Anaemia in Children

Low iron in young children delays development and learning.

Prevention

Prevention of anaemia is critical (see HEALTHY CHILD protocol).

Common causes of iron deficiency and associated anaemia in the Kimberley include:

- Low iron stores at birth due to low birth weight, prematurity and maternal anaemia.
- Poor quality / late introduction of weaning foods +/- diet not sufficient in iron.
- High burden of infection.
- Cows milk in first year (fresh, powdered, sunshine, flavoured milk).

Preventing and promptly treating iron deficiency in pregnancy is important in reducing the risk of anaemia in the child (see ANTENATAL protocol).

Screening

All infants born at term should be routinely screened every 6 months commencing at 6 months of age until 5 years.

Method of Screening: A full blood count (FBC) is the most reliable method of testing. However, for screening purposes a HemoCue® is easy to use, and is sensitive enough for screening if the machine is well maintained, undergoes regular quality control and correct collection technique is used. See attachments for further detail:

Hemocue® Australia's Simple steps for Capillary Blood Sampling

Quality Control – Haemoglobin Hb201

How to use HemoCue®

- For <12 months age use heel, for >12 months of age use finger
- Make sure area is warm and clean
- Alcohol wipes are not required
- Use a 2.2mm lancet for finger and <2mm for heel
- Prick at the side of the finger/heel (best blood flow)
- Wipe away the first three drops of blood
- Do not milk the blood from the finger
- Make sure the cuvette is full
- Avoid topping up the cuvette after the first filling

Case Definition

AGE	Anaemia if Haemoglobin (Hb) below:
At birth	<130g/L
< 6 months	<95g/L
6 – 12 months	<105g/L
1– 4 years	<110g/L
5-7 years	<115g/L
8-11 years	<119g/L
> 12 years	• Males <125g/L • Females <118g/L

If Hb on HemoCue® below 80 g/L obtain a venous FBC. Do not delay treatment if a sample can not be obtained.

Principles of Management

1. Education is key (see HEALTHY CHILD protocol).
2. Anaemia in children in the Kimberley is nearly always due to iron deficiency, and extensive investigation is rarely warranted.
3. Anaemia is common in children with growth faltering – check child's weight and height (see GROWTH FALTERING protocol).
4. Twice weekly supervised oral iron is the preferred method of iron replacement. It is more effective than recommending daily unsupervised iron and is as effective compared to intramuscular (IM) iron administration.
5. Parasites (worms) have been common in the Kimberley, and routine treatment is recommended in children with anaemia.

Therapeutic Protocols

Do not give iron treatment if child has a fever (Temp >38°C) or is very unwell (see UNWELL CHILD protocol).

Discuss or refer all anaemic children with the GP.

GP to discuss with paediatrician before treatment if:

- Infant <6 months age.
- Hb <80g/L.
- Infant has other illnesses such as growth faltering or acute infection.
- Clinical 'red flags' are present such as bruising or bleeding suggestive of serious underlying disease.

Provide appropriate advice for carers regarding nutrition and refer to a dietitian if clinically concerned (see HEALTHY CHILD protocol for prevention and nutrition advice).

If bottle feeding, ensure carers are using formula appropriate for age.

Anaemia in Children

Treat once for presumed parasites - give Albendazole 200mg daily for 3 days if <10kg and 400mg daily for 3 days if >10kg.

Provide oral iron replacement as follows:

Preparation	**Ferro-Liquid® oral iron** (*NOTE: if using a different brand, check first with GP in case a different dose in mL is needed*)
How is the dose calculated?	There are 6mg of elemental iron in every mL of Ferro-Liquid®. The dose required is 3-6mg/kg – this dose is the same whether it is given once a day or twice a week.
How often is oral iron given?	1. Once a day if given at home by the parent/carer at home. 2. Twice a week if given by clinic staff ("supervised") – offer this option if home dosing by a parent or carer is not possible/ acceptable/reliable.

Weight	**Dose of Ferro-Liquid®** (daily at home or twice weekly supervised)
4 - 5kg	3mL
5.1 - 10kg	5mL
10.1 - 15kg	10mL
15.1 - 20kg	15mL
> 20kg	**1 Ferro-F® tablet** (crushed if necessary)

Prematurity:

All preterm infants (born before 37 weeks gestation) should be screened routinely at 4 months, 6 months and then 6 monthly until 5 years of age.

All premature infants born prior to 35 weeks and who are breastfed (>50% of milk intake) should be commenced on oral iron at 1 month of age and continue until 4 months of age. Use Ferro-Liquid® at a dose of 0.2mL/kg twice daily up to maximum 0.5mL daily. Formula fed babies do not require routine iron supplementation, unless screening reveals they are anaemic.

Ways to maximise oral iron absorption:

Give oral iron with fruit or foods high in vitamin C and avoid milk, tea or dairy food with dose as this prevents absorption.

Remind carers to keep oral iron in a safe place as it is very dangerous in overdose. Document this advice has been given.

If child refuses or does not tolerate oral iron, or if carer has a firm preference not to give oral iron, confirm Hb with a venous sample and give IM iron.

How to give Ferrum H® injections:

Injection in small children is intramuscular into the anterolateral thigh or ventrogluteal. In larger children it is gluteal/ventrogluteal.

1. First, pull the skin down from the chosen site and hold in this spot until you have finished giving the injection.
2. Put the needle into the muscle.
3. Give the injection slowly.
4. When finished, leave the needle in place for about 10 seconds (this stops any leak onto the skin).
5. Take out the needle and let go of the skin. This forms a z-track.

Total amount of Ferrum H® and each dose size, depends on child's weight and Hb level. See table as follows:

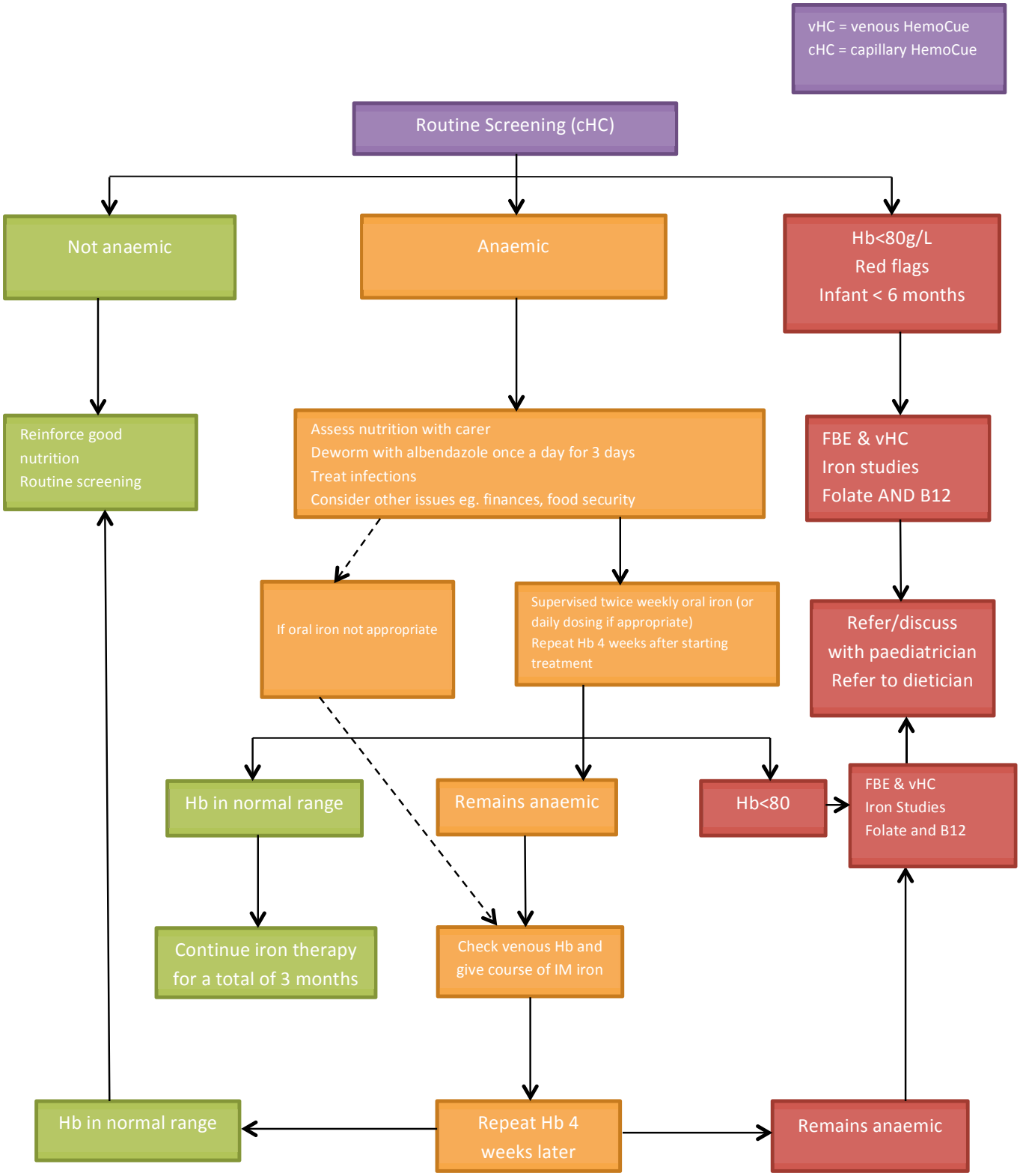
Intramuscular Ferrum H® Treatment		
	Hb 70-90 g/L	**Hb 90-110 g/L**
Weight	**Individual dose and frequency**	**Individual dose and frequency**
5 - 7kg	1mL on 3 alternate days (total 3mL)	1mL on 2 alternate days (total 2mL)
8 - 10kg	1mL on 4 alternate days (total dose 4mL)	1mL on 3 alternate days (total dose 3mL)
11 - 13kg	2mL on 3 alternate days (total dose 6mL)	2mL on 2 alternate days (total dose 4mL)
14 - 16kg	2mL on 3 alternate days, then give 1mL on last alternate day (total dose 7mL)	2mL on 3 alternate days (total dose 6 mL)
17 - 19kg	2mL on 4 alternate days, then give 1mL on last alternate day (total dose 9mL)	2mL on 3 alternate days, then 1mL on last alternate day (total dose 7mL)

Frequency of Ferrum H® treatment can be less often e.g. twice a week until total Ferrum H® dose is reached. Anaphylaxis is a very rare complication of IM iron administration. Administer in a clinic.

Follow up

See Anaemia in Children Flow Chart.

Anaemia in Children Flow Chart



HemoCue® Australia's Simple Steps for Capillary Hb Sampling

Please note: The method described here is excellent for anaemia screening and will minimise the false lows common in capillary Hb testing, but it's important to note that even the best capillary sampling method will not eliminate these false lows completely. Because of this, low capillary Hb results should be confirmed with venous EDTA blood on the HemoCue before drastic intevention. Only venous (EDTA) on the HemoCue can assure lab accurate results.

Sit opposite to the patient.
- your shoulders should be squarely opposite the patients.
- the patient's hands should preferably be warm.
- cold hands increase the incidence of false low Hb results.
- either of the patient's hand's can be used.

Use the patient's middle or ring finger for sampling,
- remove the rings on the patient's sample finger, if present.
- make a fist with your non-dominant hand.
- hold the last joint of the patient's finger with your thumb.

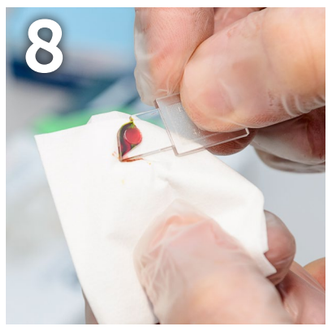
Clean the finger to be sampled.
- patients can either wash their hands or you can use an alcohol swab.
- make sure the finger is dry before lancing.
- remember that to prick while wet with alcohol is painful.

Use a good quality lancet.
- preferably pressure triggered.
- sharper lancets are less traumatic and bleed better than the more blunt lancets.
- 2.2 mm deep.
- less than 2.2mm and less sharp lancets will just increase the need for venous confirmations of false low results.

Hold the lancet in your dominant hand.
- prick while squeezing the last joint of the patient's finger to create taut skin facilitating a more effective puncture.
- don't prick on the tip, top or side but between these three points.
- prick on the thumb side to easily control droplets that may run.

Squeeze the patient's last finger joint to create a large blood droplet
- **it is important to let the finger go** before firmly wiping away each droplet to get rid of the micro-clot and allow refilling of the area.
- repeat 3 times and sample the 4th.
- squeeze the same spot each time to prevent interstitial fluid from other areas diluting the sample.

Push the tip of the cuvette into the droplet, like a bird's beak.
- don't skim the top of the drop, touch the skin below.
- allow enough time for capilarity to fill the cuvette expelling all the air on the open side.
- completely fill the cuvette.
- double dipping promotes bubbles.



Once the cuvette is filled, wipe the bottom and sides clean before placing it in the analyser.
- do not clean the open side of cuvette as the sample may be drawn back out.

Place the cuvette in the analyser and close the cuvette tray to run the test.
- the Hb analyser shows three flashing dashes to signify its ready to read a cuvette.
- remember to discard the cuvettes and lancets correctly after use.
- error codes usually mean the analysers need internal cleaning with a cleaner stick.
- Phone +61 (0) 243846855 for help

Maintenance

The analyser must be cleaned internally with a HemoCue cleaning stick after an average of 50 tests.
Remove the cuvette tray as shown in picture

Maintenance

Insert the HemoCue cleaning stick into the opening, move from side to side 5-10 times. Remove the cleaning stick and allow to dry before reassembly.

Quality Control

We recommend liquid quality control be performed regularly, this ensures your system is performing at its best.
Contact HemoCue Australia for details

HemoCue® has been a leader in Point of Care medical diagnostics for over 30 years. We specialise in giving healthcare providers tests that deliver fast results with the precision expected of a central clinical lab.
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Quality Control (QC) – Haemoglobin Hb201.

Overview:
The user needs to regularly analyse a liquid QC sample so that the user can have confidence in the results obtained. The QC result must be within the supplied scatter range of the assigned Control Material for the instrument.
Obtaining a correct QC result tells us that:

- the operator knows how to perform the procedure successfully.
- the sample has been delivered into the POCT system correctly.
- the electronic component of the instrument is working satisfactorily.
- the consumable component, cuvette including reagent, is functioning correctly.

HemoCue also recommends that a Quality Assurance Protocol (QAP) be established.

Recommended QC frequency:
HemoCue supports the AACB's "Point of Care Implementation Guide" (http://www.aacb.asn.au./documents/item/155 see page 18) statement of frequency for Liquid QC testing which is –

- A QC sample must be tested with every new delivery of reagents.
- One QC sample per month must be tested as a minimum requirement. In this case, it is recommended that the sample tested has a value in the pathological range.
- Electronic QC can also check part of the PoCT testing process.

Further to the AACB recommendations, HemoCue Australia suggests –

- Implementing QCs weekly together with your other routines. The two bottles of QC supplied in each pack only last a month once opened - so it's very little extra cost that weekly QCs would encounter. This way one can see a trend while also keeping the skills practiced.
- HemoCue Australia suggests the low normal and high Hb controls be prioritised per test type (ie: one needs to always (and at least) do the "normal" control for Hb tests as this is the area that is crucial for diagnosis of anaemia. Thereafter it can be decided to do the "low" and "high" controls. We have found that alternating the low, normal and high controls causes confusion and leaves large time spans when the crucial controls are not checked.
- We would also like to state that it is vital that a liquid QC test be performed if patient results are queried or doubted.

Packaging:
The QC supplied by HemoCue Australia for the Hb201 system are available in three levels (Packaging: 2 x 1ml, must be refrigerated):

1. Low (Item # 022.001.002)
2. Normal (Item # 022.002.002)
3. High (Item # 022.003.002)

Shelf Life:
HemoCue Australia endeavours to supply QC that have an expiry date of approximately six months from purchase. Once the vial has been opened, it is advisable to be used within 30 days. Unopened AND opened QC must be stored at 2 – 8 degrees Celsius for maximum shelf life.

Process for usage: See package insert and graph supplied with control
Precautions:

1. For in-vitro diagnostic use only.
2. It is good laboratory (Point of Care Testing) practice to follow the same precautions as with patient samples with the handling and/or disposing of control vials and sample cuvettes.
3. Please consult the package insert for more detail.