PROCEDURE

Head circumference assessment

Scope (Staff):	Community Health
Scope (Area):	CAHS-CH, WACHS

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this disclaimer

Aim

To correctly measure, record and interpret the head circumference of infants and young children.

Risk

Failure to conduct a head circumference assessment, or obtaining an inaccurate measurement, may delay the identification of an infant or young child with health and developmental concerns associated with deviations in head size.

Background

Measuring the head circumference of infants and young children is a fast, reliable and non-invasive procedure for determining underlying brain size[1]. When conducted as part of a regular, holistic growth assessment and plotted on an appropriate growth chart, the head circumference measurement can assist in determining whether an infant or young child has age-appropriate growth, or if a deviation is apparent that warrants further assessment, early intervention and monitoring[1].

The most dramatic increase in brain growth occurs during the last three-months in utero and the first two-years of life[2]. Therefore, measuring head circumference in the first two-years of life is crucial to detecting and monitoring slow or excessive growth, reviewing and monitoring the impact of illness and associated treatment, and identifying or monitoring those at higher risk of neurodevelopmental disorders or adverse developmental outcomes[2,3,4].

Head circumference measurements that deviate from the norm may be attributed to disorders, including:

- *microcephaly* (a smaller than expected head circumference that is below the 3rd percentile for age[5]);
- *macrocephaly* (a disproportionately large head circumference that is above the 98th percentile for age[5]);
- *achondroplasia* (the most common form of disproportionate short stature that affects bone development and may be characterised by macrocephaly[6]); or
- *craniosynostosis* (an abnormal head shape resulting from the premature fusion of one or more of the cranial sutures[7]).

Research shows a link between deviations in infant head circumference and autism spectrum disorder (ASD)[8]. It has been observed that the head circumference at birth is often normal, or smaller than normal, in those with ASD[9]. Following a period of rapid growth between six and 14-months-of-age, head circumference stabilises. Accelerated head growth in the first year of life is found in approximately 70% of children with ASD[10,11].

Refer to the *Physical Assessment 0-4 years* Guideline for more information about the possible causes of deviation to the head from birth to four-years-of-age.

Key points

- A head circumference assessment should be conducted:
  - at the 8-week, 4-month and 12-month Universal contact appointments; or
  - when concerns regarding growth or any other identified risk are raised by a Community Health Nurse or parent/carer at any Universal Plus contact.

- To ensure an accurate head circumference measurement is recorded, reliable equipment and the correct technique should be used. Inaccurately taking, recording or plotting a head circumference measurement can lead to a misleading growth assessment, clinical misinterpretation and unnecessary concern for parents/carers.

- Decisions about growth deviations should never be determined solely by growth charts[12]. However, reviewing head circumference measurements from previous child health contacts will assist in interpreting overall growth status. Accelerations or decelerations in head circumference growth indicate the need for further assessment and/or referral.

- Community Health Nurses need to provide a culturally safe service delivery, which demonstrates a welcoming environment that recognises the importance of the cultural beliefs and practices of all clients.

- Community Health Nurses must follow the organisation's overarching Infection Control Policies and perform hand hygiene in accordance with WA Health guidelines at all appropriate stages of the procedure.

Equipment

- A clean, flexible, non-stretchable, non-retractable measuring tape or a disposable paper tape.
- Non-disposable measuring tapes should be cleaned before and after use (see *Medical Devices: Single Use, Single Patient Use and Reusable*).
- The tape should have increments of 0.1 centimetres (cm) and a width of 0.5–1.0cm.
- Check the tape yearly against a static measure for accuracy and replace if required.

Procedure

Steps	Additional information
Explanation • Explain the procedure to the parent/carer and, where appropriate, the young child. Allow sufficient time for the discussion of parent/carer concerns.	• Encourage parent/carer support and involvement with the procedure.
Preparation • Remove any items or hair accessories worn on the head. Cultural considerations should be applied. • Lay the infant/young child supine on the assessment bench.	• Infants/young children may need to be held firmly (yet comfortably) to prevent unexpected movement. • Young children may prefer to sit on their parent's/carer's lap, facing the Nurse.
Measuring • Place the tape above the infant/young child's eyebrows, above the supraorbital ridge and around the occipital prominence at the back of the head. • Pull the tape gently to compress the hair. • Note the measurement to the nearest 0.1cm.	• The Nurse may wish to repeat the measurement a number of times, to enable consistency in technique and accuracy in the result.

Steps	Additional information

Recording
 	
• Record the head circumference measurement.
 	
  • CAHS-CH Community Health Nurses must use a CDIS assessment screen to record the head circumference measurement. The measurement will be automatically plotted on the relevant growth chart.
 	
  • WACHS nurses must enter the head circumference measurement in relevant CHIS qualifiers and review it on the appropriate centile chart.
 	
  • If CDIS/CHIS are temporarily unavailable, the relevant paper-based growth chart should be used to precisely plot the head circumference measurement (see *Additional information*). The measurement should be entered into CDIS/CHIS, when available.
	• Age is plotted in completed weeks/months/years, as appropriate.
	
	• If an unexpected growth trajectory is evident when the head circumference measurement is plotted on the relevant growth chart, the Nurse should re-take the measurement to check for accuracy.
	
	• If a paper-based chart is used prior to entering a head circumference measurement into CDIS/CHIS, the following process applies.
	
	  • For infants born **after 37 weeks gestation**, the measurement should be plotted on the following World Health Organization (WHO) *Head circumference for age* growth charts:
	    • Birth to 13 weeks
	    • Birth to 2 years
	
	  The actual age for these infants commences at birth. Growth measurement plotting begins at birth at “0 years” and continues according to actual age.
	
	  • For infants born at **less than 37 weeks gestation**, the measurement should be plotted using the *Fenton Preterm Growth Charts*.
	
	  Once a corrected age of 40-weeks is reached, the WHO *Head circumference for age* growth charts should be used.

Steps	Additional information
	Corrected age must be used until two-years. If the child catches up before this, actual age can be used.
Interpretation • Interpret the head circumference measurements on the growth chart, noting any changes in growth trajectory. • Discuss the findings and growth pattern with the parent/carer.	• In some cases, a single head circumference measurement may indicate the need for additional assessment and/or referral. However, serial measurements of the head circumference over time and a holistic assessment are usually required to confirm that a deviation from the normal pattern of growth has occurred. • Serial measurements showing changes in the growth trajectory require additional assessment and/or referral.

Referral

If required, refer to a medical practitioner for further assessment.

Documentation

Nurses maintain accurate, comprehensive and contemporaneous documentation of assessments, planning, decision making and evaluations; according to CAHS-CH and WACHS processes.

References

1. Harris S. Measuring head circumference - Update on infant microcephaly. Canadian Family Physician. 2015;61(8):680-4.
2. Australian Institute of Health and Welfare. National Maternity Data Development Project: Baby head circumference - Research brief no.3. Canberra: Australian Institute of Health and Welfare; 2016.
3. World Health Organization. Training course on child growth assessment. Geneva: World Health Organization; 2006.
4. Duderstadt K. Pediatric physical examination: An illustrated handbook. Elsevier Health Sciences; 2013.
5. Perth Children's Hospital. Microcephaly and Macrocephaly. Perth: Child and Adolescent Health Service, Government of Western Australia; 2021. Available: https://pch.health.wa.gov.au/For-health-professionals/Referrals-to-PCH/Prereferral-guidelines/Microcephaly-and-macrocephaly.
6. Child and Adolescent Health Service. Clinical guideline: Achondroplasia. Perth: Government of Western Australia; 2021.

7. Perth Children's Hospital. Plagiocephaly and Craniosynostosis. Perth: Government of Western Australia; 2022. Available: https://pch.health.wa.gov.au/Hospitals/PCH/Home/For%20health%20professionals/Referrals%20to%20PCH/Prereferral%20guidelines/Plagiocephaly%20and%20Craniosynostosis.
8. Fukumoto A, Hashimoto T, Mori K, Tsuda Y, Arisawa K, Kagami S. Head circumference and body growth in autism spectrum disorders. Brain and Development. 2011;33(7):569-75.
9. Elder L, Dawson G, Toth K, Fein D, Munson J. Head Circumference as an Early Predictor of Autism Symptoms in Younger Siblings of Children with Autism Spectrum Disorder. Journal of Autism and Developmental Disorders. 2008;38:1104-11.
10. Courchesne E, Carper R, Akshoomoff N. Evidence of brain overgrowth in the first year of life in autism. JAMA. 2003;290(3):337-44.
11. Muratori F, Calderoni S, Apicella F, Filippi T, Santocchi E, Calugi S, et al. Tracing back to the onset of abnormal head circumference growth in Italian children with autism spectrum disorder. Research in Autism Spectrum Disorders. 2012;6:442-9.
12. The Royal Children's Hospital Melbourne. The 10 top things about growth charts. Victoria: The Royal Children's Hospital Melbourne; 2013. Available: www.rch.org.au/uploadedFiles/Main/Content/childgrowth/10%20top%20things%20about%20growth%20charts_Nov2013.pdf.

Related internal Policies, Procedures and Guidelines
The following documents can be accessed in the **Clinical Nursing Manual** via the HealthPoint link, Internet link or, for WACHS staff, in the WACHS Policy link.
Aboriginal child health
Body Mass Index assessment – Child Health
Body Mass Index assessment – Primary School
Growth - birth – 18 years
Growth – static or downward trajectory
Height assessment 2 years and over
Length assessment 0 - 2 years
Overweight and obesity
Physical Assessment 0 - 4 years
Universal contact (8 weeks, 4 months and 12 months)
Universal Plus – Child Health
Universal Plus – School Health
Weight assessment 0 - 2 years
Weight assessment 2 years and over
The following documents can be accessed in the CAHS Infection Control Policies manual on HealthPoint.
Infection Control Policies (including the *Medical Devices: Single Use, Single Patient Use and Reusable* Policy)

Related internal forms
The following forms can be accessed from the CAHS-Community Health Forms page on HealthPoint.
Body Mass Index Boys (CHS430B)
Body Mass Index Girls (CHS430A)
World Health Organization Charts (CHS800A series)

Related internal resources
The following resources can be accessed from the CAHS-Community Health Resources page on HealthPoint.
How children develop
Practice guide for Community Health Nurses

Related external resources
Royal Children's Hospital Melbourne Child Growth learning resource
Fenton Preterm Growth Charts
World Health Organization Child Growth Standards
World Health Organization growth charts: head circumference for age

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

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