

CADTH Reference List

# Maximum Blood Draw for Pediatric Patients

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**Authors:** Camille Santos, Quenby Mahood

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## Key Message

One evidence-based guideline was identified regarding maximum blood draws for pediatric patients.

## Research Question

What are the evidence-based guidelines regarding maximum blood draws for pediatric patients?

## Methods

### Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were blood draw volumes and pediatrics. CADTH-developed search filters were applied to limit retrieval to guidelines. Additional searches were run specifically for the concepts maximum blood draws and pediatric, as well as maximum blood draws and guidelines. The searches were also limited to English language documents published between January 1, 2017, and December 31, 2022. Internet links were provided, where available.

### Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications. Open access full-text versions of evidence-based guidelines were reviewed when available, and relevant recommendations were summarized.

## Results

One evidence-based guideline<sup>1</sup> was identified regarding maximum blood draws for pediatric patients. No health technology assessments or systematic reviews were found.

Additional references of potential interest that did not meet the inclusion criteria but provided information on policies and recommendations regarding maximum blood draws for pediatric

**Table 1: Selection Criteria**

Criteria	Description
Population	Pediatric patients (< 18 years) requiring blood draws
Intervention	Blood withdrawal via any method (e.g., peripherally inserted central lines, phlebotomy, blood draws, venous or central access device, central venous access devices or central venous catheters)
Comparator	Not applicable
Outcomes	Recommendations regarding safety, maximum volume, and range of volume of blood draws
Study designs	Health technology assessments, systematic reviews, evidence-based guidelines

patients are summarized in Appendix 1. Other articles of potential interest are provided in Appendix 2.

## Overall Summary of Findings

One evidence-based guideline was found regarding maximum blood draw volumes for pediatric patients.<sup>1</sup> The National Institute of Health recommended a maximum blood draw of 3mL/kg for pediatric patients. This limit includes both research and clinical blood draws.<sup>1</sup>

## References

### Health Technology Assessments

No literature identified.

### Systematic Reviews and Meta-Analyses

No literature identified.

### Guidelines and Recommendations

1. Todd N, Keener LA, Classen A, Ballard H, Cato K, Kolakowski D. A closer look at blood draw volume practices in research patients across a hospital system [presentation deck]. (*Presented at the National Cancer Institute*). Bethesda (MD): National Institutes of Health; 2020: [https://ccrod.cancer.gov/confluence/download/attachments/69992650/Blood\\_DrawPPT\\_NCL\\_12.9.20FINAL.pdf?version=1&modificationDate=1607965408490&api=v2](https://ccrod.cancer.gov/confluence/download/attachments/69992650/Blood_DrawPPT_NCL_12.9.20FINAL.pdf?version=1&modificationDate=1607965408490&api=v2). Accessed 2022 Feb 22.  
See: Recommendations, slide 36

## Appendix 1: Summary of References and Policies for Maximum Blood Draws for Pediatric Patients From Other Hospitals and Sources

Note that this appendix has not been copy-edited.

Six guidelines<sup>2-6</sup> and 1 memorandum<sup>7</sup> from other hospitals and sources were found regarding maximum blood draws for pediatric patients. All recommendations and policies<sup>2-7</sup> specified total blood draw volumes based on body weight and total blood volume of pediatric patients. Two guidelines<sup>2,7</sup> are specific to research, and 3 guidelines<sup>4-6</sup> apply to both research and clinical settings. Table 2 summarizes the recommendations and policies for maximum blood draws for pediatric patients from other hospital and sources.

**Table 2: Summary of Recommendations and Policies in References for Maximum Blood Draws for Pediatric Patients From Other Hospitals and Sources**

Author (year)	Summary of recommendations and policies for pediatric patients
Children's Hospital Los Angeles (2022) <sup>2</sup>	No more than 2.5% of TBV (generally 2 mL/kg) within 24 hours for research.
Henry Ford Health System (2021) <sup>3</sup>	Maximum volume in 24 hours are as follows: ≤ 2.3kg = Do not perform blood draw and refer to pediatric unit; 2.7-3.6 kg :2.5 ml; 3.6-4.5 kg = 3.5 ml; 4.5-6.8 = 5.0 ml; 6.8-18.6 kg = 10.0; 18.6-27.7 kg = 41-60 ml
University of California San Francisco (2021) <sup>4</sup>	No more than 2.5% of TBV within 24 hours for research and clinical purposes.
Ordre professionnel des technologistes médicaux du Québec (2018) <sup>5</sup>	Maximum volume per 24 hours is based on a limit of 5% of the TBV over 24 hours for the lowest weight of the interval indicated. It is recommended to reduce volumes in sick patients and each institution must determine the maximum volumes to be collected with the specialists concerned.
The Hospital for Sick Children Research Ethics Board (2017) <sup>6</sup>	For research of infants, children and adolescents, total blood draw of up to 5% of the research participant's TBV over an 8-week period, on a single occasion or in divided portions is permitted. If there are clinical blood draws within the given time period, this amount must be subtracted from what is permitted to be taken for research.
Stanford Children's Health (2019) <sup>7</sup>	Maximum draw volumes of 2.5% of TBV per draw and 5% of total blood volume per 30 days for pediatric clinical trial patients.

TBV = total blood volume.

### Policies and Recommendations – Unclear Methodology

2. Acceptable blood volumes drawn for children in research studies. Los Angeles (CA): Children's Hospital Los Angeles; 2022: <https://www.chla.org/sites/default/files/atoms/files/Acceptable%20Blood%20Draw%20Volumes%20for%20Children%20in%20Research%2002-28-2020.pdf>. Accessed 2022 Feb 22.
3. Blood collection: babies and children. Detroit (MI): Henry Ford Health System; 2021: <https://lug.hfhs.org/babiesKids.html>. Accessed 2022 Feb 22.
4. Risk levels of pediatric procedures and chart of maximum allowable total blood draw volumes in children. San Francisco (CA): Human Research Protection Program, University of California San Francisco; 2021: <https://irb.ucsf.edu/sites/hrpp.ucsf.edu/files/risk%20Levels%20of%20Pediatric%20Procedures%20and%20Chart%20of%20Maximum%20Allowable%20Total%20Blood%20Draw%20Volumes%20in%20Children.pdf>. Accessed 2022 Feb 22.
5. Blood collection guide by venipuncture for analytical purposes. Montreal (PQ): Ordre Professionnel des Technologistes Médicaux du Québec; 2018: [https://www.opiq.qc.ca/wp-content/uploads/2020/08/Blood-collection-guide-by-venipuncture-for-analytical-purposes\\_final.pdf](https://www.opiq.qc.ca/wp-content/uploads/2020/08/Blood-collection-guide-by-venipuncture-for-analytical-purposes_final.pdf). Accessed 2022 Feb 22.  
See: Section 11.15.2.4 filling volume (p. 42), section 13.1.1. precautions related to blood volume collected (p. 52), annex 7 maximum blood volume to be drawn from children (p. 65)
6. Blood sampling guidelines. Toronto (ON): Hospital for Sick Children Research Ethics Board; 2017: <https://www.sickkids.ca/siteassets/research/reb/research-ethics-guidelines/sickkids-reb-blood-volume-guidelines-2020-2021.pdf>. Accessed 2022 Feb 22.

### Additional References – Memorandum

7. Hazard FK. Pediatric maximum blood draw volumes for clinical trials [memo]. Stanford (CA): Stanford Children's Health; 2019: [https://med.stanford.edu/content/dam/sm/mchri/documents/research/Memo\\_Maximum%20Blood%20Draw%20Volume%20-%20Pediatric%20Clinical%20Trials%20.pdf](https://med.stanford.edu/content/dam/sm/mchri/documents/research/Memo_Maximum%20Blood%20Draw%20Volume%20-%20Pediatric%20Clinical%20Trials%20.pdf). Accessed 2022 Feb 22.

## Appendix 2: References of Potential Interest

Note that this appendix has not been copy-edited.

### Non-Randomized Studies

8. Peplow C, Assfalg R, Beyerlein A, Hasford J, Bonifacio E, Ziegler AG. Blood draws up to 3% of blood volume in clinical trials are safe in children. *Acta Paediatr.* 2019;108(5):940-944. [PubMed](#)

### *Intervention Not Specific to Maximum Blood Volume Collected*

9. El Feghaly RE, Chatterjee J, Dowdy K, et al. A quality improvement initiative: reducing blood culture contamination in a children's hospital. *Pediatrics.* 2018;142(4):10. [PubMed](#)

### Review Articles

10. Hamilton K, Chan AK, Bhatt M. Canadian guidelines regarding safe blood-draw volumes for research in pediatric participants [abstract]. *Res Pract Thromb Haemost.* 2020;4(Suppl 1). <https://abstracts.isth.org/abstract/canadian-guidelines-regarding-safe-blood-draw-volumes-for-research-in-pediatric-participants/>. <https://abstracts.isth.org/abstract/canadian-guidelines-regarding-safe-blood-draw-volumes-for-research-in-pediatric-participants/>. Accessed 2022 Feb 22.
11. Huber S, Hetzer B, Crazzolara R, Orth-Holler D. The correct blood volume for paediatric blood cultures: a conundrum? *Clin Microbiol Infect.* 2020;26(2):168-173. [PubMed](#)