**C&TC Requirements**

**General**

The following are C&TC requirements for Hemoglobin (Hb) or Hematocrit (Hct) screening:

- One baseline Hb or Hct screening is required between 9 and 15 months of age.
- One Hb or Hct screening is required between 12 and 20 years of age for all menstruating females.

**Personnel**

Screening may be completed by a medical assistant or lab technician. A licensed health care provider (physician, nurse practitioner, physician assistant, or registered or public health nurse (RN, PHN) who has completed the C&TC Comprehensive Screening training through the Minnesota Department of Health (MDH) must interpret the results and ensure appropriate follow-up.

**Documentation**

It is not necessary to have a complete record of laboratory test results on the documentation forms. Test results may be found elsewhere in the chart but documentation forms should indicate where this information can be found.

For documentation examples, refer to the C&TC Documentation Forms for Providers and Clinics (www.dhs.state.mn.us)

**Procedure**

Three basic methods are used to determine Hb concentration and Hct level:

- Venipuncture with analysis by an automated cell counter,
- Capillary sampling with analysis by a hemoglobin meter, or
- Capillary sampling with a micro hematocrit analysis by centrifuge.

If the capillary method is used, refer to the CDC Capillary Blood Sampling Protocol (www.cdc.gov).

**Hb / Hct anemia cutoffs for C&TC**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>Hb (&lt;g/dl)</th>
<th>Hct (&lt;%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>6 months – 2 years</td>
<td>11.0</td>
<td>32.9</td>
</tr>
<tr>
<td>Both</td>
<td>2 – 5 years</td>
<td>11.1</td>
<td>33.0</td>
</tr>
<tr>
<td>Both</td>
<td>5 – 8 years</td>
<td>11.5</td>
<td>34.5</td>
</tr>
<tr>
<td>Both</td>
<td>8 – 12 years</td>
<td>11.9</td>
<td>35.4</td>
</tr>
<tr>
<td>Females (non-pregnant)</td>
<td>12–15 years</td>
<td>11.8</td>
<td>35.7</td>
</tr>
<tr>
<td>Females (non-pregnant)</td>
<td>15-18 years</td>
<td>12.0</td>
<td>35.9</td>
</tr>
<tr>
<td>Females (non-pregnant)</td>
<td>≥18 years</td>
<td>12.0</td>
<td>35.7</td>
</tr>
</tbody>
</table>

(Centers for Disease Control and Prevention, 1998). Note, Hb and Hct values may vary depending on the laboratory or specific test used.

**Follow-up**

All infants and youth with Hb or Hct values below the cutoffs per age on the above table should have further evaluation and follow-up. Refer to the recommendations in the Clinic Report - Diagnosis and Prevention of Iron Deficiency and Iron-Deficiency Anemia in Infants and Young Children (www.pediatrics.aappublications.org).
Importance of Screening

Iron deficiency (ID) is the most common nutritional deficiency in the world. Iron Deficiency Anemia (IDA) is a common cause of anemia in young children (Baker & Greer, 2010).

IDA is associated with psychomotor and cognitive abnormalities in children. Infants and toddlers in the following groups are at highest risk for ID and IDA (Baker & Greer, 2010):

- History of prematurity or low birth weight
- Inadequate nutrition
- Lead exposure
- Weaning to cow’s milk and/or formulas with low-iron or no iron before 12 months
- Exclusive breastfeeding beyond 4 months of age without supplemental iron
- Children of low socioeconomic status or with special health needs, feeding problems, or poor growth and development

Health Disparities in Anemia

The rate of anemia in Minnesota’s WIC program is 1.7 times higher than the US general child population, for all race/ethnic groups. Black/African-American children experience about 2 times the rate of anemia compared to white children (Minnesota Department of Health, 2019).

Professional Recommendations

American Academy of Pediatrics

The AAP recommends universal screening of Hb concentration at approximately 1 year of age. This should include an assessment of risk factors associated with ID/IDA (Baker & Greer, 2010).

Resources

American Academy of Pediatrics

- Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents (www.brightfutures.aap.org)

Minnesota Department of Human Services

- C&T C Schedule of Age-Related Screening Standards (www.dhs.state.mn.us)
- Minnesota Health Care Programs (MHCP) Provider Manual - C&T Section (www.dhs.state.mn.us)

Minnesota Department of Health

- Women, Infants and Children (WIC) Program (www.health.state.mn)
- Child and Teen Checkups (C&T) (www.health.state.mn.us)

References


For More Information

The Child and Teen Checkups (C&T) program is administered through a partnership between the Minnesota Department of Human Services and the Minnesota Department of Health. For questions about this fact sheet or to obtain this information in a different format, call 651-201-3760 or email health.childteencheckups@state.mn.us.