



Bloedafname en -armoede

Wat te bepalen?

Bloedafname en -armoede

Inhoudsopgave

- Vragen
- Volwassenen
- PICU
- Conclusie
- Discussie

[J Gen Intern Med.](#) 2005 Jun; 20(6): 520–524.

doi: [10.1111/j.1525-1497.2005.0094.x](https://doi.org/10.1111/j.1525-1497.2005.0094.x)

PMCID: PMC1490143

PMID: [15987327](https://pubmed.ncbi.nlm.nih.gov/15987327/)

Do Blood Tests Cause Anemia in Hospitalized Patients?

The Effect of Diagnostic Phlebotomy on Hemoglobin and Hematocrit Levels

[Paaladinesh Thavendiranathan](#), MD, MSc,¹ [Akshay Bagai](#), MD,¹ [Albert Ebidia](#), RT,² [Allan S Detsky](#), MD, PhD,^{1,3,4} and [Niteesh K Choudhry](#), MD, PhD^{1,4,5}

[Rom J Anaesth Intensive Care.](#) 2015 Apr; 22(1): 13–16.

PMCID: PMC5505326

PMID: [28913450](https://pubmed.ncbi.nlm.nih.gov/28913450/)

Language: English | [Romanian](#)

Blood sampling as a cause of anemia in a general ICU – a pilot study

[Adrian Cioc](#), [Raluca Fodor](#), [Orsolya Benedek](#), [Alina Moldovan](#), and [Sanda-Maria Copotoiu](#)

Editorial > [Pediatr Crit Care Med.](#) 2020 Jun;21(6):597–598.

doi: [10.1097/PCC.0000000000002361](https://doi.org/10.1097/PCC.0000000000002361).

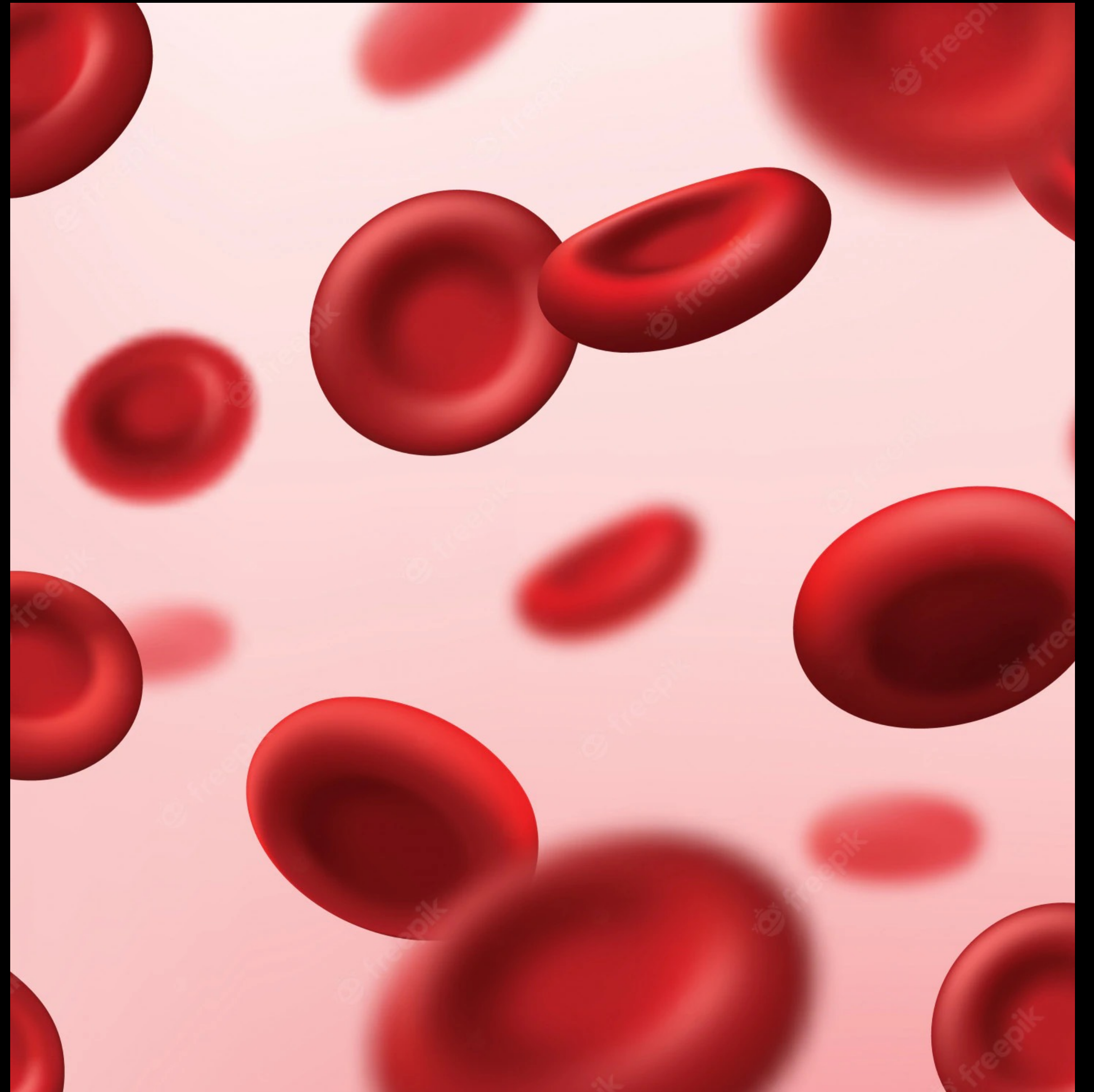
Anemia at PICU Discharge: Is It a Problem?

[Geneviève Du Pont-Thibodeau](#) ¹, [Camille Jutras](#), [Jacques Lacroix](#)

Affiliations + expand

PMID: 32483028 DOI: [10.1097/PCC.0000000000002361](https://doi.org/10.1097/PCC.0000000000002361)

**Welke eenheid
gebruiken wij voor
Hb-bepalingen?**

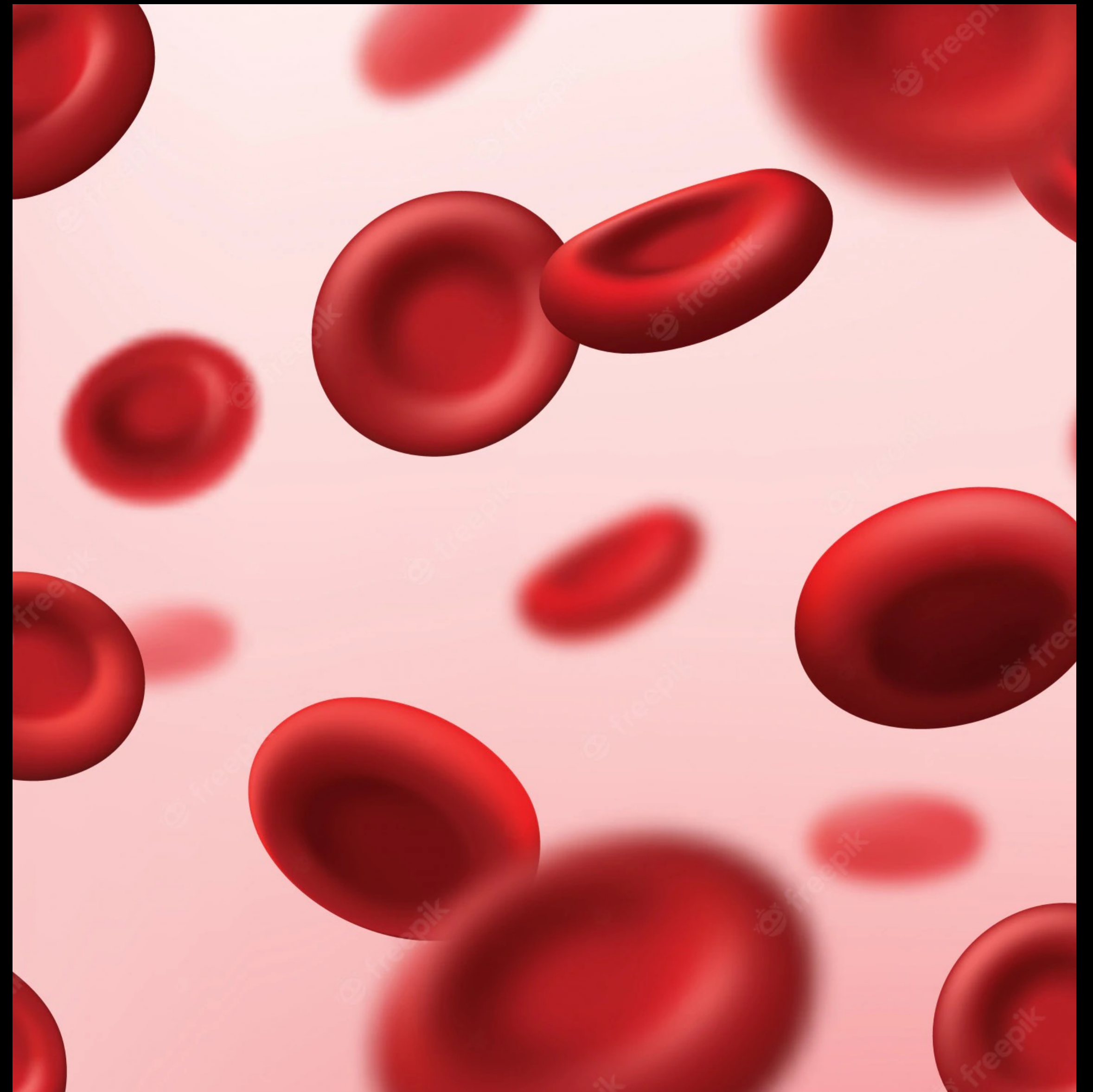


Welke eenheid gebruiken wij voor Hb-bepalingen?

Mmol/L

mmol/L	g/dL	g/L
1,0	1.61	16.1

g/dL	g/L	mmol/L
1,0	10	0.62



**Wat is de Hb-daling
voor elke 100mL
bloedafname?**



Wat is de Hb-daling voor elke 100mL bloedafname?

On average, every **100 mL** of phlebotomy was associated with a decrease in hemoglobin and hematocrit of **7.0 g/L** and **1.9%**, respectively.

7.0 g/L = 0,43 mmol/L



**Hoeveel procent van
de patiënten hebben
na PICU-ontslag
een anemie?**



Hoeveel procent van de patiënten hebben na PICU-ontslag een anemie?

Anemia is a significant complication of critical illness and 50% of children are discharged from the PICU anemic.



Volwassenen

Bloed afnemen

Paaladinesh e.a.

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- Retrospectieve cohort-studie
- n=404
- Gemiddelde daling
 - Hb 7.9 g/L 7.9 g/L = 0,49 mmol/L
 - Ht 3,8%
- Gemiddelde afname totaal: 74.6 mL
- Gemiddelde leeftijd 69 jaar

Bloed afnemen

Paaladinesh e.a.

Table 3. Volumes of Blood Draw and Predicted Drops in Hemoglobin and Hematocrit Based on Clinical Scenarios

Volume of Blood Draw, mL	Expected Change in Hemoglobin, g/L (95% CI)*	Expected Change in Hematocrit, % (95% CI)	Scenarios Resulting in the Volume of Blood Draw
10	0.7 (0.5 to 0.9)	0.19 (0.13 to 0.25)	Routine labs (CBC, electrolytes, renal and coagulation profiles)
50	3.5 (2.4 to 4.6)	0.95 (0.65 to 1.25)	Routine labs for 5 days
100	8.0 (4.8 to 10.2)	1.90 (1.30 to 2.50)	Routine labs for 5 days, acute anemia workup, 3 sets of cardiac enzymes
200	14.0 (9.6 to 18.4)	3.80 (2.60 to 5.00)	Routine labs for 10 days, 3 sets of cardiac enzymes, 3 sets of liver profile, transaminitis work-up

**Divide by 10 to convert g/L to g/dL.*
 CBC, Complete Blood Count.

Volwassenen

PICU

PICU

Rekensom

- Neonat 3kg
- 5 dagen lang, 5cc bloedafname/dag
- Hoeveel procent totaal circulerend volume?



PICU

Rekensom

- Neonaat 3kg
- 5 dagen lang, 5cc bloedafname
- Hoeveel procent totaal circulerend volume?



$$\cdot 3\text{kg}, 80\text{mL/kg} = 240\text{mL} \cdot$$

$$\cdot 5 \times 5\text{mL} = 25\text{mL} \cdot$$

$$= 10,4\% \cdot$$

Bloed afnemen Jutras e.a.

 Open Access Full Text Article

Anemia in Pediatric Critical Care

This article was published in the following Dove Press journal:
International Journal of Clinical Transfusion Medicine

Camille Jutras
Julien Charlier 
Tine François 
Geneviève
Du Pont-Thibodeau

Department of Pediatrics, Division of
Pediatric Critical Care Medicine, CHU
Sainte-Justine, Montréal, Québec, Canada

- Anaemie PICU
 - 33% bij opname
 - 41% ontwikkelt
 - 75% tijdens opname
 - 50% bij ontslag

Bloed afnemen

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 - 50% bij ontslag

Table I Diagnosis of Anemia According to the Hemoglobin Level*

Population	Anemia		
	Mild	Moderate	Severe
6–59 months	100–109	70–99	<70
5–11 years old	110–114	80–109	<80
12–14 years old	110–119	80–109 ^a	<80
>15 years old (women)	110–119	80–109	<80
> 15 years old (men)	110–129	80–109	<80

Notes: According to the WHO recommendations. Reproduced from WHO. Haemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. Geneva: World Health organization; 2011. Available from: https://apps.who.int/iris/bitstream/handle/10665/85839/WHO_NMH_NHD_MNM_11.1_eng.pdf?sequence=22&isAllowed=y. Copyright 2011.¹ *Hemoglobin is in grams per liter.

Mild

6,2-6,8 mmol/L

6,2-7,1 mmol/L

6,2-7,4 mmol/L

Bloed afnemen Jutras e.a.

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- Oorzaken anaemie
 - Inflammatie
 - Insufficiëntie erythropoïese
 - Verhoogde afbraak RBC's en cytolyse
 - Bloedverlies
 - Hemodilutie

Bloed afnemen

François e.a.

- Prospectief
- Uitkomsten
 - Bloedafname volume
 - Weggegooid volume
 - Verband tussen volume en anemie bij ontslag

Observational Study > [Pediatr Crit Care Med.](#) 2022 Jun 1;23(6):435-443.

doi: [10.1097/PCC.0000000000002947](https://doi.org/10.1097/PCC.0000000000002947). Epub 2022 Apr 11.

Impact of Blood Sampling on Anemia in the PICU: A Prospective Cohort Study

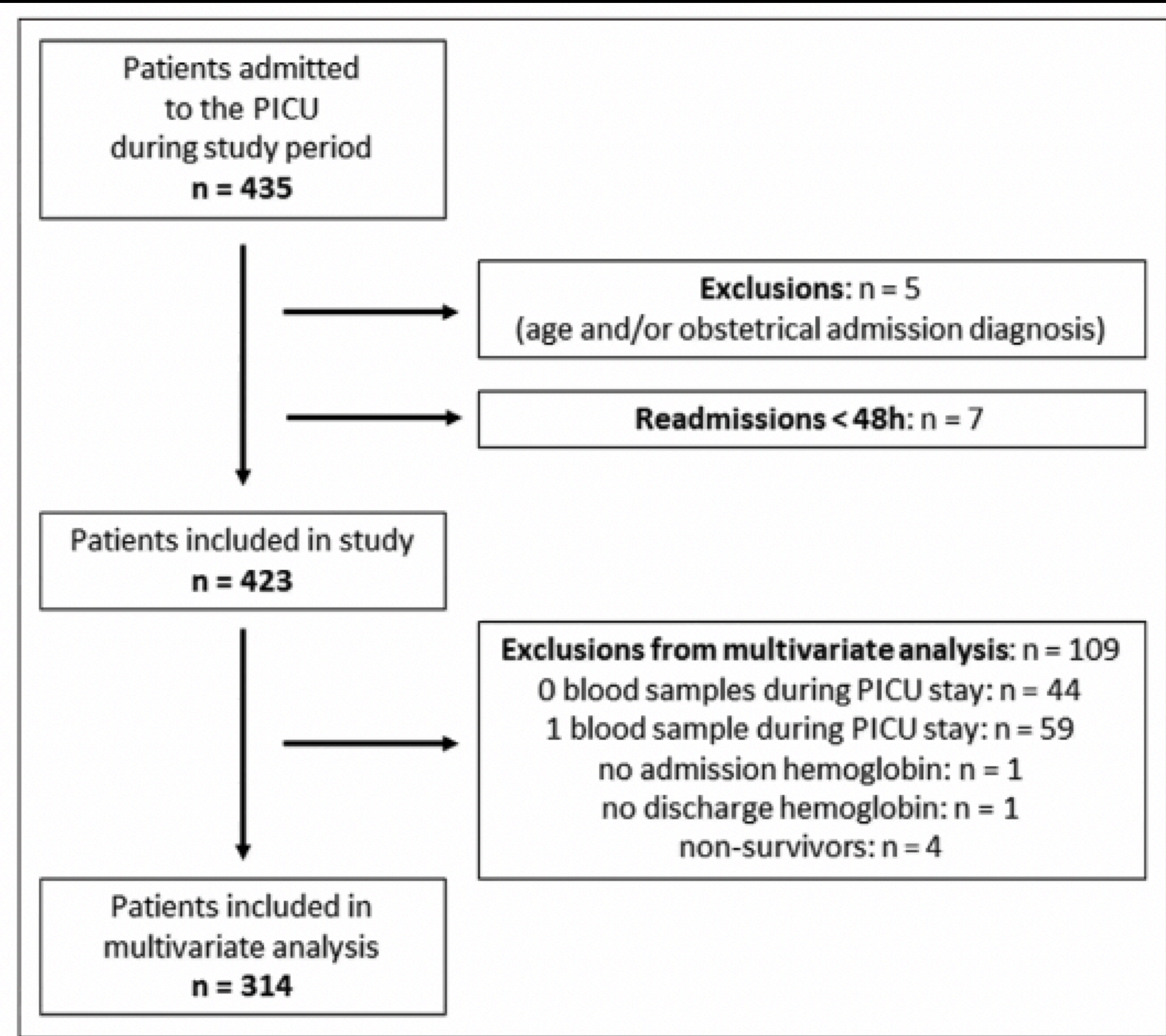
Tine François ¹, Michaël Sauthier ¹, Julien Charlier ¹, Jessica Dessureault ¹, Marisa Tucci ¹, Karen Harrington ¹, Laurence Ducharme-Crevier ¹, Sally Al Omar ², Jacques Lacroix ¹, Geneviève Du Pont-Thibodeau ¹

Affiliations + expand

PMID: 35404309 DOI: [10.1097/PCC.0000000000002947](https://doi.org/10.1097/PCC.0000000000002947)

Bloed afnemen François e.a.

Impact of Blood Sampling on Anemia in the PICU: A Prospective Cohort Study



Bloed afnem

François e.a.

TABLE 1.
Patient Characteristics^a

Variable	All Patients (Enrolled at PICU Entry) (<i>n</i> = 423)	Anemia at PICU Discharge (<i>n</i> = 177)	No Anemia at PICU Discharge (<i>n</i> = 138)	< 2 Blood Samples (During PICU Stay) (<i>n</i> = 102)
At PICU entry				
Age, mo	59.1 (±66.9); 28.0 (4.0–108.0)	74.3 (±67.7); 54.0 (12.0–133.0)	41.5 (±62.6); 9.5 (2.0–56.0)	28.8 (±69.0); 27.0 (8.0–88.5)
Weight, kg	20.3 (±20.7); 12.7 (6.2–24.6)	24.9 (±23.0); 15.9 (8.6–31.0)	15.1 (±18.2); 7.2 (4.0–16.7)	19.8 (±19.5); 12.5 (7.6–21.0)
Sex (male), <i>n</i> (%)	229 (54)	100 (58)	72 (42)	55 (54)
Hb at PICU entry, ^b g/L	117 (±23); 114 (103–130)	106 (±18); 108 (96–116)	131 (±25); 129 (113–146)	-
Anemia at PICU entry, ^b <i>n</i> (%)	161 (41) ^b	121 (86)	19 (14)	-
Main admission diagnosis				
Neurologic disease	35 (8)	16 (9)	12 (9)	4 (4)
Other	59 (14)	24 (14)	12 (9)	19 (19)
Cardiac surgery	50 (12)	29 (16)	19 (14)	0 (0)
Noncardiac surgery	90 (21)	41 (23)	13 (9)	27 (26)
Sepsis and shock	33 (8)	33 (8)	12 (9)	4 (4)
Respiratory disease	156 (37)	49 (28)	69 (50)	48 (47)

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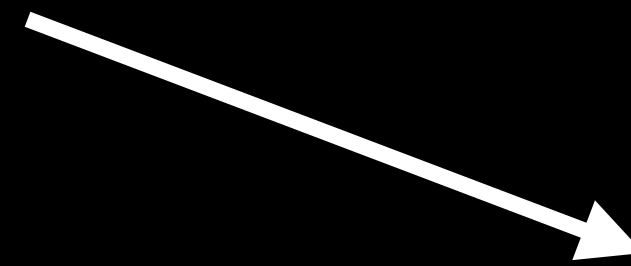
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During PICU stay				
Pediatric Logistic Organ Dysfunction-2 score ^c	4.9 (±3.9); 4.0 (2.0–7.0)	4.8 ± 3.8; 4.0 (2.0–7.0)	5.5 (±4.3); 4.0 (2.0–8.0)	4.7 (±3.8); 3.0 (2.0–6.8)
Length of stay, d	4.5 (±10.0); 2.1 (1.1–3.7)	4.9 ± 11.4; 2.2 (1.5–3.5)	5.3 (±10.5); 3.0 (1.4–5.0)	1.8 (±3.0); 1.1 (0.8–1.9)
Invasive ventilation, ^d <i>n</i> (%)	126 (30)	76 (43)	41 (30)	9 (9)
Noninvasive ventilation, ^d <i>n</i> (%)	198 (47)	74 (42)	84 (61)	42 (41)
Vascular catheters, ^e <i>n</i> (%)	179 (42)	103 (58)	54 (39)	14 (14)
Central venous catheter, <i>n</i> (%)	134 (32)	73 (41)	50 (36)	11 (11)
Arterial line, <i>n</i> (%)	120 (28)	81 (46)	31 (23)	3 (3)
Blood samples per day, <i>n</i>	2.9 (±3.4); 2.0 (0.9–3.7)	3.7 (±3.0); 3.1 (1.8–4.7)	2.9 (±3.7); 1.8 (1.0–3.4)	-
Blood sample volume per stay, mL/kg	3.9 (±19.0); 0.4 (0.1–1.3)	5.8 (±27.3); 0.7 (0.3–1.7)	3.6 (±9.7); 0.6 (0.3–2.4)	-
Transfusion, <i>n</i> (%)	43 (10)	27 (15)	15 (11)	2 (2)
Hb at PICU discharge, ^f g/L	110 (±20); 109 (98–122)	98 ± 13; 99 (89–108)	126 (±17); 123 (113–134)	-
Anemia at discharge, ^f <i>n</i> (%)	177 (56) ⁱ	177 (100)	0 (0)	-

Impact of Blood Sampling on Anemia in the PICU: A Prospective Cohort Study

Bloed afnemen

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- Bloedafname mL/kg/opname: 3,9



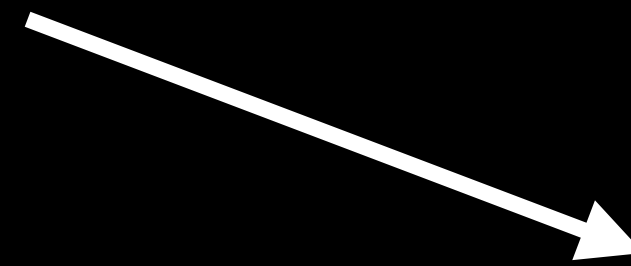
Neonaat 3kg
Circulerend 80 mL/kg = 240mL
3,9 mL/kg = 12mL = 5%

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Bloed afnemen

François e.a.

- Bloedafname mL/kg/opname: 3,9



Neonaat 3kg
Circulerend 80 mL/kg = 240mL
3,9 mL/kg = 12mL = 5%

- Weggegooid: 1mL/kg/opname

i.e. 26% van totale bloed

Impact of Blood Sampling on Anemia in the PICU: A Prospective Cohort Study

Bloed afnemen

François e.a.

- Risico-groepen
 - Post-cardiochirurgie 11mL/dag
 - Sepsis 8 mL/dag

- Beademd
- Met veneuze/arteriële toegang

Weggegooid

CVL-afname : 1mL

Arteriële afname: 0,1mL

Capillaire afname: 0,05mL

Bloed afnem

François e.a.

- Anaemie
 - 56% bij ontslag
 - 18% ontwikkelt

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Impact of Blood Sampling on Anemia in the PICU: A Prospective Cohort Study

Bloed afnemen

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- Grootste risico bij meer bloedafname

Risk factors	Multivariate analysis			
	OR	95% CI		<i>p</i> -value
Total blood volume sampled (Includes discarded) per PICU stay, ml/kg				
> 5 ml/kg	3.10	0.88	10.94	0.079
1-5ml/kg	2.22	0.96	5.12	0.063
< 1ml/kg (ref)	1.00	.	.	.

Impact of Blood Sampling on Anemia in the PICU: A Prospective Cohort Study

Bloed afnemen

François e.a.

- Opmerkingen
 - Niet-geblindeerd
 - Geen verband met ernst ziekte aangetoond
 - Geen verband met bloedtransfusies aangetoond

Conclusie

Bloedafname en -armoede

Conclusie

- Verband tussen bloedafname en anemie
- Risico-groepen
 - Anemie bij opname
 - Sepsis en Post-cardiochirurgie
- 25% wordt weggegooid

- Gemiddelde afname = $\sim 4\text{mL/kg/opname}$

Tips

Bloedafname en -armoede

Tips

- Kleine buisjes & POC's
- Kijk naar etCO₂ en saturatiemeter
- CVL vroeg uit

- Bloedafname: “Nee, tenzij”

Bloedafname en -armoede

- Primum non nocere

MEDICAL VAMPIRES

THE only two mammals to remove blood regularly from other mammals are vampire bats (subfamily, *Desmodontinae*) and humans. Vampires, dead people who rise from their graves at night to nourish themselves on the blood of the living (that is, Dracula and his ilk), are to be found only in movies and in Eastern European folklore. Werewolves, demonized people who, according to legend, take the form of wolves, are less fastidious about their source of nourishment; any part of the body will do. Vampire bats live exclusively on the blood of other animals. They obtain the blood painlessly by scooping out a shallow channel in the flesh of their victims with their razor-sharp teeth and then lapping up the blood from the lower end of the wound. Vampire bats only occasionally attack humans.¹

Bloedafname en -armoede

- Jongen, 2 jaar
 - Trend naar transfusiegrens
 - Laatste ABG Hb 0,2mmol/L boven transfusiegrens
 - Beleid?

- Voor welke parameters een dagcurve?