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# Iron Deficiency Assessment for Children Procedure

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## 1. Purpose

This document guides Community Health staff in the early detection, management and referral of children with iron deficiency anaemia (IDA).

The rapid growth of the brain in the early stages of life requires adequate nutrition, including iron. Delayed identification and intervention for iron deficiency can lead to faltering growth, stunting and neurodevelopmental delay. Infants and young children with iron deficiency have been shown to have poorer cognitive, motor and social/emotional functioning than healthy infants.<sup>1</sup>

Anaemia is the term used to describe low haemoglobin levels and impeded ability for red blood cells to transport oxygen around the body, and impairment of other bodily functions.<sup>1</sup> Anaemia is generally an indicator of poor nutrition and poor general health, however, it is important to explore any underlying medical conditions that may be causing iron deficiency, for example; coeliac disease or blood loss.<sup>2</sup> In children, undetected anaemia is associated with stunted growth, delay of cognitive function, decreased memory and impaired learning and concentration.<sup>3,4</sup> In addition, individuals may experience compromised immunity and increased risk of infectious diseases.<sup>5</sup>

It is estimated that in Australia, 8% of preschool children, 12% of pregnant women and 15% of non-pregnant women of reproductive age have anaemia, with inadequate dietary iron intake the most common cause.<sup>2,3</sup> Anaemia is highly prevalent in Aboriginal communities, with one WA study finding that 55% of women experience the condition.<sup>2</sup> Infants gain their iron stores from their mothers during the third trimester of pregnancy, and this iron is utilised by infants during the first six months of life. After the first six months, children require iron-rich solid foods. Children born to mothers with IDA are likely to start life with low iron stores and are at risk of iron deficiency in the first six months and beyond, if there is no intervention.<sup>6</sup>

Iron deficiency is largely preventable with adequate dietary iron intake.<sup>5</sup> Serial growth monitoring in conjunction with developmental assessment is important to identify any concerns.<sup>7</sup> Community health nurses are well positioned to monitor growth and development, provide practical nutrition education, observe risk factors, signs and symptoms and to facilitate early intervention for IDA.

## 2. Procedure

<b>Step 1. Promotion and prevention</b>	
<p>1.1. At every contact, promote key health education messages:</p> <ul style="list-style-type: none"> <li>• Breastfeeding exclusively for the first six months and continue until 12 months of age and beyond, for as long as mum and baby desire.</li> <li>• Encourage mothers to consume a healthy diet including iron-rich foods (refer to <a href="#">Appendix 2</a>).</li> <li>• For infants not breastfeeding, use infant formula to 12 months.</li> <li>• Avoid introducing cow's milk as a main milk drink until 12 months of age.</li> <li>• Introduction of solid foods at around 6 months of age.</li> <li>• Introduce iron-rich foods first: iron-enriched infant cereals, pureed meat, fish or chicken, pureed cooked tofu and pureed legumes.</li> <li>• Include iron-rich food regularly each day, gradually increasing texture from puree, mashed to minced and chopped. Include finger foods and cut up family foods, as appropriate.</li> <li>• Encourage water as the main drink.</li> <li>• Consume Vitamin C rich foods such as citrus fruits, berries, tomatoes and capsicum with non-haem iron sources (plant foods and eggs) to optimise iron absorption.</li> <li>• Choose whole fruit and vegetables high in Vitamin C (pureed/ mashed/ lumps and chunks if required) instead of juice.</li> <li>• Avoid tea for infants and young children. Tea contains tannins and other compounds that inhibit iron absorption.</li> <li>• For children over 12 months of age, limit milk to no more than 500ml per day. High intake of milk can displace high-iron foods in the diet.</li> <li>• Encourage child and family consumption of iron-rich food, as in <a href="#">Appendix 2</a>.</li> </ul>	
<p>1.2. Provide positive feedback about what is going well for the family and the health promoting activities or practices they have already adopted.</p>	
<b>Step 2. Identify child at risk of anaemia</b>	<b>Additional information</b>
<p>2.1. Consider if there are any child and maternal risk factors.</p>	<p>See <a href="#">Appendix 3</a> for child and maternal risk factors.</p> <p>If mother was identified as iron deficient during pregnancy, consider additional checks and recalls for infant.</p>

<p>2.2. Observe child’s appearance and discuss behaviours with parent/carer. Infants and children who are iron deficient <b>may</b> exhibit signs and symptoms, such as:</p> <ul style="list-style-type: none"> <li>• Listless, lethargic, irritable or tired</li> <li>• Behaviour problems</li> <li>• Recurrent infections/illness</li> <li>• Loss of appetite</li> <li>• Strange food cravings or eating behaviour (pica)</li> <li>• Breathless</li> <li>• Increased sweating</li> </ul>	<p>Consider seeking guidance and support from an Aboriginal Health Worker when identifying and responding to child at risk of anaemia.</p>
<p>2.3. Review growth and development.</p>	<p>Refer to CAHS policy documents <a href="#">Growth birth - 18 years</a> and <a href="#">Growth - static or downward trajectory</a></p>
<p>2.4. Conduct or refer for assessment if there are any risk factors, signs or symptoms evident, and/or growth is below expected norms.</p>	<p>If there are concerns about an infant aged under 4 months who was born before 37 weeks gestation, or an infant born at term under 6 months of age, refer for medical assessment.</p>
<p><b>Step 3. Assessment</b></p>	<p><b>Additional information</b></p>
<p>3.1. Conduct a haemoglobin screening test. OR Refer for medical assessment if outside scope of practice</p>	<p>Conduct assessment <b>only</b> if within scope of practice and if timely medical assessment is not locally available.</p> <p>Refer to CAHS Community Health <a href="#">Capillary Blood Sampling (Heel and Finger Prick) procedure</a>.</p> <p>If using RAD 67™ refer to manufacturer’s instructions.</p> <p>Refer to <a href="#">Appendix 4</a> for haemoglobin analysis and lower limits.</p>
<p>3.2. Refer for medical assessment if haemoglobin is outside of normal limits.</p>	
<p><b>Step 4. Management</b></p>	<p><b>Additional information</b></p>
<p>4.1. Plan follow-up contact (at least within 3 months) to monitor progress. Set Recalls.</p>	<p>Continue to monitor growth as per the Enhanced Child Health Schedule.</p>

<p>4.2. Provide nutrition education to enhance iron intake as appropriate for parent/carer. Use visual tools such as graphics, photos or food demonstrations whenever possible.</p>	<p>Consider referral to dietitian for nutrition education to enhance iron intake. This includes for people on restricted diets or whose IDA is associated with a chronic condition.</p>
<p>4.3. Refer for medical assessment and care as required (e.g. Haemoglobin levels indicate anaemia, growth faltering evident).</p>	<p>Make a clinical judgement about the need for support to action referrals and interventions. Some families will need early and more frequent follow-up to ensure child's needs are met</p>

See [Appendix 1](#): Iron Deficiency Assessment for Children – Care Pathway.

**Useful Resources:**

- Australian Government Department of Health [Aboriginal and Torres Strait Islander Guide to Healthy Eating](#)
- National Health & Medical Research Council, [Australian Dietary Guidelines](#)
- National Health & Medical Research Council: [Infant Feeding Guidelines: Information for health workers](#)
- Queensland Department of Health [Healthy Food and drinks for children aged 1 – 4 years](#)
- Queensland Department of Health [Healthy food and drinks for your grandkids](#)
- Queensland Department of Health [Iron rich foods for babies and growing children](#)
- Queensland Department of Health [Starting solids](#)
- Queensland Department of Health [Keeping food safe](#)
- Kimberley Aboriginal Medical Service [How much sugar is in your drink?](#)
- [Raising Children Network](#) Nutrition related information and videos
- Women’s Health and Family Services [High Iron Foods pamphlet \(Photographic\)](#)

**3. Roles and Responsibilities**

**Community health staff conducting health assessments for children aged 0-5 years;** Enhanced Child Health Schedule (ECHS), Children in Care checks, community health assessments or other opportunistic health checks on children are required to;

- Identify children with iron deficiency concerns.
- Conduct or refer for haemoglobin screening assessment, promptly.
- Refer and/or manage iron deficiency as described in this document.
- Develop and apply cultural capabilities to deliver a culturally safe and responsive service, ensuring the rights, views, values and expectations of Aboriginal people are recognised and respected.

**All staff** are required to work within policies and guidelines to make sure that WACHS is a safe, equitable and positive place to be.

## 4. Monitoring and Evaluation

### 4.1 Monitoring

Monitoring of compliance with this document is to be carried out by the regional community health and public health managers, using CHIS reports and audits of haemoglobin screening assessment, referrals and outcomes.

### 4.2 Evaluation

Evaluation of this document is to be carried out by the senior regional community health managers and relevant program managers.

## 5. Compliance

Failure to comply with this procedure may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the [Integrity Policy Framework](#) issued pursuant to Section 26 of the [Health Services Act 2016](#) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies and procedures is mandatory.

## 6. References

1. World Health Organization. *Nutritional Anaemia: Tools for effective prevention and control*. Geneva, WHO, 2017.
2. Pasricha SR, et.al. Diagnosis and management of iron deficiency anaemia: a clinical update. *Medical Journal of Australia*. 2010;193(9):525-32.
3. Aquino D, Leonard D, Hadgraft N, Marley JV. High prevalence of early onset anaemia amongst Aboriginal and Torres Strait Islander infants in remote northern Australia. *Australian Journal of Rural Health*. 2018;26(4):245-50.
4. Royal Children's Hospital (RCH) *Clinical Practice Guidelines for Iron Deficiency*. January 2019
5. National Aboriginal Community Controlled Health Organisation and the Royal Australian College of General Practitioners. *National guide to a preventive health assessment for Aboriginal and Torres Strait Islander people*. 3rd edn. East Melbourne, Vic: RACGP, 2018.
6. Central Australian Rural Practitioners Association. *CARPA Standard Treatment Manual*. 7<sup>th</sup> Edition. Alice Springs: Centre for Remote Health; 2019.
7. Royal Children's Hospital (RCH). *Child growth and growth charts in the early years - background paper*. 2013.
8. Kimberley Aboriginal Health Planning Forum. *Clinical Protocols and Guidelines Anaemia in Children*. Broome, WA: KAMSC, 2015.
9. Haider BA, Olofin I, Wang M, Spiegelman D, Ezzati M, Fawzi WW. Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes. *British Medical Journal*. 2013; 346.

10. Davies J, Majumdar S, Forbes RT, Smith P, Currie BJ, Baird RW. Hookworm in the Northern Territory: Down but not out. *Medical Journal of Australia*. 2013 198(5):278-281.
11. Smith JL, Brooker S. Impact of hookworm infection and deworming on anaemia in non-pregnant populations: a systematic review. *Tropical Medicine and International Health*. 2010;15(7):776-95.
12. Pasricha S-R. Should we screen for iron deficiency anaemia? A review of the evidence and recent recommendations. *Pathology*. 2012;44(2):139-47.
13. National Health and Medical Research Council. *Infant feeding guidelines*. Canberra National Health and Medical Research Council; 2012.

## 7. Definitions

<b>Aboriginal</b>	Within Western Australia, the term Aboriginal is used in preference to Aboriginal and Torres Strait Islander, in recognition that Aboriginal people are the original inhabitants of Western Australia. No disrespect is intended to our Torres Strait Islander colleagues and community.
<b>Anaemia</b>	Deficient concentration of haemoglobin in the blood. The range is specific for age, gender and gestation.
<b>Haemoglobin</b>	Protein found in red blood cells which contains iron and is responsible for transporting oxygen.
<b>Iron deficiency anaemia (IDA)</b>	A common form of anaemia caused when iron losses or requirements exceed absorption of iron. Lack of iron results in insufficient haemoglobin production.

## 8. Document Summary

<b>Coverage</b>	WACHS wide
<b>Audience</b>	Community health staff
<b>Records Management</b>	Clinical: <a href="#">Health Record Management Policy</a>
<b>Related Legislation</b>	<a href="#">Health Services Act 2016</a>
<b>Related Mandatory Policies / Frameworks</b>	<a href="#">Clinical Services Planning and Programs</a>
<b>Related WACHS Policy Documents</b>	<a href="#">Enhanced Child Health Schedule Guideline</a> <a href="#">Enhanced Child Health Schedule Practice Guide</a> <a href="#">WebPAS Child at Risk Alert Procedure</a>
<b>Other Related Documents</b>	<a href="#">Guidelines for Protecting Children 2020</a> <a href="#">CAHS Capillary Blood Sampling (Heel and Finger Prick) procedure</a> <a href="#">CAHS Child Health Services policy</a> <a href="#">CAHS Growth Birth - 18 Years</a> <a href="#">CAHS Growth – Static or Downward Trajectory</a> <a href="#">CAHS Nutrition for Children - Birth to 18 years</a> <a href="#">Kimberley Aboriginal Health Planning Forum. Clinical Protocols and Guidelines</a>
<b>Related Forms</b>	Nil
<b>Related Training Packages</b>	Nil
<b>Aboriginal Health Impact Statement Declaration (ISD)</b>	ISD Record ID: 2161
<b>National Safety and Quality Health Service (NSQHS) Standards</b>	2.10 & 5.10

## 9. Document Control

Version	Published date	Current from	Summary of changes
2.00	13/06/2023	13/06/2023	Change of title from 'Child Health' to 'Children' to reflect use with older children if needed (previously 0-5 years). Changes to key health education messages and procedure as per feedback from WACHS senior dietitians. Improved emphasis on developing cultural competencies.

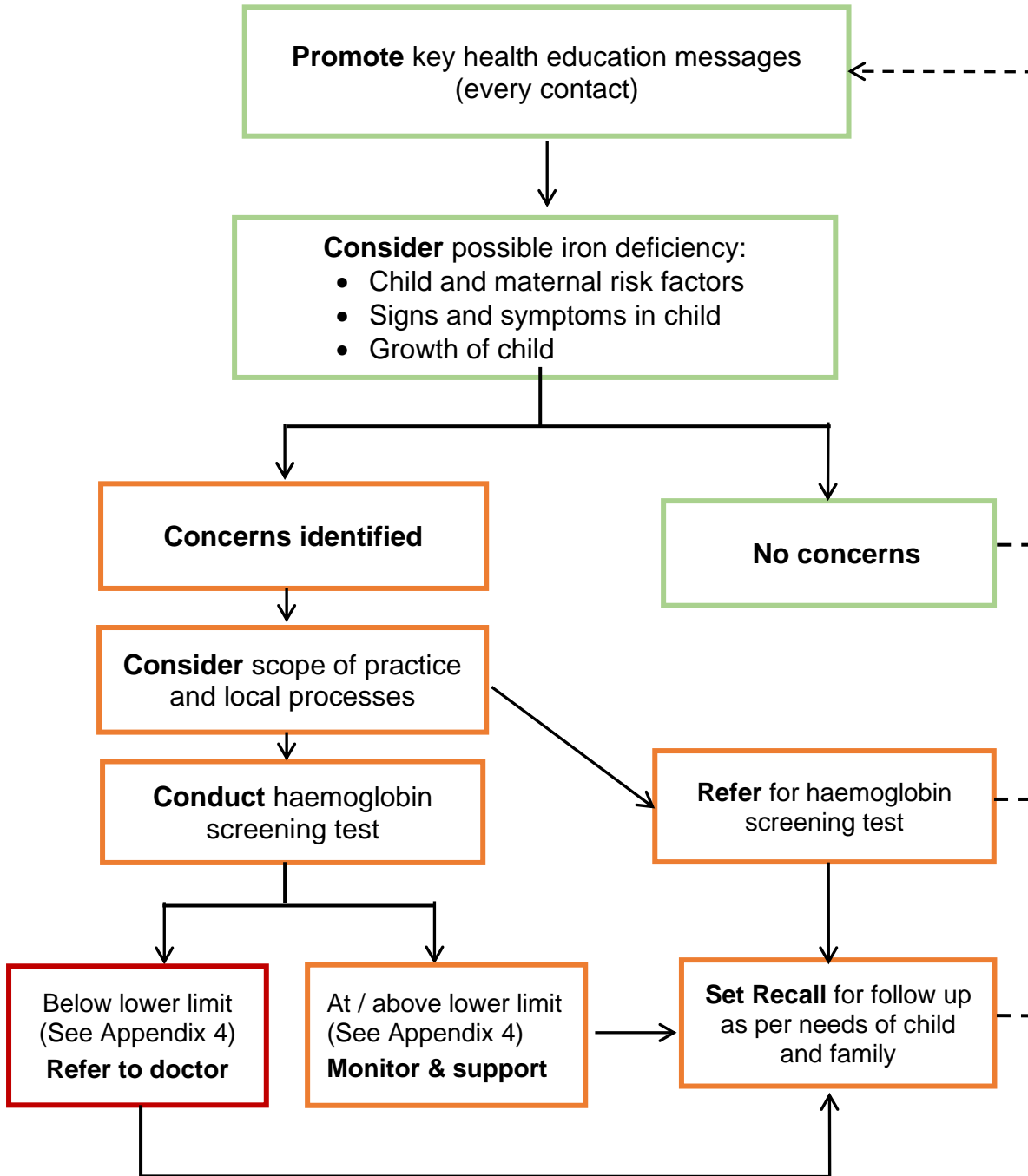
## 10. Approval

<b>Policy Owner</b>	Executive Director Clinical Excellence
<b>Co-approver</b>	Executive Director Nursing & Midwifery
<b>Contact</b>	Senior Policy and Portfolio Officer
<b>Business Unit</b>	Population Health
<b>EDRMS #</b>	ED-CO-20-31352
<p><i>Copyright to this material is vested in the State of Western Australia unless otherwise indicated. Apart from any fair dealing for the purposes of private study, research, criticism or review, as permitted under the provisions of the Copyright Act 1968, no part may be reproduced or re-used for any purposes whatsoever without written permission of the State of Western Australia.</i></p>	

**This document can be made available in alternative formats on request.**



## Appendix 1: Iron Deficiency Assessment for Children - Care Pathway



## Appendix 2: Iron Rich Foods

Encourage child and family consumption of iron-rich food, as below:

Iron rich foods <sup>13</sup>	
Food	Iron (mg)
Kangaroo (grilled loin fillet) 100g	4.1
Breakfast cereal (iron fortified) 1 cup	3.0
Lean beef (cooked) 100 g	2.0-3.0
Lean lamb (cooked) 100 g	2.0-2.5
Legumes – cooked ½ cup	2.0-2.5
Baked beans (small can 130g)	1.66
Salmon (canned or grilled) 100 g	1.1-1.3
Tuna (canned in water) 100 g	1.0-1.3
Egg – large 65-70 g	1.0
Lean pork (cooked) 100 g	0.6-1.0
Skinless chicken breast (cooked no skin) 100g	0.4-0.9

### Absorption:

- Iron in food takes two forms, haem iron and non-haem iron.
- Haem iron occurs in red meat and to a lesser extent in fish and poultry
- Non-haem iron occurs in wholemeal breads, breakfast cereals, green leafy vegetables, legumes and eggs.
- Haem iron is more easily absorbed by the body than non-haem iron.<sup>13</sup>
- Iron in infant formula is less well absorbed (around 10%) compared to the iron in breastmilk (absorption 50-70%). Therefore, the recommended iron intake is higher for formula fed infants.<sup>13</sup>

## Appendix 3: Risk Factors

### Maternal:

- Medical conditions or complications during pregnancy and/or postnatal e.g. haemorrhagic disease or infection.
- Untreated maternal anaemia during pregnancy.
- Restricted diets such as vegetarian or vegan diets, if insufficient iron-rich foods are not consumed.
- Multiple pregnancy<sup>5</sup>

### Child:

- Premature (born prior to 37 weeks gestation)
- Low birth weight.<sup>9</sup>
- Exclusive breast feeding after 6 months.<sup>4</sup>
- Chronic or parasitic infection.<sup>10,11</sup>
- Late or insufficient introduction of iron rich foods.<sup>4</sup>
- Intake of cow's milk before 12 months of age.<sup>12</sup>
- High intake of cow's milk in infants over 12 months of age (as has low iron content, can displace iron-rich foods and can impact iron absorption).
- Restricted diets such as vegetarian or vegan diets, if insufficient iron-rich foods are not consumed.
- Gastrointestinal disorders e.g. coeliac disease, inflammatory bowel disease.
- Gastric or intestinal surgery.
- Poor quality diet.
- Lack of access to iron-rich foods.

**Note:** Aboriginal, culturally and linguistically diverse (CALD) and refugee children do not have an additional genetic risk of IDA. The prevalence of IDA in children in some of these communities can be attributed to low socioeconomic status (i.e. poor maternal iron stores, reduced access to iron containing foods and increased infection rates) or exposure to soil transmitted helminths.

## Appendix 4: Haemoglobin Levels for Anaemia

Age	Haemoglobin levels for anaemia (Levels below the amounts listed indicates anaemia.)
At birth	135 g/L
7-35 days	100 g/L
5 weeks – 6 months	95 g/L
7 months - 2 years	105 g/L
2 – 6 years	110 g/L
6 – 12 years	115 g/L
12-18 years FEMALE	120 g/L
12-18 years MALE	125 g/L

Source: PathWest QEII Haematology Reference Data – Haematology Methods Manual HM038 Version 1.2 2018