2010 Feb;92(2):265-9



Oral Iron Salts

	Dose mg	Elemental mg	Cost
Ferrous gluconate (ODB)	300	35	\$0.07
Ferrous sulfate	300	60	\$0.13
Ferrous fumarate (ODB)	300	100	\$0.18

- Give once a day on an empty stomach
- Absorption only 10% of elemental Fe
- GI side effects: epigastric pain, heartburn, nausea, vomiting, constipation or diarrhea

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Oral Iron

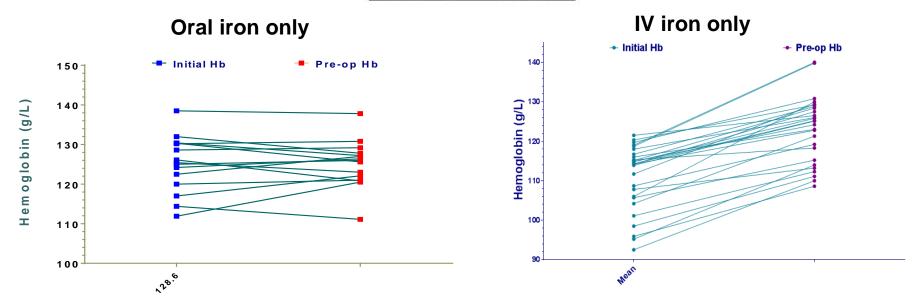


	Dose	Elemental mg	Cost
	mg		
Polysaccharide (Triferexx)	150	150	\$0.71
Polysaccharide (Feramax)	150	150	\$0.95
Polysaccharide (Odan)	150	150	\$0.72
Heme iron (Proferrin)	398	11	\$1.03
Heme iron (Optifer alpha)		11	\$0.86

- Fewer side effects
- No evidence that more effective than oral iron salts

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2017 ONTraC data: Hb change 1 g/L vs. 13 g/L (p<0.0001) Lead time < 3 weeks in ~50%

Lin et al. CSTM Conference Abstract 2019

Oral vs. IV iron

• Oral iron: response in 3-4 weeks; 5-10g/L per week

- Indications for IV iron
 - Oral iron not tolerated or effective (absorption or active bleeding)
 - Moderate/severe anemia, e.g. Hb < 100 g/L
 - Short time to surgery < 6-8 weeks</p>

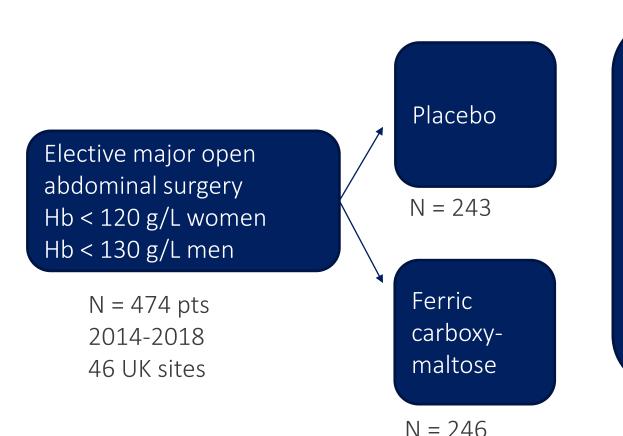
RCT: IV Iron in Abdo Surgery

- 72 pts for major abdominal surgery
 - Average Hb 107 g/L; Ferritin < 300, TSAT < 25% (mean ferritin 19-37)
- Randomized to IV iron or usual care
 - Ferric carboxymaltose 15mg/kg up to 1000mg preop + postoperative
 0.5 mg per mL blood loss
 - Usual care: nothing
 - Only 3 patients prescribed oral iron in entire cohort
 - IV iron: 1 pt preop and 4 pts post-op

RCT: IV Iron in Abdo Surgery

- Terminated early due to poor outcomes in usual care group! (target 268 pts)
 - \uparrow Hb increment 8 g/L vs. 1 g/L pre-op (p=0.01)
 - ↓ transfusion 12.5% vs. 31.3% (p<0.0003)</p>
 - $-\downarrow$ length of stay 7.0 vs 9.7 days (p=0.026)
 - ↑ Hb at 4 wks 122 g/L vs. 111 g/L (p<0.001)</p>
- *"Usual care failed the majority of participating patients, leaving them untreated with a treatable condition"*

PREVENTT Trial



Blood Transfusion/Death: 28% vs. 29% (RR 1.03; 95% CI 0.78-1.37)

Number of transfusions: 111 vs. 105 (RR 0.98; 95% CI 0.68-1.43)

Richards et al. Lancet 2020

PREVENTT Trial

- Mean baseline Hb 111 g/L with Hb above 100 g/L in 83%
- No baseline iron criteria; 5% had IBD; 29% had iron deficiency
- Intervention:
 - Median 15 days preop; Hb 个 5 g/L preop
 - Anemia corrected 21% vs. 10%
 - No specific transfusion protocol
- No difference in subgroups (Hb <> 100; ferritin <>100)
- No difference in postop complications, LOS, QOL
- Decreased risk of readmission to hospital in IV iron group*

Richards et al. Lancet 2020

PREVENTT Trial

- Secondary analysis
 - Hb increase with preop IV iron
 - Absolute iron deficiency +8.9 g/L
 - Functional iron deficiency +2.8 g/L
 - No iron deficiency minimal difference
 - No difference in outcomes: transfusion or death, postop complications or length of stay
 - Low MCV group had reduced death or transfusion and fewer units of blood following iv iron compared to placebo
- Absolute iron deficiency: should investigate and treat
- However, questions delay of surgery to optimize (depends on degree of anemia)

Richards et al. Anaesthesia 2022 Dec 8. epub

Latest systematic review...

- Evidence to date for Preoperative treatment
 - Iron supplementation increases Hb but may not result in reduced # of pts transfused (N=700 pts)
 - Iron ± ESAs increases Hb and probably results in reduced # of pts transfused (N=1500 pts)

Van Remoortel et al. TMR 2021;35:103-124.

Intravenous iron	iron sucrose	ferric gluconate	iron isomaltoside
Name	Venofer	Ferrlcit	Monoferric
Indication	IDA in CKD	IDA in HD epo	IDA no oral iron cannot be used
Max single dose	300mg	125 mg	1500 mg
Test dose	No	No	No
Infusion time @ SBK	2 hours	1 hour	30 min (500mg) 60 min (1000mg)
Costs @ SBK	\$29.01 per 100mg	\$45.52 per 100mg	\$47.48 per 100mg
Life threatening ADE	0.6 per 10 ⁶	0.9 per 10 ⁶	comparable

Munoz et al. Blood Transfus 2012;10:8-22; Chertow et al. Nephrol Dial Transpl 2006;21:378-82; Wang et al. JAMA 2015;314:2062-68

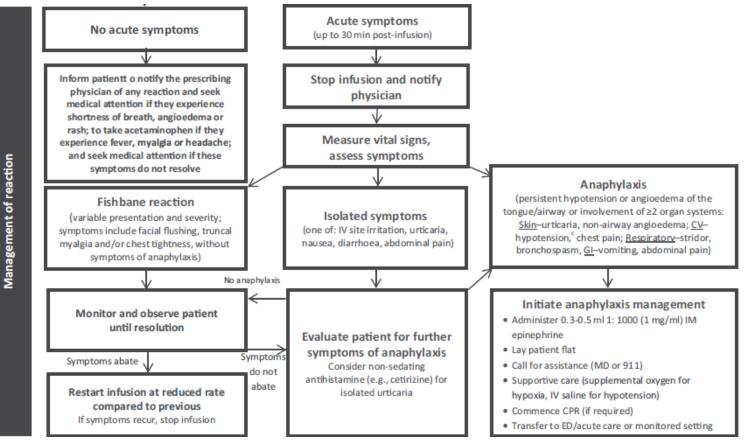
How to give it

- What dose?
 - Ganzoni formula
 - Dose = [wt (kg) x (target initial Hb g/dL) x 2.4] + 500mg
 - In practice, 1000 1500 mg

How to give it

- Side effects
 - -Serious allergic reactions are rare but include anaphylaxis
 - -Fishbane reactions: flushing, chest tightness (encourage hydration before coming to appt)
 - -Hypotension 1-2%, metallic taste, headache, muscle cramps, arthralgias
- Contraindications:
 - -Active infection, previous allergy to IV iron

Hypersensitivity reactions



• Transfer to ED/acute care or monitored setting Lim et al. Vox Sang 2019;114:363-73 Objective #3: Consider the role of Erythropoiesis-stimulating agents

Study		%	
ID	RR (95% CI)	Weight	
Aydin 2012	0.78 (0.46, 1.33)	4.20	
Christodoulakis 2005	0.83 (0.61, 1.12)	5.06	
D'Ambra 1997	0.63 (0.43, 0.91)	4.78	
Dardashti 2014	1.38 (0.88, 2.14)	4.55	
deAndrade 1996	0.46 (0.28, 0.78)	4.23	
Dousias 2003	0.11 (0.01, 1.82)	0.52	Preop EPO in
Dousias 2005	0.13 (0.01, 2.34)	0.51	
Faris 1996	0.39 (0.26, 0.60)	4.66	Surgical Pts
Feagan 2000	0.42 (0.27, 0.65)	4.54	Juigicai i ts
Gaston 2006	1.00 (0.07, 15.12)	0.57	
Haljan 2009	0.17 (0.02, 1.60)	0.79	32 trials
Heiss 1996	1.32 (0.55, 3.20)	2.90	
Kettelhack 1998	1.20 (0.67, 2.16)	3.97	4,750 pts
Kim 2013	1.05 (0.66, 1.68)	4.45	
Kosmadakis 2003	0.37 (0.22, 0.62)	4.21	
Luchette 2012	1.22 (0.88, 1.70)	4.97	
Na 2011	0.38 (0.21, 0.68)	3.99	Decreaced
Norager 2006	1.13 (0.49, 2.61)	3.03	Decreased
Podesta 2000	0.04 (0.01, 0.27)	1.02	
Qvist 1999	0.64 (0.38, 1.08)	4.23	transfusion
Scott 2022	0.79 (0.58, 1.08)	5.03	
Sowade 1997	0.21 (0.08, 0.56)	2.62	OR 0.59
Tsuji 1995	- 0.33 (0.02, 6.65)	0.48	011 0.55
Weber 2005	0.24 (0.17, 0.34)	4.95	(0.47, 0.73)
Weltert 2010	0.43 (0.28, 0.64)	4.66	(0.47, 0.75)
Weltert 2015	0.44 (0.33, 0.58)	5.11	
Wurnig 2001	0.60 (0.42, 0.86)	4.88	
Yoo 2011	0.69 (0.51, 0.92)	5.08	
Overall (I-squared = 79.0%, p = 0.000)	0.59 (0.47, 0.73)	100.00	
NOTE: Weights are from random effects analysis			
.00557 Favors EPO 1 Fa	avors Placebo 1 180		

Figure 2. The weighted (pooled) estimate for the effect of preoperative erythropoietin (EPO) administration on incidence of whole hospitalization allogeneic transfusions (risk ratio [RR], 0.59; 95% CI, 0.47–0.73; P < .001) compared to placebo administration.

Cho et al. Anesth Analg 2019; 128:981-992

Concerns about ESA

- Chronic kidney disease
 - CHOIR: Epo to \uparrow Hb to 135 g/L (vs. 113 g/L) associated with \uparrow arterial TE events
 - CREATE: Epo to ↑ Hb to 130-150 g/L (vs. 105-115 g/L) no difference
 - TREAT: Darbepoietin to 个 Hb to 130 g/L (vs. placebo) no difference in composite outcome, but 个 stroke in darbepoietin group
 - ESA used for > 16 months

Singh et al. NEJM 2006;355:2085-98 Druecke et al. NEJM 2006;255:2071-84 Pfeffer et al. NEJM 2009;361:2019-32

ID			RR (95% CI)	Weight
Aydin 2012	-	•	3.83 (1.14, 12.83)	6.17
Bailey 1993		•	1.55 (0.59, 4.04)	9.83
Christodoulakis 2005	į		1.51 (0.06, 36.61)	0.89
D'Ambra 1997			0.81 (0.48, 1.36)	33.00
deAndrade 1996	-#-	•	1.95 (0.78, 4.90)	10.67
Faris 1996			0.47 (0.15, 1.49)	6.84
Feagan 2000		_	0.74 (0.26, 2.12)	8.14
Heiss 1996	i	*	1.83 (0.08, 41.17)	0.93
Kettelhack 1998	!	*	- 3.37 (0.14, 80.76)	0.89
Kosmadakis 2003		*	→ 5.16 (0.26, 103.27)	1.00
Laupacis 1996			0.96 (0.33, 2.83)	7.72
Luchette 2012			0.96 (0.25, 3.72)	4.91
Norager 2006			1.01 (0.06, 15.91)	1.19
Qvist 1999		*	- 3.38 (0.14, 80.70)	0.90
Weber 2005			1.01 (0.09, 11.14)	1.57
Weltert 2010	i		0.34 (0.01, 8.33)	0.89
Weltert 2015	• ·	_	0.40 (0.08, 2.05)	3.39
Wurnig 2001	i		- 3.74 (0.21, 68.30)	1.07
Overall (I-squared = 0.0% , p = 0	.587)	•	1.07 (0.79, 1.44)	100.00
NOTE: Weights are from random	effects analysis			
.00968	Favors EPO 1	Favors Placebo	1 103	

Study

Preop EPO in Surgical Pts not associated with ↑ TE events Overall rate 4.1% 2° outcome

%

2° outcome Uncertainty (wide 95% CI)

Cho et al. Anesth Analg 2019; 128:981-992

Figure 3. The weighted (pooled) estimate for effect of preoperative erythropoietin (EPO) administration on incidence of thromboembolic events (risk ratio [RR], 1.02; 95% CI, 0.78–1.33; P = .68) compared to placebo administration.

ESA in Cancer

- Mortality effect RR 0.97 1.17 (2 SR \uparrow , 3 SR no difference)
 - Controversial: How? VTE related? Poor responders to ESAs = worse prognosis? Seen in trials that targeted high Hb > 120 g/L
- Concern about tumour progression
 - Not clear how as tumours have low/undetectable EpoR
 - Theories unproven: angiogenesis, ↑tissue oxygenation → tumour growth, contribution to chemo resistance
- ↑ venous TE RR 1.48-1.67 (5 SR)
- Most studies in cancer used ESA > 8 weeks

Bohlius 2006; Bennett 2008; Ludwig 2009; Tonelli 2009; Aapro 2009; Glaspy 2010 http://www.fda.gov/cder/drug/infopage/RHE/qa2007.html

The role of ESAs

Guidelines: role of preop ESAs less clear

- 1. High blood loss surgery (> 10% transfusion)
 - cardiac, orthopedic, major abdominal surgery

Goodnough et al. NATA guidelines 2011; NICE guidelines 2015; Kozek-Langenecker et al. Eur J Anaesth 2017;34:332-95

When to use Epo?

CanJSurgFor patients with anemia who have no evidence of IDA or IDA refractory to iron supplementation,
referral to a hematologist should be considered for treatment with erythropoietin and intravenousStrongHighInstruction</td

- In patients with inadequate response to IV iron or when iron sequestration or inflammation limits the bioavailability of iron, an ESA should be considered on a case-by-case basis.
- In patients with anemia and evidence of inflammation or renal failure where an ESA is indicated, it should be combined with IV iron.

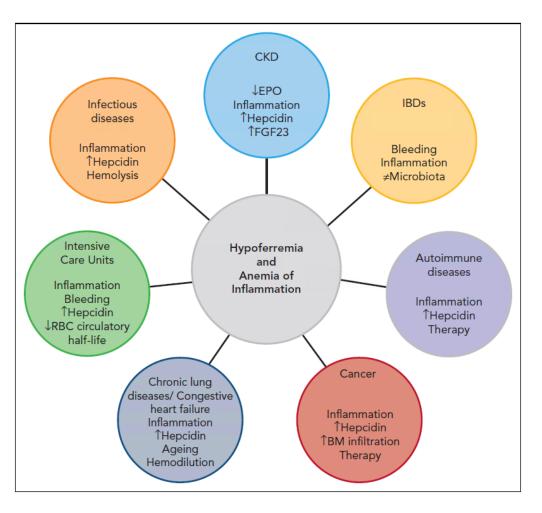
NAC

Greenberg et al. Can J Surg 2021;64:E491-509

Lett et al. NAC Statement on PBM 2022 June. <u>https://nacblood.ca/en/resource/nac-patient-blood-management-statement</u>

Figure 2. Leading pathophysiological mechanisms contributing to hypoferremia and AI in CKD, IBDs, autoimmune diseases, cancer, chronic lung diseases, CHF, infectious diseases, and ICUs.

Anemia of inflammation



Marques et al. Blood 2022 Nov 10;140(19):2011-23.

The role of ESAs

Guidelines: role of preop ESAs less clear

- 1. High blood loss surgery (> 10% transfusion)
 - cardiac, orthopedic, major abdominal surgery
- 2. Patients with anemia: Hb < 120-130 g/L
 - Religious objections to blood transfusion
 - Multiple alloantibodies \rightarrow difficult to find blood

Goodnough et al. NATA guidelines 2011; NICE guidelines 2015; Kozek-Langenecker et al. Eur J Anaesth 2017;34:332-95

Even if there is not much time...

- Ultra-short anemia treatment
 - 484 pts elective cardiac surgery, anemia, ferritin < 100
 - Day before surgery: iv iron 20mg/kg, epo 40,000 units, B12, folic acid (vs. placebo)
 - ↓ RBC units in 7d (median 0 vs. 1; OR 0.7 (95% CI 0.50-0.98))
 - Despite \downarrow RBC transfusion, higher Hb at 7 days
 - No difference in clinical outcomes, TE, safety

Spahn et al. Lancet June 2019;2201-22

Practical Aspects

• Requires adequate lead time (3-4 weeks)

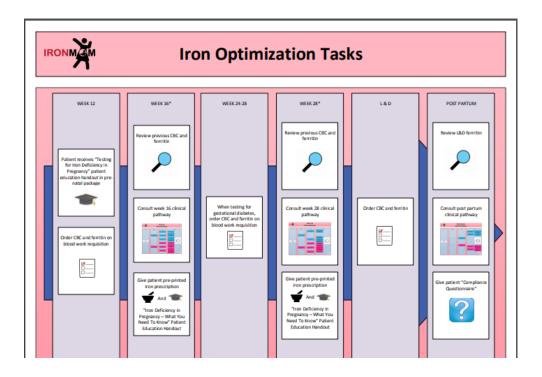
short term use

- Dose: 40,000 units s.c. q weekly x 2-4 doses 🥌
- Side effects: flu like symptoms with bone/muscle pain, hypertension (typically with longer term use)
- Iron supplementation
- Cost effectiveness uncertain
- Postop DVT prophylaxis

Obstetrics - Screen for Anemia

- ACOG
 - All pregnant women should be screened for anemia
 - Treat with iron if iron deficient
- BCH
 - Full blood count at booking (1st trimester) and at 28 wks
 - Anemic women with no other obvious cause: diagnostic trial of oral iron with CBC repeat at 2-3 wks

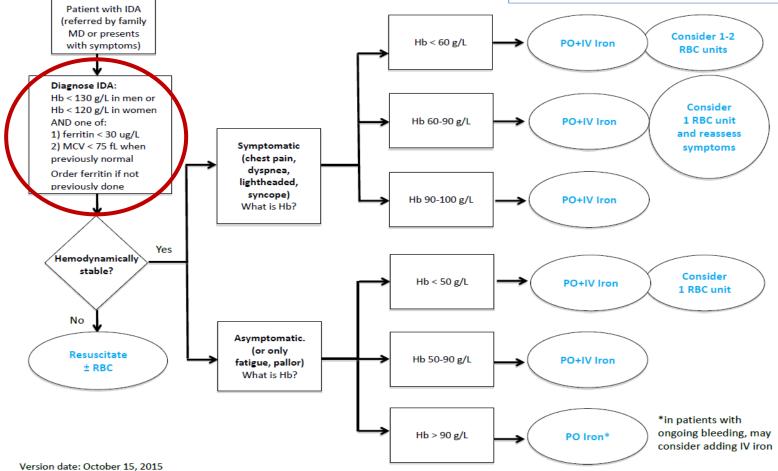
QI Project – IRON MOM Canada



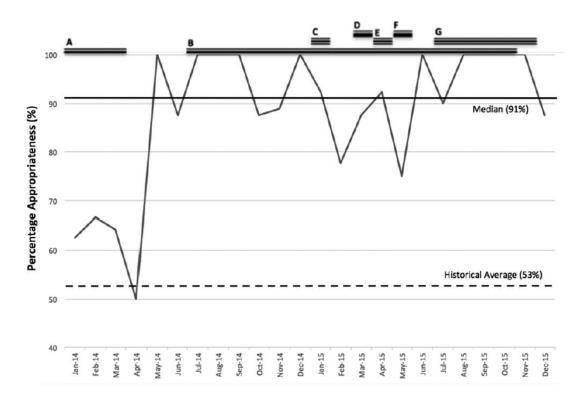
Outcomes: ↑ ferritin tests ↓ anemia at delivery (13.5% to 10.6%, p>0.001) ↓ transfusions (1.2% vs. 0.8%, p=0.049)

Guideline for Iron Deficiency Anemia Management in the ED

Note: Please refer to WebER for patient pamphlet, IV iron orders (written consent not required), oral iron prescription and discharge letter.



Emergency Dept - Appropriate transfusion for IDA



- A. IV iron avail. in ED
- B. IV iron guideline
- C. Stakeholder feedback
- D. Grand rounds
- E. Access to TM MD
- F. Podcast release
- G. ED IDA toolkit

Khadadah, Lin et al. Transfusion 2018;58:1902-8

Summary – Treat anemia

- Preoperative anemia & transfusion are associated with bad perioperative outcomes
- Look for treatable anemia (Do CBC EARLY!)
- Look for iron deficiency anemia (common)
 - Ferritin < 30 ug/L; Ferritin < 100 ug/L + TSAT<20%</p>
 - Make sure the underlying cause is identified in IDA
- Consider preop erythropoietin in high blood loss surgery especially in pts with religious objections or rare blood needs