Patient Blood Management

Preventing post-operative anemia – how family practice clinicians can help

Why should family physicians be involved in preventing post-op anemia?

- 30-70% of patients present to elective surgery with anemia
- Patients with undiagnosed or undertreated anemia have worse outcomes: increased morbidity, mortality and health care costs
- Historically, anemia was thought of as harmless and easily corrected with blood transfusions; but transfusion is inherently hazardous and is also associated with increased morbidity and mortality and is an independent risk factor for increased length of stay (1.5 to 2-fold), and infection rates (1.5 to 2-fold). Furthermore transfusion is costly (purchase cost of a unit of red cells is CAD $420; overall cost of a transfusion to the health care system is $1200 USD -- *Shander A, Best Pract Res Clin Anaesthesiol 21:271, 2007; Shander et al, Transfusion 50:753, 2010; Freedman et al, Transfusion, 48:237-250, 2008*).

Who are candidates for anemia work-up prior to elective surgery?

- All patients going for elective surgery in whom blood loss is expected to be >500 ml e.g. orthopedic, cardiac, gynecologic surgeries.

What can the Family physician do?

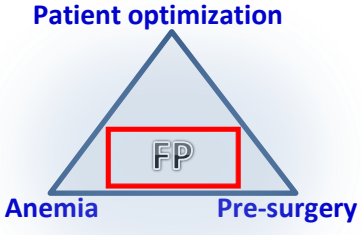
- Detect preoperative anemia early, preferably > 30 days before surgery. Waiting until the preadmission clinic which is often within 21 days prior to surgery is too late to diagnose and treat anemia
- At the time of referral to a surgeon for a high blood loss surgery (e.g. orthopedic, cardiac, major vascular surgery, major gynecology or gastrointestinal surgery), or as soon as your office is informed about a patient's surgery date, order a CBC. If the patient has a hemoglobin below 130 g/L, then order a serum ferritin, transferrin saturation (sometimes also ordered as iron saturation depending on the laboratory).

How can patients be treated?

- Although there may be many causes of anemia, the most common cause is iron deficiency anemia (IDA). This is defined as a ferritin < 30 mcg/mL or in the setting of inflammation, a ferritin of < 100 mcg/L with a transferrin saturation of < 20%.
- Treatment of iron deficiency anemia requires identifying the cause of iron deficiency (e.g. identify source of blood loss or malabsorption). Once that is identified, iron supplementation is required.
    - When time to surgery is sufficient (> 6 weeks), oral iron may be considered (Table next page). Oral iron can be started as 40–60 mg elemental iron daily or 80–100 mg every other day.
    - IV iron is indicated if oral iron is poorly tolerated, is ineffective (no increase in Hb after 4 weeks), or if insufficient time until surgery (< 4-6 weeks). IV iron is relatively safe: studies have shown no increased risk of severe adverse events such as infections, cardiovascular, neurological, respiratory, gastrointestinal, thromboembolic and constitutional severe reactions; anaphylaxis is rare and the benefits of IV iron significantly outweigh the risks. However, IV iron administration may be slow (up to 4 h, although with some 15-30 min; and 30 min afterwards), space is needed for infusion, and patients need to be monitored; resuscitation equipment and trained personnel should be available. If you do not have access to IV iron, please see the next section on "who can help?"
- In other cases of preoperative anemia, management depends on the underlying cause and may require a referral.

Who can help?

- There are Patient Blood Management (PBM) nurse coordinators present in 25 Ontario hospitals as part of the ONTraC program. If a patient has preoperative anemia with a planned surgery at one of these hospitals, the patient can be referred to the local PBM nurse coordinator who can then assist with the Hb optimization of the patient (and provide documentation to the referring physician, the surgeon and/or anesthesiologist) – the earlier the coordinator knows about the patient, the more likely a better outcome. A list of coordinators and a simple referral form are appended



Key messages for diagnosis and management of iron deficiency

Minck S, Robinson K, Saxon B, Spigiel T, Thomson A: Australian Family Physician 42(5): 291-297, 2013

Investigations

- Iron deficiency is never a final diagnosis in itself and a cause should always be sought
- Upper and lower GI tact in all postmenopausal women and men with IDA unless clear overt evidence of non-GI blood loss
- In premenopausal women, GI investigations should be done in those aged >50 years, those with symptoms suggesting GI disease and those with a strong family history of GI cancer
- Patients with IDA may need assessment for celiac disease

Iron therapy

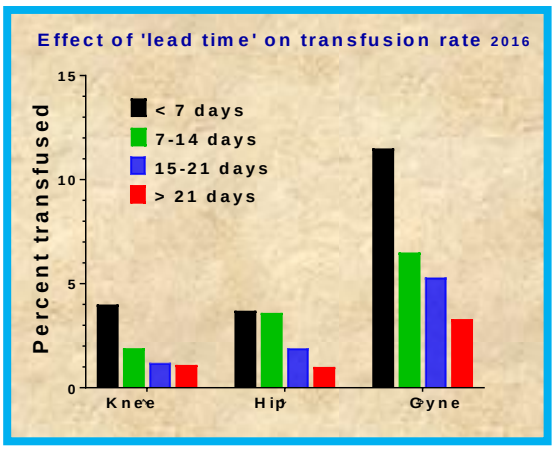
- Increasing dietary iron intake alone is inadequate to treat frank iron deficiency
- Oral iron therapy in appropriate dosing and for sufficient duration is effective first line therapy for most patients
  - After therapeutic doses of oral iron, reticulocytosis should occur within 72 hours and Hb should rise by about 20 g/L every 3 weeks
  - Oral iron should be continued for 3-6 months beyond hemoglobin normalization so that stores are replenished
- IV iron may be considered in those with:
  - Demonstrated intolerance, non-compliance or lack of efficacy with oral iron
  - A clinical need for a rapid response e.g. insufficient time before non-deferrable surgery
  - Intestinal malabsorption
  - Ongoing blood loss that exceeds absorptive capacity
- Blood transfusion should be reserved for patients with or at risk of cardiovascular instability due to their anemia

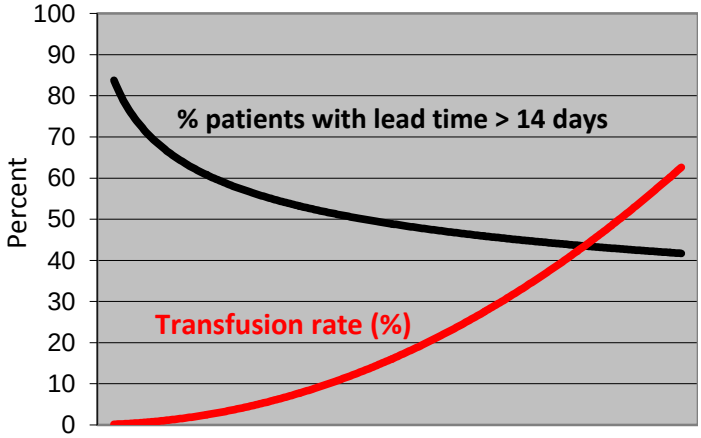
Oral irons (preparations vary in cost)	Strength per capsule/tablet	Elemental iron per capsule/tablet
Ferrous fumarate (e.g. Palafer & generics available)	300 mg	100 mg
Ferrous gluconate (generics available)	300 mg	35 mg
Ferrous sulfate (generics available)	300 mg	60 mg
Ferrous sulfate dried sustained release (Slow-Fe)	160 mg	50 mg
Polysaccharide iron complex (e.g. Feramax)	150 mg	150 mg
Heme-iron polypeptide (e.g. Proferrin, Optifer alpha)	11 mg	11 mg

To ensure best iron absorption, supplement should be taken on an empty stomach (if tolerated) or with foods high in vitamin C, which enhances iron absorption; not necessary, however, when taking polysaccharide-iron complex or heme iron polypeptide. Gastro-intestinal side effects might lead to poor compliance with oral iron therapy; it is important to discuss clearly with the patient the expectations when taking oral iron e.g. black tarry stools, constipation.

An algorithm for diagnosis and management of anemia used by the ONTraC program can be obtained from a Coordinator or by visiting the ONTraC website at www.ontracprogram.com

Seeing patients early allows pre-op planning and decreases transfusion rates (from ONTraC data)

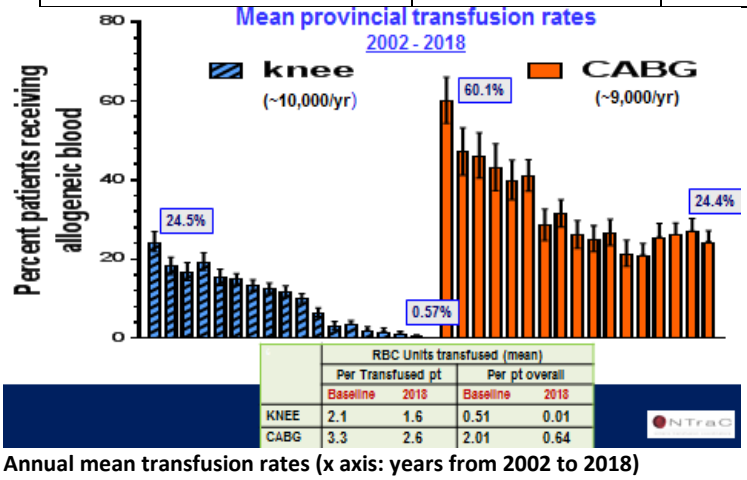




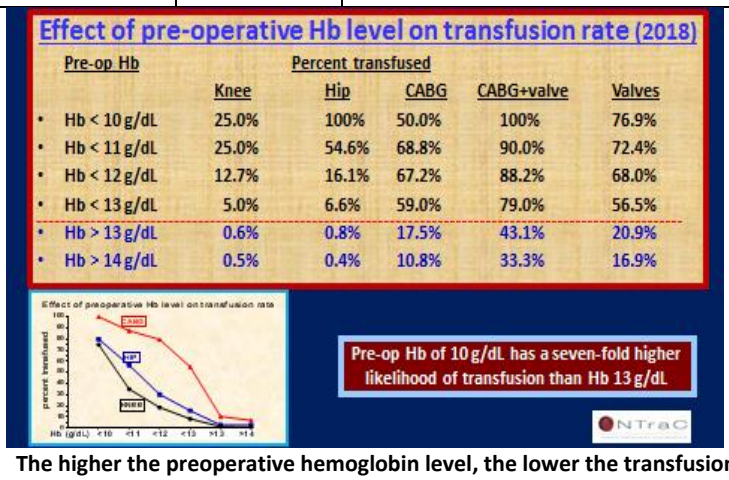
The fewer patients with longer lead times the higher the transfusion rate

ONTraC program PBM Coordinators

Hospital	Coordinator	Phone	FAX	email
Guelph General Hospital	Lucinda Lahey	519-837-6440 x2583	519 837 6779	Llahey@gghorg.ca
Hamilton Health Sciences	Linda Pickrell	905-521-2100 x75836	905 521 5058	Pickrell@hhsc.ca
Health Sciences North (Sudbury)	Carla Delisle	705-523-7100 x8695	705 671 5268	cdelisle@hsnsudbury.ca
Hospital for Sick Children	a. Nadia Naraine	b. 416-813-6264	416 813 5433	nadia.naraine@sickkids.ca
Humber River Hospital	Krystal-Lyn Harder	416-242-1000 x62023	416 242 1128	KHarder@hrh.ca
Kingston Health Sciences Centre	Karen Letourneau	613-548-1347	613 548 2409	Karen.letourneau@kingstonhsc.ca
Lakeridge Health	Kelly Syer	905-576-8711 x3764	905 721 4855	ksyer@lh.ca
London Health Sciences Centre	a. Christine Cotton b. Lynda Wrightr	a. 519-685-8500 x32707 b. 519-685-8300 x35659	519 663 3563	Christine.Cotton@lhsc.on.ca Lynda.Wrightr@lhsc.on.ca
Michael Garron (TEGH)	Esther Cabrera	416-469-6580 x2768	416 469 6676	Esther.Cabrera@tehn.ca
Mt Sinai	Donna Cole	416-586-4800 x2627	416 586 8830	donna.cole@sinaihealthsystem.ca
Niagara Health System	Tammy Hamilton	905-378-4647 x46570	905 682 9929	tammy.hamilton@niagarahealth.on.ca
North Bay Regional Health System	Nancy Chapin	705-474-8600 x4930	705 495 8130	Nancy.chapin@nbrhc.on.ca
Ottawa Hospital	Donna Touchie	613-737-8899 x71735	613 739 7686	dtouchie@toh.on.ca
Peterborough Regional Health Centre	Kim Devlin	705-743-2121 x3019	705 876 5135	kdevlin@prhc.on.ca
Sault Area Hospital	Ann Cook	705-759-3434 x4135	705 256 3482	CookA@sah.on.ca
Scarborough Health Network	Laura McKenzie-Kerr	416-438-2911 x6626	416 431 8245	lmckenzie@shn.ca
Southlake Regional Health Centre	Sheila McCarthy	905-895-4521 x2909	905 830 5965	smccarthy@southlakeregional.org
St Joseph's (Toronto)	Maria Monteiro	416-530-6486 x4286	416 530 6006	Maria.Monteiro@unityhealth.ca
St Mary's General Hospital	Alisa Paneghel	519-749-6578 x1941	519 749 6636	apaneghel@smgh.ca
St Michael's	a. Anna Nassis b. Yvonne Davis-Read	a. 416-864-6060 x6733 b. 416-864-6060 x3036	416 864 6063	Anna.Nassis@unityhealth.to Yvonne.Davis@unityheaalth.to
Sunnybrook Health Sciences Centre	Saudia Jadunandan Ruby Tano	416-480-6100 x2061	416 480 4128	Saudia.jadunandan@sunnybrook.ca ruby.tano@sunnybrook.ca
Trillium: Credit Valley	Gerry O'Brien	905-813-1100 x5540	905 813 3848	Gerry.OBrien@thp.ca
Trillium: Mississauga	Cecilia Addison	905-848-7580 x2074	905 804 7906	Cecilia.Addison@thp.ca
University Health Network (UHN)	a. Lucia Evans (TWH) b. Cielo Bingley (TGH)	a. 416-603-5800 x5164 b. 416-340-4800 x6102	416 603 5622 416 340 3757	Lucia.evans@uhn.ca cielo.bingley@uhn.ca
Windsor Regional Hospital	Veronika Pulley	519-254-5577 x52389	519 255 6470	veronika.pulley@wrh.on.ca
ONTraC Program Manager	Alanna Howell	416-864-6060 x4055	416 864 6063	Alanna.Howella@unityhealth.ca



Annual mean transfusion rates (x axis: years from 2002 to 2018)



The higher the preoperative hemoglobin level, the lower the transfusion rate (marked decrease when hemoglobin ≥ 130 g/L)

REFERRAL TO ONTRAC COORDINATOR FOR ANEMIA MANAGEMENT-

PATIENT

Name of patient: _____.

Patient's hospital ID (if known) _____.

Patient age: _____ **Patient sex (please circle):** M F .

Patient contact information: Phone: _____ **Fax:** _____ **Email** _____.

Address if none of above applicable _____.

REFERRING PHYSICIAN **(Can use "stamp" if available)**

Name of referring physician _____.

Contact details of referring physician:

Phone: _____.

FAX: _____ .

Email: _____.

Name of referring physician's secretary/assistant/nurse (if appropriate): _____.

PROCEDURE

Anticipated procedure _____.

Name of surgeon or anesthesiologist (if known) _____.

Name of anticipated hospital for surgery (if known) _____.

Date of anticipated surgery (if known) _____.

LAB RESULTS:

Date of Hemoglobin determination _____ .

Hemoglobin level _____g/L

Ferritin level (if known) _____.

TSAT (if known) _____.

ONTraC COORDINATOR

Referral to ONTRaC Coordinator: **Coordinator's name:** _____ .

Method of referral (please circle): **FAX:** **email:** **Phone:** **Letter.**

Date of referral: _____.

Special instructions from referring physician to coordinator: _____.

_____.

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For coordinator use:

Date patient contacted

Date patient seen:

Date report to referring physician:

Date report to surgeon/anesthesiologist: