

Methodological quality assessment of RBC transfusion guidelines and the evidence base of more restrictive transfusion thresholds

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INTRODUCTION & OBJECTIVES

Recent literature suggests that more restrictive red blood cell (RBC) transfusion practices are equivalent/better than more liberal transfusion practices. The methodological quality of guidelines recommending more restrictive transfusion thresholds and their underlying scientific evidence is unclear. Therefore, we aimed 1) to evaluate the quality of the development process of RBC transfusion guidelines, and 2) to investigate the underlying evidence of guidelines recommending a more restrictive hemoglobin threshold.

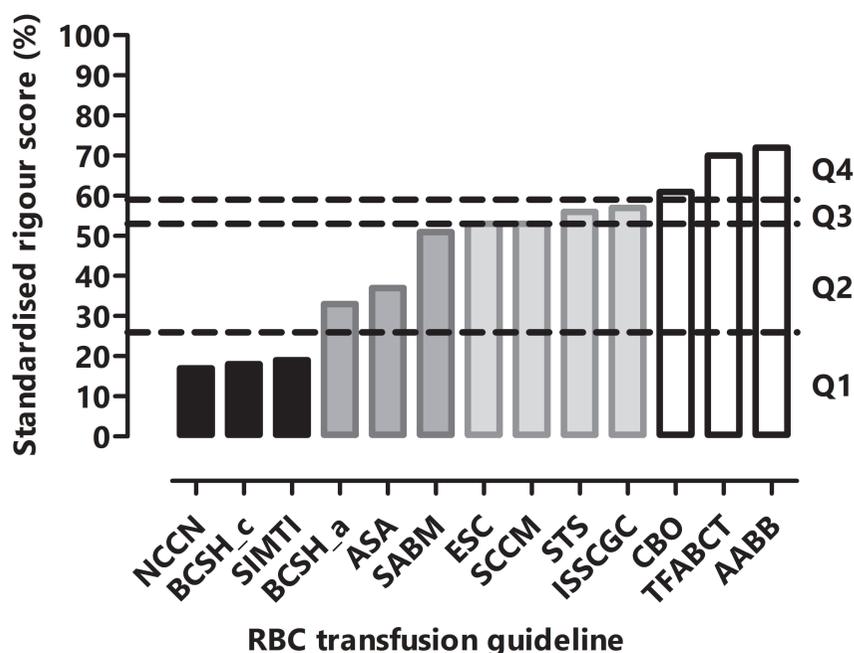
METHODS¹

- Via systematic literature screening of relevant databases (NGC, GIN, Medline and Embase), RBC transfusion guidelines recommending a more restrictive hemoglobin level (<6, <7 or <8 g/dL) were included. A restrictive transfusion strategy is defined as the administration of red blood cells once the Hb level is below 7 to 8 g/dL. Hb ranges including Hb levels ≤8 g/dL (e.g. Hb 7-9 g/dL, Hb 6-10 g/dL) were considered as restrictive and were also included.
- Four assessors independently evaluated the methodological quality by scoring the rigor of development domain of the AGREE II checklist (0-100%)
- The "level of evidence", provided in the guideline based on an explicit methodology (e.g. GRADE), served as a reference for the quality of the underlying evidence.

RESULTS¹

- We finally selected 13 RBC transfusion guidelines, including 32 recommendations that used an explicit restrictive Hb threshold.
- The methodological quality of 13 RBC transfusion guidelines was variable (18-72%) but highest for those developed by Advancing Transfusion and Cellular Therapies Worldwide (72%), the Task Force of Advanced Bleeding Care in Trauma (70%) and the Dutch Institute for Healthcare Improvement (61%) (**Figure 1**)
- 12 recommendations (38%) were based on a (very) low level of evidence (observational studies with limitations, case series or expert opinion), while high level evidence (well-conducted RCT's) formed the scientific basis in only 4 recommendations (12%) (**Table 1**).
- Hemoglobin <7 g/dL (intensive care unit patients) or <8 g/dL (postoperative patients) were the only thresholds based on high-quality evidence.

Figure 1: The standardized rigor of development scores of the RBC transfusion guidelines.



The dotted lines distinguish quartile 1 (Q1, black bars) from quartile 2 (Q2, dark grey bars), quartile 2 from quartile 3 (Q3, light grey bars) and quartile 3 from quartile 4 (Q4, white bars). NCCN: National Cancer Center Network, BCSH_c: British Committee for Standards in Hematology (children), SIMTI: Italian Society of Transfusion Medicine and Immunohaematology, BCSH_a: British Committee for Standards in Hematology (adults), ASA: American Society of Anesthesiologists, SABM: Society for the Advancement of Blood Management¹⁵, ESC: European Society of Cardiology, SCCM: Society of Critical Care Medicine, STS: Society of Thoracic Surgeons, SSCGC: Surviving Sepsis Campaign Guidelines Committee, CBO: Dutch Institute for Healthcare Improvement, TFABCT: Task Force for Advanced Bleeding Care in Trauma, AABB: Advancing Transfusion and Cellular Therapies Worldwide.

Table 1: Recommendations with a specific hemoglobin threshold and/or range: level of evidence versus strength of recommendation

Level of evidence	Strength of recommendation					
	Strong (n=11)*		Weak (n=16)†		No strength of recommendation due to lack of information (n=5)‡	
	n (%)	Guideline	n (%)	Guideline	n (%)	Guideline
High	2 (18%)	SCCM, AABB	0 (0%)		2 (40%)	CBO
Moderate	7 (64%)	BCSH_a, SSCGC, SIMTI	7 (44%)	SCCM, AABB, BCSH_c	1 (20%)	CBO
(Very) low	2 (18%)	ESC, TFABCT	9 (56%)	STS, BCSH_a, NCCN	1 (20%)	ASA
Not provided	0 (0%)		0 (%)		1 (20%)	SABM
Totals (%)	11 (34%)		16 (50%)		5 (16%)	

* Grade of recommendation is labeled as 'strong', 'level 1' or 'uniform consensus'. † Grade of recommendation is classified as 'weak', 'level 2', 'level 3', Class IIa, Class IIb or 'Grade 2 (suggested)'. ‡ The guideline did not provide information and/or did not use a standard methodology to grade the strength of recommendation (e.g. strong versus weak). Abbreviations of different guidelines are provided in legend figure 1.

CONCLUSIONS¹

- The methodological quality in RBC transfusion guidelines is variable (18-72%) and has room for improvement. This is important to ensure that the best available evidence is captured when formulating recommendations on a restrictive transfusion strategy.
- Today, the recommendations on a restrictive Hb threshold of <7 g/dL or 7-9 g/dL, as proposed by AABB, CBO and SCCM, were the only recommendations which were based on high quality evidence (RCT's).
- More high-quality research on restrictive blood transfusion strategies is needed to make stronger evidence-based recommendations on lower Hb thresholds/ranges (e.g. Hb < 6 g/dL) or certain populations (patients with cardiovascular disease, children, severe sepsis). This would be helpful for further optimization of evidence-based transfusion strategies in Patient Blood Management.

