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When and at What Level can Postoperative Anemia be Tolerated after Major Vascular Surgery: When Should it be Corrected by Transfusion, and Do Cardiac Comorbidities Make a Difference

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Disclosures

- ◆ No financial conflicts of interest
- ◆ Principal Investigator of TOP Trial (CSP 599: Transfusion Triggers after Operations in High Cardiac Risk Patients)

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Randomized Transfusion Trials

RCT Name	Clinical Setting	Year	Hb Thresholds	Outcome
TRICC	ICU	1999	7 vs. 9 gm/dl	Restrictive non-inferior
TRACS	Cardiac Surgery	2010	8 vs. 10 gm/dl	Restrictive non-inferior
FOCUS	Hip Replacement	2011	8 vs. 10 gm/dl	Restrictive non-inferior
	GI Bleeding	2013	7 vs. 9 gm/dl	Restrictive superior
TRISS	Septic Shock	2014	7 vs. 9 gm/dl	Restrictive non-inferior
TITRe2	Cardiac Surgery	2015	7.5 vs. 9 gm/dl	Restrictive non-inferior

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Red Blood Cell Transfusion 2023 AABB International Guidelines

Jeffrey L. Carson, MD¹; Simon J. Stanworth, MD, DPhil^{2,3,4,5}; Gordon Guyatt, MD⁶; et al

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JAMA. 2023;330(19):1892-1902. doi:10.1001/jama.2023.12914

- ◆ Transfusion is recommended at trigger Hb **7 g/dL** for most stable hospitalized patients
- ◆ (8 g/dL for patients with cardiovascular risk factors)

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Clinical question

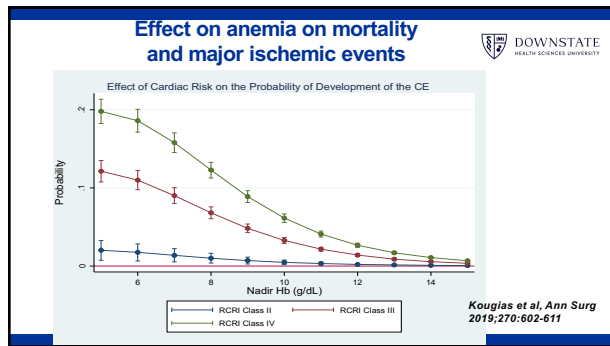
- ◆ What is the optimal transfusion threshold for high cardiac-risk patients who undergo major vascular operations?

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Effect on anemia on mortality and major ischemic events

Predictors	z-score	Adjusted OR	95% CI		P-value	C Statistic: 0.83
			Lower	Upper		
Nadir hemoglobin	52	1.47	1.45	1.49	<0.001	
ASA Class	39	2.09	2.02	2.17	<0.001	
Age	26	1.02	1.02	1.02	<0.001	
Intraoperative transfusions	16.6	1.13	1.12	1.15	<0.001	
Hemoglobin delta	13.9	1.09	1.08	1.10	<0.001	
High cardiovascular risk	10.9	1.42	1.33	1.51	<0.001	
COPD	8.65	1.23	1.18	1.29	<0.001	
Total PRBCs transfused	7.8	1.13	1.09	1.16	<0.001	
Diabetes mellitus	5.8	1.14	1.09	1.19	<0.001	
Current smoking	5.1	1.13	1.08	1.18	<0.001	
Hypertension	4.8	1.13	1.07	1.20	<0.001	
Operative time (hours)	-4.2	0.97	0.96	0.99	<0.001	
Year	-13.6	0.95	0.94	0.96	<0.001	

Kougias et al, Ann Surg 2019;270:602-611



TOP trial

- ◆ RCT of high cardiac-risk patients
- ◆ Restrictive (Hb 7 d/dL) vs. Liberal (Hb 10 g/dL) arms
- ◆ **Primary endpoint:** Mortality or major ischemic events at 90 days

Ashville, NC	Houston, TX	Pittsburgh, PA
Buffalo, NY	Little Rock, AR	Portland, OR
Cleveland, OH	Long Beach, CA	San Francisco, CA
Dallas, TX	Minneapolis, MN	Seattle, WA
Gainesville, FL	Palo Alto, CA	Tampa, FL

TOP Trial

- ◆ Funded by the VA CSP
- ◆ Enrollment completed in late 2023
- ◆ Adjudication to be completed in December 2024

Observed vs. Expected

Randomized Participants (n)

Months since Site Activation

Conclusions

- ◆ Observational data indicate that postoperative anemia increases the risk of early death or ischemic events after major general and vascular surgery interventions
- ◆ TOP trial will definitively address the question of thresholds in high cardiac risk patients