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LES OBJECTIFS THERAPEUTIQUES DE L'HEMOGLOBINE EN REANIMATION

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Introduction

L’anémie est définie selon l’Organisation Mondiale de la Santé comme une concentration:

- Hb <13g/dL chez l’homme
- Hb <12g/dL chez la femme
- Hb < 11 g/dl Chez la femme enceinte

L’anémie en réanimation:

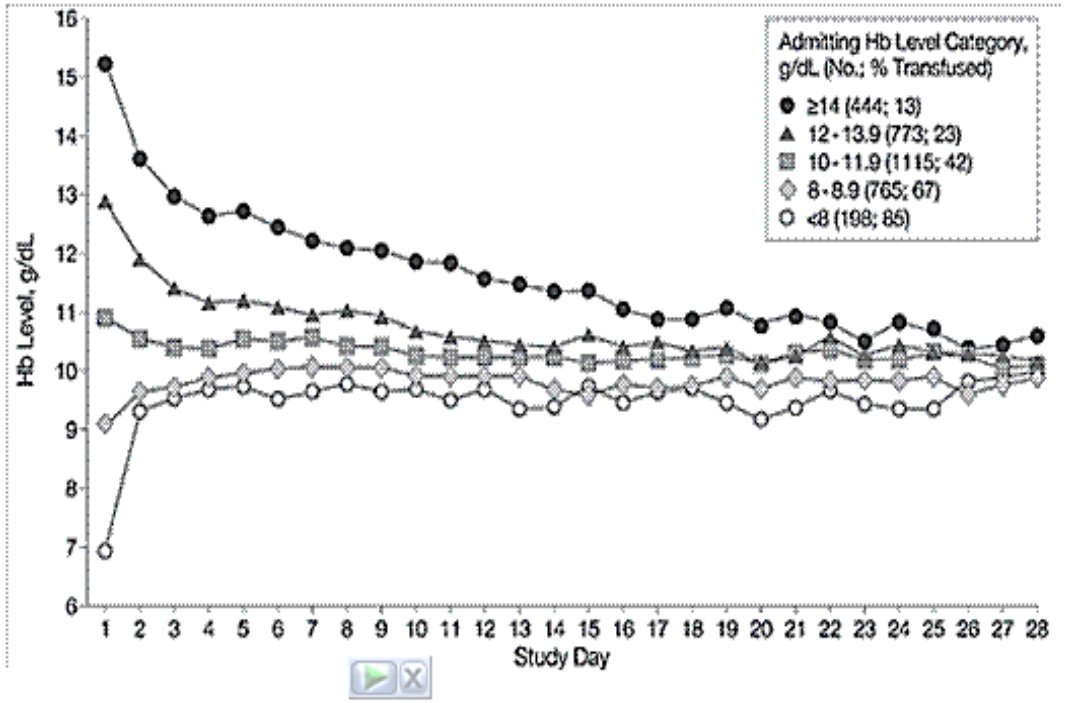
- Fréquente
- Associée à une morbi-mortalité

Introduction

Anemia and Blood Transfusion in Critically Ill Patients

Vincent JL, et al. JAMA. 2002.

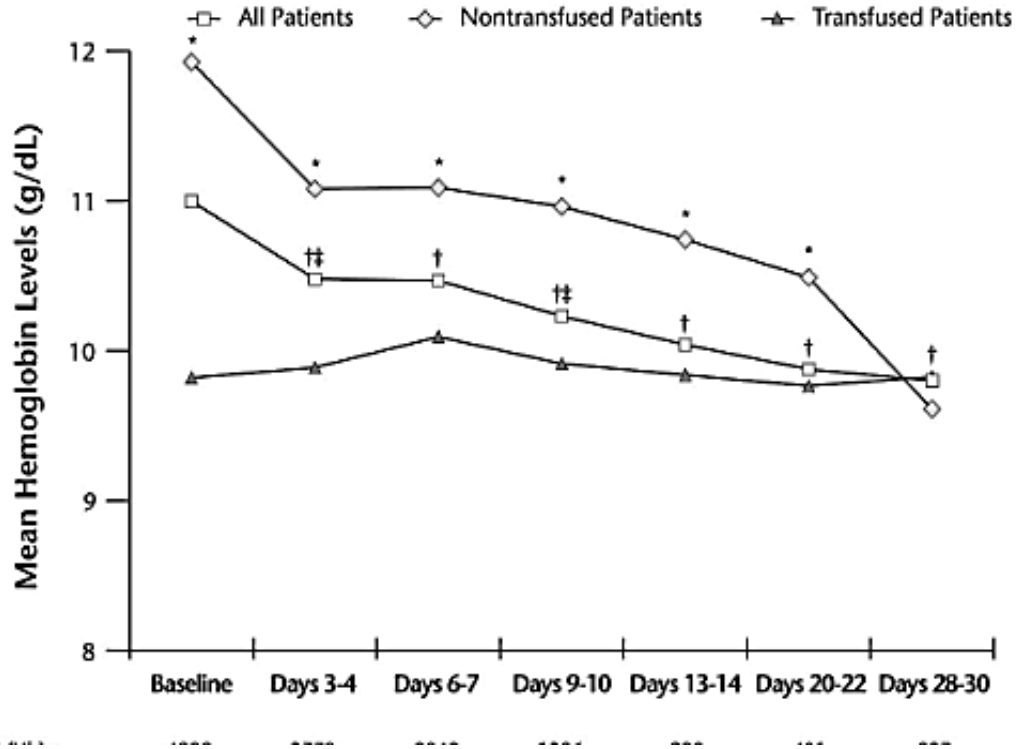
Figure 1. Course of Hemoglobin (Hb) Patterns by Admitting Hb Level Category



Numbers do not total 3534 because of missing data (some forms incomplete).

The CRIT Study: Anemia and blood transfusion in the critically ill—Current clinical practice in the United States

Howard L, et al. Crit Care Med 2004



Introduction

The CRIT Study: Anemia and blood transfusion in the critically ill—Current clinical practice in the United States

Howard L, et al. Crit Care Med 2004

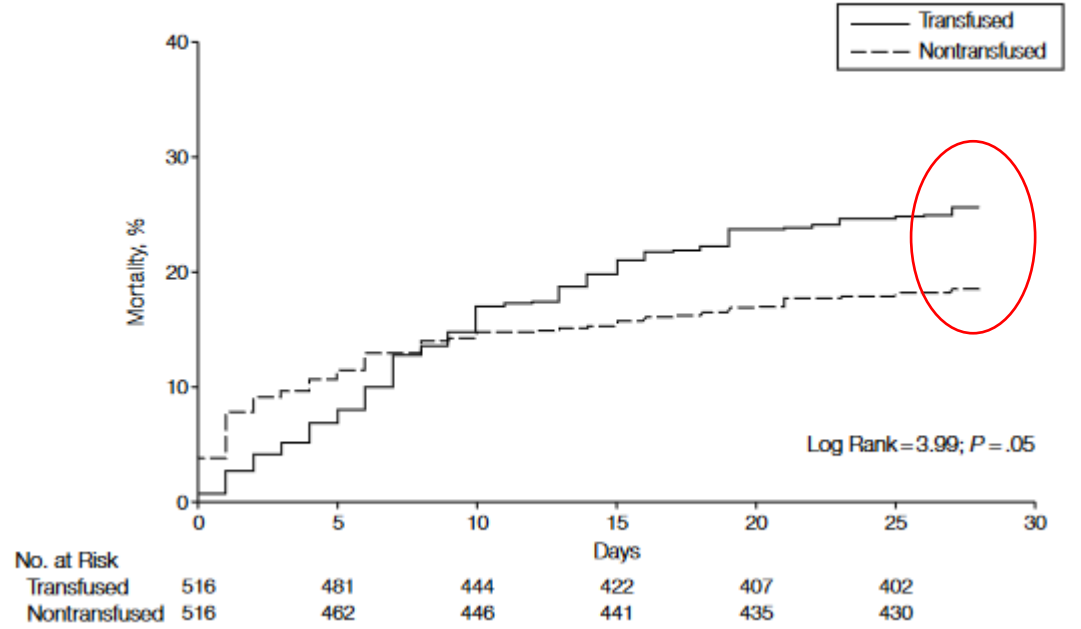
Table 7. Complications in the Intensive Care Unit

	n	%[a]	Patients Who Received Transfusions, n	%[b]
One or more complications	1552	31.7	1049	67.6
ARDS	227	5.7	217	78.3
Pulmonary edema	234	4.8	158	67.5
Sepsis	452	9.2	329	72.8
Septic shock	355	7.3	273	76.9
Infection	461	9.4	324	70.3
Pneumonia	638	13.0	421	66.0
Deep venous thrombosis	69	1.4	53	76.8
Pulmonary embolus	29	0.6	22	75.9
Significant bleeding	277	5.7	269	97.1
Transfusion reactions	—	—	86	4.0

Anemia and Blood Transfusion in Critically Ill Patients

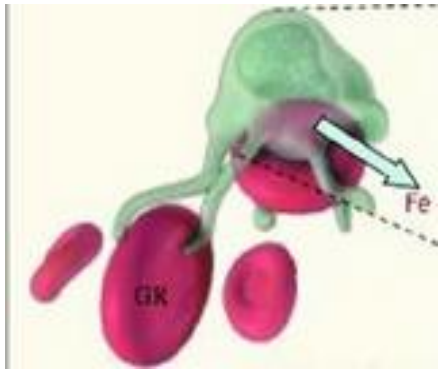
Vincent JL, et al. JAMA. 2002.

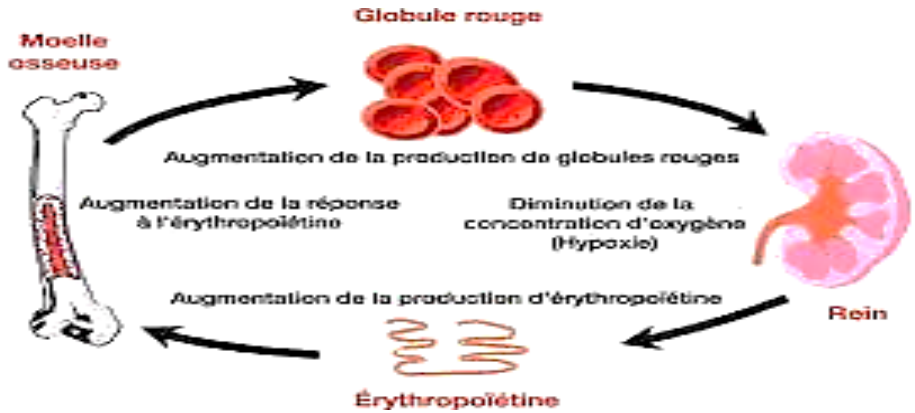
Figure 2. Survival Analysis by Transfusion Status Among Propensity-Matched Patients

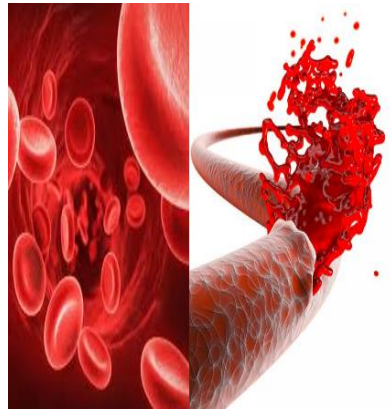


Physiopathologie

Repose sur quatre facteurs principaux:







Durée de vie réduite des GR

Défaut de synthèse de l'EPO

Défaut de réponse à l'EPO

Hémodilution

Pertes sanguines

Quand transfuser les patients de réanimation ?

Patient de soins critique

A Multicenter, Randomized, Controlled Clinical Trial of Transfusion Requirements in Critical Care

Paul C et al. N Engl J Med 1999

TABLE 2. OUTCOMES.*

OUTCOME MEASURE	RESTRICTIVE-TRANSFUSION STRATEGY (N=418)	LIBERAL-TRANSFUSION STRATEGY (N=420)	ABSOLUTE DIFFERENCE BETWEEN GROUPS	95% CONFIDENCE INTERVAL	P VALUE
			percent		
Death — no. (%)					
30-day	78 (18.7)	98 (23.3)	4.7	−0.84 to 10.2	0.11
60-day†	95 (22.7)	111 (26.5)	3.7	−2.1 to 9.5	0.23
ICU	56 (13.4)	68 (16.2)	2.3	−2.0 to 7.6	0.29
Hospital	93 (22.2)	118 (28.1)	5.8	−0.3 to 11.7	0.05
Multiple-organ-dysfunction score					
Unadjusted score	8.3±4.6	8.8±4.4	0.5	−0.1 to 1.1	0.10
Adjusted score‡	10.7±7.5	11.8±7.7	1.1	0.8 to 2.2	0.03
Change from base-line score§	3.2±7.0	4.2±7.4	1.0	0.1 to 2.0	0.04
No. of organs failing — no. (%)					
0	100 (23.9)	82 (19.5)			
1	136 (32.5)	149 (35.5)			
2	109 (26.1)	108 (26.0)			
3	51 (12.2)	63 (15.0)			
>3	22 (5.3)	18 (4.3)	1.8¶	−3.4 to 7.1¶	0.53¶
Length of stay — days					
ICU	11.0±10.7	11.5±11.3	0.5	−1.0 to 2.1	0.53
Hospital	34.8±19.5	35.5±19.4	0.7	−1.9 to 3.4	0.58

TABLE 3. COMPLICATIONS THAT OCCURRED DURING THE PATIENTS' STAYS IN THE INTENSIVE CARE UNIT.

COMPLICATION*	RESTRICTIVE-TRANSFUSION STRATEGY (N=418)	LIBERAL-TRANSFUSION STRATEGY (N=420)	ABSOLUTE DIFFERENCE BETWEEN GROUPS	95% CONFIDENCE INTERVAL†	P VALUE
	no. (%)		percent		
Cardiac	55 (13.2)	88 (21.0)	7.8	2.7 to 12.9	<0.01
Myocardial infarction	3 (0.7)	12 (2.9)	2.1	—	0.02
Pulmonary edema	22 (5.3)	45 (10.7)	5.5	1.8 to 9.1	<0.01
Angina	5 (1.2)	9 (2.1)	0.9	—	0.28
Cardiac arrest	29 (6.9)	33 (7.9)	0.9	−2.6 to 4.5	0.60
Pulmonary	106 (25.4)	122 (29.0)	3.7	−2.3 to 9.7	0.22
ARDS	32 (7.7)	48 (11.4)	3.8	−0.2 to 7.8	0.06
Pneumonia	87 (20.8)	86 (20.5)	−0.3	−5.8 to 5.1	0.92
Infectious	42 (10.0)	50 (11.9)	1.9	−2.4 to 6.1	0.38
Bacteremia	30 (7.2)	40 (9.5)	2.3	−1.4 to 6.1	0.22
Catheter-related sepsis	21 (5.0)	17 (4.0)	−1.0	−3.8 to 1.8	0.50
Septic shock	41 (9.8)	29 (6.9)	−2.9	−6.7 to 0.8	0.13
Hematologic‡	10 (2.4)	10 (2.4)	0	−2.1 to 2.1	1.00
Gastrointestinal§	13 (3.1)	19 (4.5)	1.4	−1.2 to 4.0	0.28
Neurologic¶	25 (6.0)	33 (7.9)	1.9	−1.6 to 5.3	0.28
Shock‖	67 (16.0)	55 (13.1)	−2.9	−7.7 to 1.8	0.23
Any complication	205 (49.0)	228 (54.3)	5.2	−1.5 to 12.0	0.12

Patient de soins critique

Lower versus Higher Hemoglobin Threshold for Transfusion in Septic Shock

Lars B et al. N Engl J Med 2014

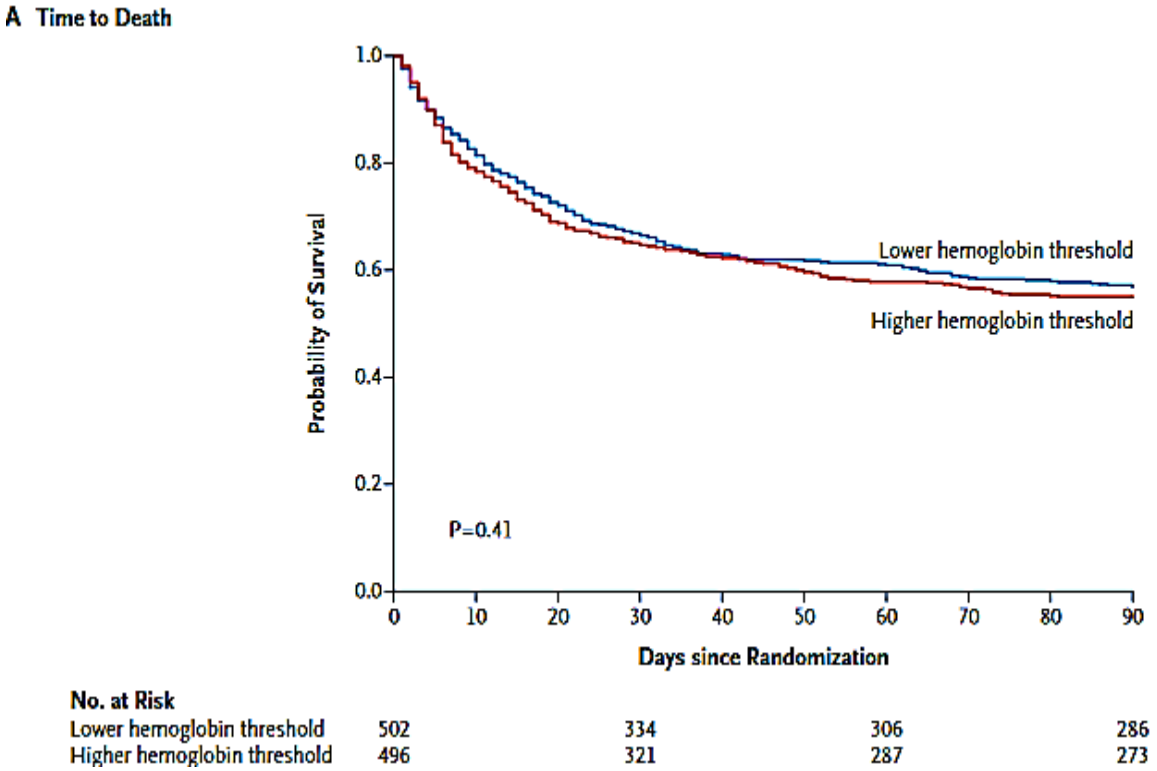


Table 2. Primary and Secondary Outcome Measures.*

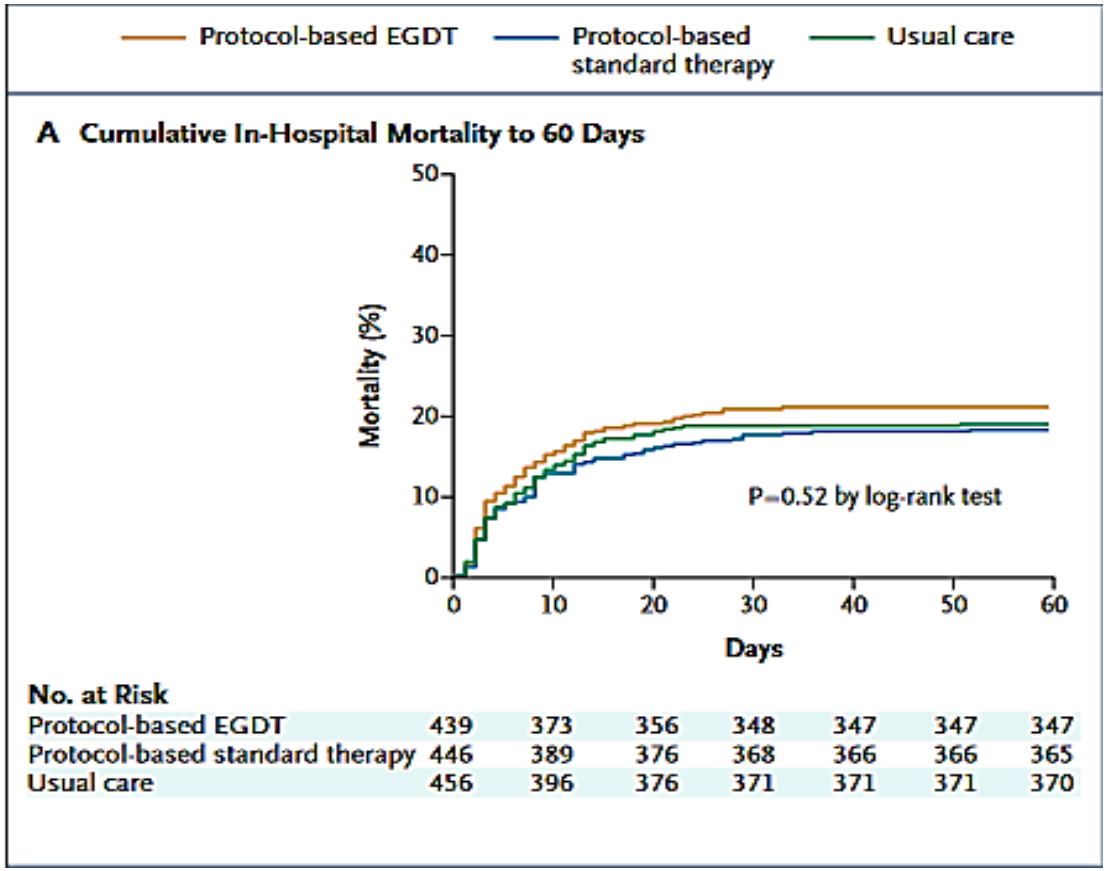
Outcome	Lower Hemoglobin Threshold	Higher Hemoglobin Threshold	Relative Risk (95% CI)	P Value
Primary outcome: death by day 90 — no./total no. (%)	216/502 (43.0)	223/496 (45.0)	0.94 (0.78–1.09)	0.44†
Secondary outcomes‡				
Use of life support — no./total no. (%)§				
At day 5	278/432 (64.4)	267/429 (62.2)	1.04 (0.93–1.14)	0.47†
At day 14	140/380 (36.8)	135/367 (36.8)	0.99 (0.81–1.19)	0.95†
At day 28	53/330 (16.1)	64/322 (19.9)	0.77 (0.54–1.09)	0.14†
Ischemic event in the ICU — no./total no. (%)¶	35/488 (7.2)	39/489 (8.0)	0.90 (0.58–1.39)	0.64‖
Severe adverse reaction — no./total no. (%)**	0/488	1/489 (0.2)	—	1.00
Alive without vasopressor or inotropic therapy — mean % of days††	73	75	—	0.93
Alive without mechanical ventilation — mean % of days††	65	67	—	0.49
Alive without renal-replacement therapy — mean % of days††	85	83	—	0.54
Alive and out of the hospital — mean % of days††	30	31	—	0.89

Patient de soins critique

A Randomized Trial of Protocol-Based Care for Early Septic Shock

The ProCESS Investigators*N Engl J Med 2014

in the EGDT protocol, protocol-based standard therapy recommended packed red-cell transfusion only if the hemoglobin level was less than 7.5 g per deciliter. The protocol for standard



Patient de soins critique

Effect of restrictive versus liberal transfusion strategies on outcomes in patients with cardiovascular disease in a non-cardiac surgery setting: systematic review and meta-analysis Annemarie B D et al. BMJ 2016

WHAT IS ALREADY KNOWN ON THIS TOPIC

Restrictive red cell transfusion policies are recommended as safe for most hospital patients with anaemia

Uncertainty exists for patients with cardiovascular disease, whose hearts may be more susceptible to limited coronary oxygen supply

No systematic reviews have specifically compared outcomes for patients with cardiovascular disease in a non-cardiac surgery setting, and guidelines acknowledge the paucity of evidence in this area

WHAT THIS STUDY ADDS

Restrictive blood transfusion strategies may not be as safe as more liberal strategies for patients with coexisting cardiovascular disease in non-cardiac surgery settings

An increased risk of acute coronary syndrome was shown with restrictive thresholds (haemoglobin level <80 g/L)

These data support the use of a more liberal transfusion threshold (>80 g/L) for patients with both acute and chronic cardiovascular disease, until adequately powered high quality randomised trials have been undertaken in this patient population

Patient de soins critique

R2.1 – Il est recommandé de suivre une stratégie transfusionnelle restrictive (seuil d'Hb à 7,0 g/dL) chez les patients de soins critiques en général, y compris chez les patients septiques, afin de réduire le recours à la transfusion de concentrés érythrocytaires sans augmenter la morbi-mortalité.

Grade 1+, (accord FORT)

La proposition de recommandation d'adopter un seuil restrictif (à 7,0 g/dL) chez les patients de soins critiques porteurs de pathologies cardio-vasculaires chroniques n'a pas abouti à un accord fort après vote du groupe d'experts. Cette incertitude persistante justifie certainement de nouvelles études randomisées plus homogènes sur cette typologie de patients.

Gestion et prévention de l'anémie (hors hémorragie aigüe) chez le patient adulte de soins critiques 2019
RFE commune SFAR – SRLF

Patient ayant un syndrome coronarien aigu

Conservative Versus Liberal Red Cell Transfusion in Acute Myocardial Infarction (the CRIT Randomized Pilot Study) Howard A et al. Am J Cardio 2011

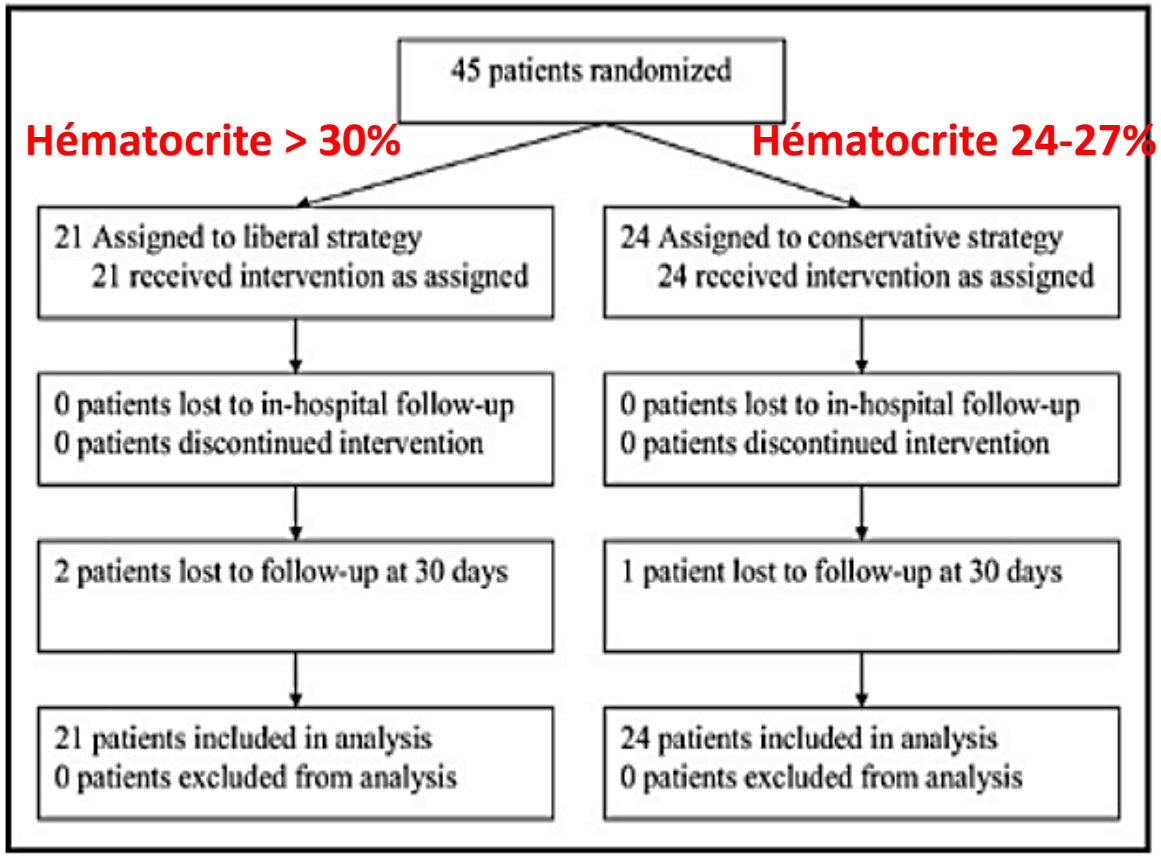


Figure 1. Participant flow diagram.

Table 3
Clinical end points according to transfusion strategy

End Point	Liberal (n = 21)	Conservative (n = 24)	p Value
In-hospital death or recurrent myocardial infarction or new or worsening heart failure	38%	13%	0.046
In-hospital death	5%	8%	1.0
In-hospital death or recurrent myocardial infarction	5%	8%	1.0
In-hospital new or worsening heart failure	38%	8%	0.03
In-hospital recurrent ischemia	0%	4%	1.0
In-hospital death or recurrent myocardial infarction or new or worsening heart failure or recurrent ischemia	38%	17%	0.4
Coronary care unit length of stay (days), mean ± SD	3.4 ± 2.3	4.3 ± 3.3	0.3
Hospital length of stay (days), mean ± SD	8.5 ± 5.6	10.4 ± 7.2	0.3
Death at 30 days	5%	8%	1.0
Death or recurrent myocardial infarction at 30 days	10%	8%	1.0
Death or recurrent myocardial infarction or new or worsening heart failure at 30 days	60%	20%	0.02

Patient ayant un syndrome coronarien aigu

Liberal versus restrictive transfusion thresholds for patients with symptomatic coronary artery disease Jeffrey L et al. Am Heart J 2013

Table III. MINT trial adjudicated 30-day events **Hb > 10g/dl** **Hb > 8g/dl**

Pilot study endpoints	Overall, N = 109 n		Liberal, N = 55 n		Restrictive, N = 54§ n		P*	Absolute risk difference at 30 days (95% CI)	Relative risk (95% CI)
Death/MI/unscheduled revascularization	20	18.3%	6	10.9%	14	25.9%	0.054†	15.0% (0.7%, 29.3%)	2.38 (0.99, 5.73)
Death‖	8	7.3%	1	1.8%	7	13.0%	0.032	11.1% (1.5%, 20.8%)	7.13 (0.91, 56.02)
Myocardial infarction	12	11.0%	5	9.1%	7	13.0%	0.52	3.9% (−7.9%, 15.6%)	1.43 (0.48, 4.22)
Unscheduled coronary revascularization‡	2	1.8%	0	0.0%	2	3.7%	0.24	3.7% (−1.3%, 8.7%)	—
Unscheduled hospital admission									
Any reason	26	23.8%	9	16.4%	17	31.5%	0.064	15.1% (−0.7%, 30.9%)	1.92 (0.94, 3.93)
Cardiac reason	11	10.1%	3	5.5%	8	14.8%	0.10	9.3% (−1.9%, 20.6%)	2.72 (0.76, 9.70)
Infection	2	1.8%	0	0.0%	2	3.7%	0.24		
Stroke†	1	0.9%	1	1.8%	0	0.0%	1.0		
Congestive heart failure	9	8.2%	2	3.6%	7	13.0%	0.093	9.3% (−0.9%, 19.6%)	3.56 (0.78, 16.40)
Stent thrombosis	0	0.0%	0	0.0%	0	0.0%	-		
DVT or pulmonary embolism†	1	0.9%	1	1.8%	0	0.0%	1.0		
Pneumonia or blood stream infection†	2	1.8%	0	0.0%	2	3.7%	0.24		
Pneumonia	2	1.8%	0	0.0%	2	3.7%	0.24		
Blood stream infection†	0	0.0%	0	0.0%	0	0.0%	-		
Death/MI/unscheduled revascularization/pneumonia	22	20.2%	6	10.9%	16	29.6%	0.015	18.7% (4.0%, 33.4%)	2.72 (1.15, 6.42)
Death/MI	18	16.5%	6	10.9%	12	22.2%	0.11	11.3% (−2.5%, 25.1%)	2.04 (0.82, 5.04)
Unstable angina	5	4.6%	1	1.8%	4	7.4%	0.21	5.6% (−2.2%, 13.4%)	4.07 (0.47, 35.29)
Death/MI/unstable angina	23	21.1%	7	12.7%	16	29.6%	0.031	16.9% (1.9%, 31.9%)	2.32 (1.04, 5.21)
Death/MI/unscheduled cardiac admission	26	23.9%	9	16.4%	17	31.5%	0.064	15.1% (−0.7%, 30.9%)	1.92 (0.94, 3.93)

*Fisher exact test P value reported when any cell had less than 5 observations.
†Cochran-Mantel-Haenszel P value reported.
‡Events not classified by adjudication committee.
§One patient had no MINT contact after 3 days and was excluded from the analysis.
‖All deaths were classified as cardiac.

Patient ayant un syndrome coronarien aigu

R2.3 – Il n'est probablement pas recommandé de suivre une stratégie transfusionnelle libérale ciblant un objectif d'Hb > 10,0 g/dL afin de diminuer la morbi-mortalité chez les patients ayant un syndrome coronarien aigu, revascularisé ou non.

Grade 2-, (accord FORT)

Gestion et prévention de l'anémie (hors hémorragie aigüe) chez le patient adulte de soins critiques 2019
RFE commune SFAR – SRLF

Patient en post opératoire de chirurgie cardiaque

Effects of restrictive red blood cell transfusion on the prognoses of adult patients undergoing cardiac surgery: a meta-analysis of randomized controlled trials

Chen et al. Critical Care (2018)

Table 2 Effects of red blood cell transfusion by outcome

	Number of studies	Number of patients	Fixed effects Odds ratio (95% CI)	Fixed effects *p* value	I^2 (%)	Heterogeneity *p* value
Mortality	7	8886	0.98 (0.77–1.24)	0.87	9	0.36
Pulmonary morbidity	5	3658	1.09 (0.88–1.34)	0.42	0	0.44
AKI	6	8355	1.03 (0.92–1.14)	0.65	0	0.71
AMI	4	7302	1.01 (0.80–1.27)	0.95	0	0.78
Infectious morbidity	6	8444	1.11 (0.95–1.3)	0.19	0	0.58
Cerebrovascular accident	6	8528	0.97 (0.72–1.30)	0.84	0	0.66

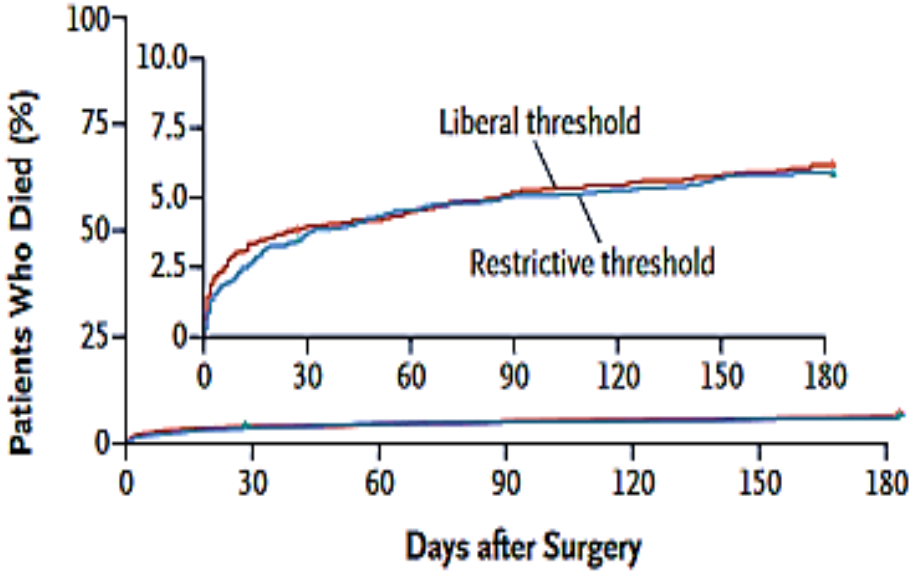
AKI acute kidney injury, *AMI* acute myocardial infarction

Patient en post opératoire de chirurgie cardiaque

Six-Month Outcomes after Restrictive or Liberal Transfusion for Cardiac Surgery Mazer CD et al. N Engl J Med 2018

CONCLUSIONS

In patients undergoing cardiac surgery who were at moderate-to-high risk for death, a restrictive strategy for red-cell transfusion was noninferior to a liberal strategy with respect to the composite outcome of death from any cause, myocardial infarction, stroke, or new-onset renal failure with dialysis at 6 months after surgery. (Funded by the Canadian Institutes of Health Research and others; TRICS III ClinicalTrials.gov number, NCT02042898.)



No. at Risk							
Liberal threshold	2429	2222	2209	2193	2187	2179	2170
Restrictive threshold	2427	2202	2181	2170	2165	2155	2150

Patient en post opératoire de chirurgie cardiaque

R2.2 – Il est recommandé de suivre une stratégie transfusionnelle restrictive (seuil transfusionnel d'Hb entre 7,5 et 8,0 g/dL) chez les patients de soins critiques en post-opératoire de chirurgie cardiaque, afin de réduire le recours à la transfusion de concentrés érythrocytaires sans augmenter la morbi-mortalité.

Grade 1+, (accord FORT)

Gestion et prévention de l'anémie (hors hémorragie aigüe) chez le patient adulte de soins critiques 2019
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Patient cérébrolésé

Hemoglobin levels and transfusions in neurocritically ill patients: a systematic review of comparative studies

Crit Care Desjardins et al2012

Table 1 Description of included studies

Study	Design	Number	Setting	Population	Outcomes measured	Confounding factors considered in the analyses	Follow-up period
McIntyre *et al.* (2006)	Subgroup of a previously published RCT	67	25 adult ICUs	Moderate to severe TBI	Mortality, MODS, ICULOS, HLOS, RBCT during ICU, infection, physician nonadherence	Age, APACHE score, use of pulmonary artery catheter, mechanical ventilation, vasopressor agents	60 days
Flückiger *et al.* (2010)	Retrospective cohort study	139	One adult ICU	Severe TBI	In-hospital mortality, ICU complications, GOSe	Worst Hct during ER/OR phase, transfusion and volume management during ER/OR phase, complications and transfusions during ICU phase	6 months
Lacroix *et al.* (2007)	Subgroup of a previously published RCT	66	19 pediatric ICUs	TBI ICH Elective neurosurgery Other space-occupying injuries	MODS, progression of MODS, ICULOS, duration of mechanical ventilation, mortality, infections, transfusion reaction, adverse events	Age, country, severity of illness, anemia, admission diagnosis	28 days
George *et al.* (2008)	Retrospective cohort study	82	Two adult ICUs	Severe TBI	Mortality, pneumonia, UTI, bacteremia, sepsis, decubitus ulcer, myocardial infarction, seizure, DVT, pulmonary embolus	Age, gender, motor and total GCS, admission BAL, head and neck AIS score, ISS, presence of SAH, min. ICU Na and Hb levels, RBCT, any complication	NR
Warner *et al.* (2010)	Retrospective cohort study	139	One adult ICU	Moderate to severe TBI	GOSe, FSE, mortality	Age, head AIS score, days with Hb < 10 g/dl, RBCT performed, volume of RBCT, highest serum glucose, days with serum glucose > 200 mg/dl, HLOS, admission GCS, mild versus severe TBI, reason and timing for RBCT	6 months
Naidech *et al.* (2010)	Randomized controlled trial	44	One adult ICU	SAH at high risk of vasospasm, cerebral infarction	Fever, ventilator-free days, vasospasm, pulmonary edema or respiratory distress NIH Stroke Scale, modified Rankin Scale	Age, WFNS score on admission, history of hypertension or diabetes	3 months

AIS, abbreviated injury scale; APACHE, Acute Physiology and Chronic Health Evaluation; BAL, blood alcohol level; DVT, deep vein thrombosis; ER, emergency room; FSE, functional status examination; GCS, Glasgow Coma Scale; GOSe, Extended Glasgow Outcome Scale; Hb, hemoglobin concentration; Hct, hematocrit; HLOS, hospital length of stay; ICH, intracerebral hemorrhage; ICU, intensive care unit; ICULOS, intensive care unit length of stay; ISS, injury severity score; MODS, multiple organ dysfunction syndrome; NIH, National Institutes of Health; NR, not reported; OR, operating room; RBCT, red blood cell transfusion; RCT, randomized controlled trial; SAH, subarachnoid hemorrhage; TBI, traumatic brain injury; UTI, urinary tract infection; WFNS, World Federation of Neurosurgeons.

Results: Among 4,310 retrieved records, six studies met inclusion criteria (n = 537). Four studies were conducted in traumatic brain injury (TBI), one in subarachnoid hemorrhage (SAH), and one in a mixed population of neurocritically ill patients. The minimal hemoglobin levels or transfusion thresholds ranged from 7 to 10 g/dl in the lower-Hb groups and from 9.3 to 11.5 g/dl in the higher-Hb groups. Three studies had a low risk of bias, and three had a high risk of bias. No effect was observed on mortality, duration of mechanical ventilation, or multiple organ failure. In studies reporting on length of stay (n = 4), one reported a significant shorter ICU stay (mean, -11.4 days (95% confidence interval, -16.1 to -6.7)), and one, a shorter hospital stay (mean, -5.7 days (-10.3 to -1.1)) in the lower-Hb groups, whereas the other two found no significant association.

Patient cérébrolésé

Effect of Hemoglobin Transfusion Threshold on Cerebral Hemodynamics and Oxygenation

Jose-Miguel Y et al Journal of neurotrauma 2015

Abstract

Cerebral dysfunction caused by traumatic brain injury may adversely affect cerebral hemodynamics and oxygenation leading to worse outcomes if oxygen capacity is decreased due to anemia. In a randomized clinical trial of 200 patients comparing transfusion thresholds <7 g/dl versus 10 g/dl, where transfusion of leukoreduced packed red blood cells was used to maintain the assigned hemoglobin threshold, no long-term neurological difference was detected. The current study examines secondary outcome measures of intracranial pressure (ICP), cerebral perfusion pressure (CPP), and brain tissue oxygenation ($PbtO_2$) in patients enrolled in this randomized clinical trial. We observed a lower hazard for death (hazard ratio [HR]=0.12, 95% confidence interval [CI]=0.02–0.99) during the first 3 days post-injury, and a higher hazard for death after three days (HR=2.55, 95% CI=1.00–6.53) in the 10 g/dl threshold group as compared to the 7 g/dL threshold group. No significant differences were observed for ICP and CPP but MAP was slightly lower in the 7 g/dL group, although the decreased MAP did not result in increased hypotension. Overall brain tissue hypoxia events were not significantly different in the two transfusion threshold groups. When the $PbtO_2$ catheter was placed in normal brain, however, tissue hypoxia occurred in 25%

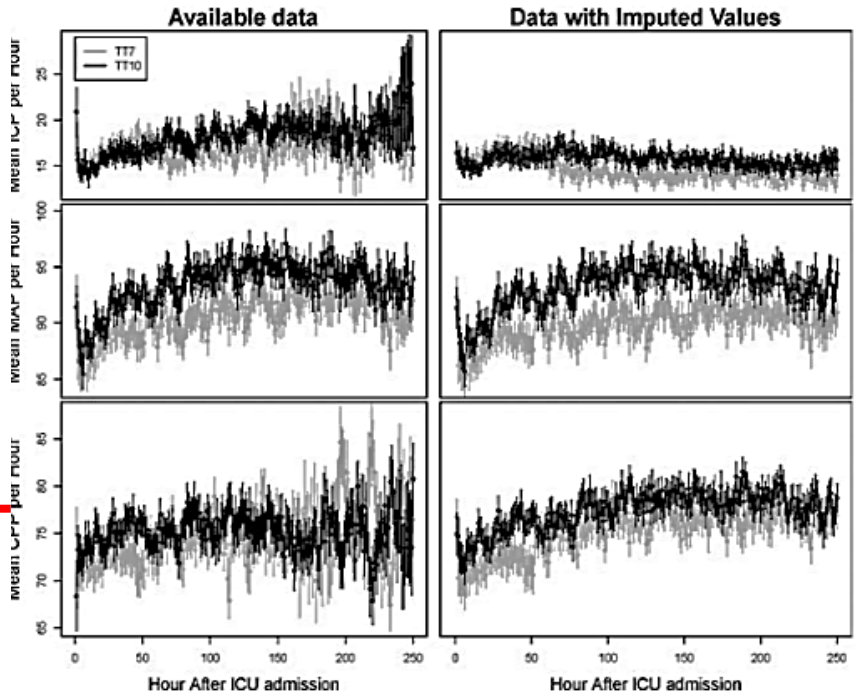


FIG. 2. Trend plot of average intracranial pressure (ICP), mean arterial pressure (MAP), and cerebral perfusion pressure (CPP) over time in the two transfusion threshold groups (TT7=7/g/dL threshold group, TT10=10 g/dL threshold group). The vertical bars indicate the standard error of the mean. The first column is available data and the second column is available data plus one set of imputed values for missing observations. ICU, intensive care unit.

Patient cérébrolésé

Hemoglobin thresholds and red blood cell transfusion in adult patients with moderate or severe traumatic brain injuries: A retrospective cohort study
Crit Care Boutin A et al,2018

Purpose

We aimed to evaluate the association between transfusion practices and clinical outcomes in patients with traumatic brain injury.

Results

We included 215 patients. Sixty-six patients (30.7%) were transfused during ICU stay. The median pre-transfusion Hb among transfused patients was 81 g/L (IQR 67–100), while median nadir Hb among non-transfused patients was 110 g/L (IQR 93–123). Poor outcomes were significantly more frequent in patients who were transfused (mortality risk ratio [RR]: 2.15 [95% CI 1.37–3.38] and hazard ratio: 3.06 [95% CI 1.57–5.97]; neurological complications RR: 3.40 [95% CI 1.35–8.56]; trauma complications RR: 1.65 [95% CI 1.31–2.08]; ICU length of stay geometric mean ratio: 1.42 [95% CI 1.06–1.92]).

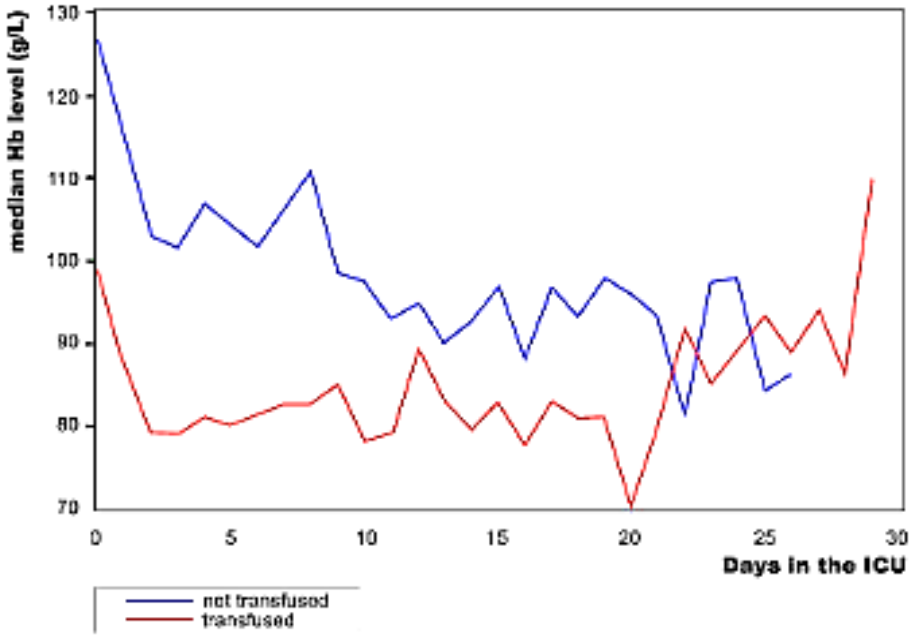


Figure 1

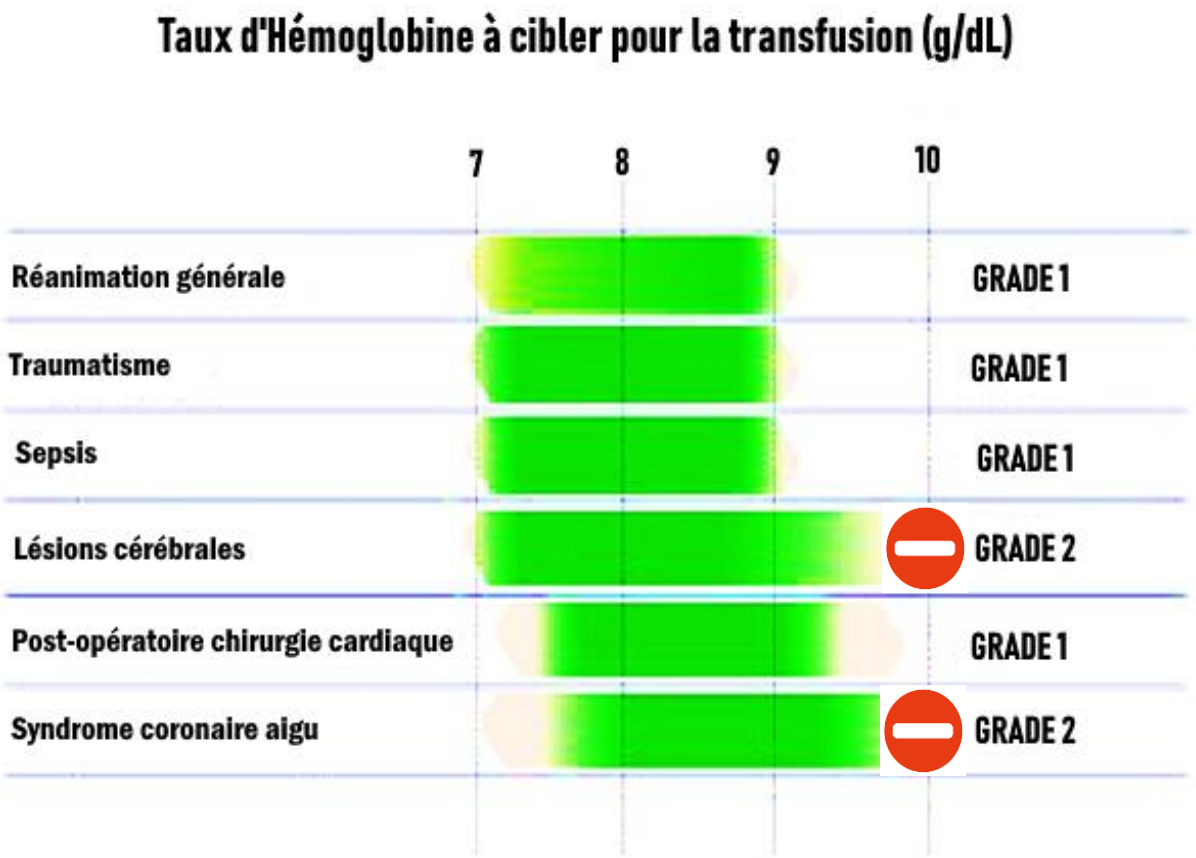
Patient cérébrolésé

R2.4 – Il n'est probablement pas recommandé de suivre une stratégie transfusionnelle libérale ciblant un objectif d'Hb >10,0 g/dL pour diminuer la morbi-mortalité chez les patients cérébrolésés.

Grade 2-, (accord FORT)

Gestion et prévention de l'anémie (hors hémorragie aigüe) chez le patient adulte de soins critiques 2019
RFE commune SFAR – SRLF

Quand transfuser les patients de réanimation ?



Il n'est probablement pas recommandé de suivre une stratégie transfusionnelle libérale ciblant >10g/dl

Ces cibles, en dehors d'hémorragie active ou de mauvaise tolérance de l'anémie (cardio-vasculaire+++)

Comment transfuser les patients de réanimation ?

Systematic reviews of guidelines and studies for single versus multiple unit transfusion strategies. Shih AWet al. Transfusion 2018

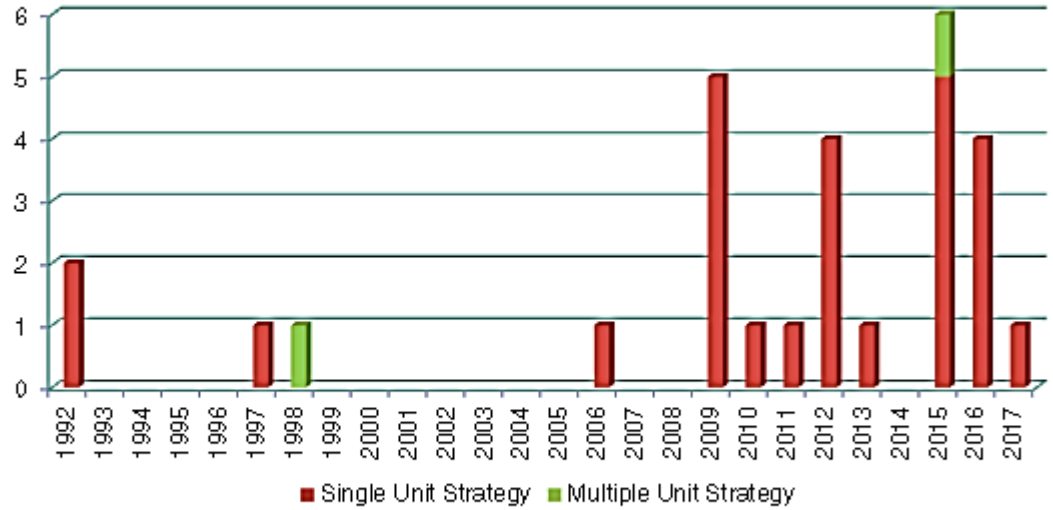


Fig. 3. Number of articles recommending single- and multiple-unit strategies published over time.

RESULTS: The first review identified 145 articles for analysis, with 51 transfusion guidelines. Only 14 guidelines (27%) made a recommendation, with most (93%) recommending single-unit transfusions. The

R2.6 – Les experts suggèrent d'adopter une stratégie transfusionnelle restrictive basée sur la transfusion d'un concentré érythrocytaire unitaire suivie d'une réévaluation de l'indication transfusionnelle, afin de réduire la consommation de concentrés érythrocytaires sans augmenter la morbi-mortalité.
Avis d'experts

Gestion et prévention de l'anémie (hors hémorragie aigüe) chez le patient adulte de soins critiques 2019
RFE commune SFAR – SRLF

Patient en état de choc hémorragique

RBC Transfusion Strategies in the ICU: A Concise Review

Crit Care Med Casey A et al,2019

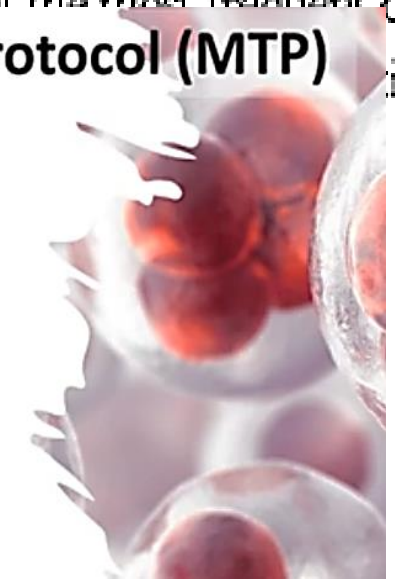
Hemorrhagic Shock

Hemorrhagic shock accounts for over 60,000 U.S. deaths annually with the vast majority related to trauma (55). Nearly 30% of prehospital trauma deaths and 20% of all hospital trauma deaths are due to hemorrhage (56–60). Massive transfusion protocols (MTPs) are the standard of care for managing hemorrhagic shock. Traumatic injuries, ruptured abdominal aortic aneurysms, gastrointestinal, and obstetric bleedings represent the most frequent causes of MTP activation (61–63). Although ing, the traditional definition of 10 RBC u

Massive transfusion protocol (MTP)

Complications:

- TACO
- TRALI
- Hypothermia
- Hyperkalemia, hypocalcemia
- Dilutional coagulopathy
- Excessive citrate
- Disease transmission



Patient en état de choc hémorragique

Recommandation

Il faut probablement avoir un objectif d'hémoglobine entre 7 et 9 g/dL (GRADE 2 +).

Recommandations sur la réanimation du choc hémorragique SFAR 2015

Une population hétérogène d'USI

Patients normo-volémiques

CGR non leuco-depleté

Un objectif d'hémoglobine plus élevé pourrait être préconisé chez certains patients (entre **9 et 10 g/dL**)

Traitements hors transfusion

Agents stimulants de l'érythropoièse

Harms of off-label erythropoiesis-stimulating agents for critically ill people.

Mesgarpour B et al Cochrane Database 2018

Intervention: ESAs parenteral
Comparison: No ESAs (including no treatment, placebo, or other treatment)

Outcomes	Illustrative comparative risks* (95% CI)		Bayesian relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Non ESAs	ESAs				
Any adverse event Follow-up: 28 days to 6 months	645 per 1000[1] 421 per 1000[2]	677 per 1000[1] (600 to 780) 442 per 1000[2] (391 to 509)	RR 1.05 (0.93 to 1.21)	3099 (8 RCTs and 1 observational)	⊕⊕◯◯ low[3]	There may be little or no effect on any adverse events.
Venous thromboembolism Follow-up: 5 days to 12 months	19 per 1000[1] 51 per 1000[2]	20 per 1000[1] (13 to 27) 53 per 1000[2] (36 to 72)	RR 1.04 (0.70 to 1.41)	18,917 (13 RCTs and 5 observational)	⊕◯◯◯ very low[4]	There may be little or no effect on venous thromboembolism.
Mortality Follow-up: 5 to 30 days	68 per 1000[1] 150 per 1000[2]	52 per 1000[1] (41 to 62) 114 per 1000[2] (91 to 138)	RR 0.76 (0.61 to 0.92)	930,470 (25 trials and 9 observational)	⊕⊕◯◯ low[5]	There is possibly a decrease in mortality.

*The basis for the assumed risk (e.g. the median control group risk across studies) is provided in footnotes. The corresponding risk (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI).
CI: Confidence interval; RCTs: randomized controlled trials; RR: Bayesian Risk Ratio combining both randomized and non-randomized studies;

Agents stimulants de l'érythropoièse

R3.1 – Il est probablement recommandé d'utiliser des agents stimulants de l'érythropoièse chez les patients de soins critiques anémiques (Hb ≤ 10-12 g/dl) et/ou traumatisés, en l'absence de contre-indication, notamment d'antécédents de pathologies cardio-vasculaires ischémiques et/ou veineuses thrombo-emboliques, afin de réduire le recours à la transfusion de concentrés érythrocytaires et de diminuer la mortalité.

Grade 2+, (accord FORT)

En pratique

Qui:

-Patient ≥ 5j réa
-Hb < 12g/dl
-Traumatisés
-Pas de risque ischémique et/ou thromboembolique

Comment:

-Epoietin
-40000 UI/semaine
-IV
-Avec du Fer si CM
-STOP quand risque Hb > 12

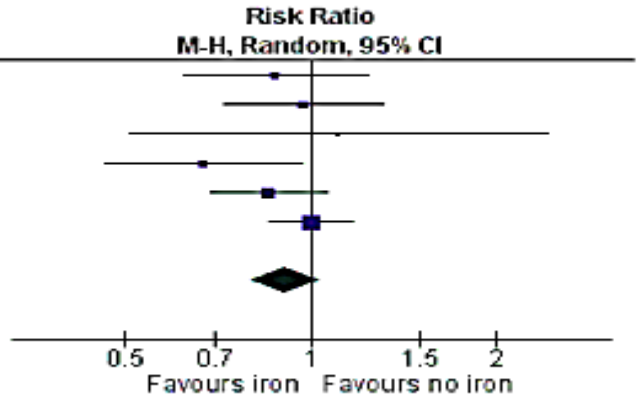
Supplémentation en Fer

Safety and efficacy of iron therapy on reducing red blood cell transfusion requirements and treating anaemia in critically ill adults: A systematic review with meta-analysis and trial sequential analysis Akshay S et al Journal of Critical Care 2019

(a) Requirement for RBC transfusion

Study or Subgroup	Iron Events	Iron Total	No iron Events	No iron Total	Weight	Risk Ratio M-H, Random, 95% CI
Garrido-Martin 2012	47	107	26	52	11.8%	0.88 [0.62, 1.24]
Litton 2016	38	70	39	70	15.0%	0.97 [0.72, 1.31]
Madi-Jebara 2004	10	40	9	40	2.6%	1.11 [0.51, 2.44]
Pieracci 2009	29	97	46	103	10.4%	0.67 [0.46, 0.97]
Pieracci 2014	47	75	55	75	23.5%	0.85 [0.68, 1.07]
van Iperen 2000	12	12	12	12	36.6%	1.00 [0.86, 1.17]
Total (95% CI)		**401**		**352**	**100.0%**	**0.91 [0.80, 1.04]**
Total events	183		187			

Heterogeneity: Tau² = 0.01; Chi² = 6.43, df = 5 (P = 0.27); I² = 22%
Test for overall effect: Z = 1.44 (P = 0.15)

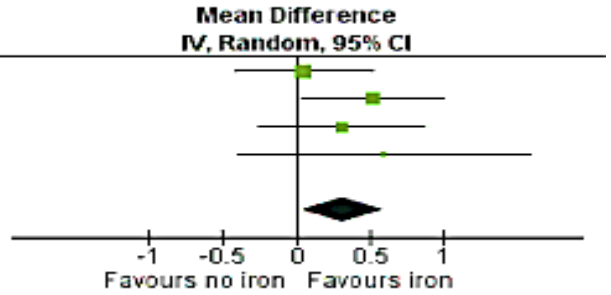


NS

(d) Mean Hb concentration (g/dL) (>10 days)

Study or Subgroup	Iron Mean	Iron SD	Iron Total	No iron Mean	No iron SD	No iron Total	Weight	Mean Difference IV, Random, 95% CI
Garrido-Martin 2012	11.05	1.4	107	11	1.44	52	34.4%	0.05 [-0.42, 0.52]
Litton 2016	10.67	1.38	70	10.15	1.5	70	33.8%	0.52 [0.04, 1.00]
Madi-Jebara 2004	12.18	1.04	30	11.87	1.21	31	24.1%	0.31 [-0.26, 0.88]
van Iperen 2000	11.4	1.3	9	10.8	0.8	9	7.7%	0.60 [-0.40, 1.60]
Total (95% CI)			**216**			**162**	**100.0%**	**0.31 [0.04, 0.59]**

Heterogeneity: Tau² = 0.00; Chi² = 2.23, df = 3 (P = 0.53); I² = 0%
Test for overall effect: Z = 2.22 (P = 0.03)



+0,3 g/dl

Supplémentation en Fer

R3.3 – Chez les patients de soins critiques, en dehors d'une association avec un traitement par agent stimulant de l'érythropoïèse, il n'est probablement pas recommandé d'administrer du fer pour réduire le recours à la transfusion érythrocytaire ou la morbi-mortalité.

Grade 2-, (accord FORT)

Prévenir l'anémie en réanimation

Réduction des prélèvements

Devices to Reduce the Volume of Blood Taken for Laboratory Testing in ICU Patients: A Systematic Review Siegal A et al Journal of Intensive Care Medicine 2020

Table 3. Effect of Interventions on Blood Sampling Volumes.[a]

Author (year)	Type of Average and Timeframe	Average Volume of Blood, mL		Percent Change in Volume of Blood Collected, %
		Intervention	Comparator	
Blood collection tube interventions				
Dolman (2015)	Mean (SD) per ICU stay	174.0 (182.0)	299.0 (355.0)	41.8
	Mean (SD) per day	22.5 (17.3)	31.7 (15.5)	29.0
Sanchez-Giron (2008)	Median (IQR) per ICU stay	5.1 (2.3-10.9)	19.9 (12.0-35.8)	74.4
Smoller (1989)[b]	Mean per ICU stay	120.2	226.1	46.8[c]
	Mean per day	32.2	55.6	42.1[c]
Arterial Line Interventions				
Gleason (1992)	Mean per day	35.0	69.0	49.3
Harber (2006)	Median (range) per day	8.0 (7.0-10.0)	40.0 (28.0-43.0)	80.0
MacIsaac (2003)	Median (range) per ICU stay	63.0 (0-787.0)	133.0 (7.0-1227.0)	52.6
Peruzzi (1993)[b]	Mean per ICU stay	260.3	320.8	18.9[c]
Low (1995)	Mean (SD) per ICU stay	63.6 (28.4)	114.7 (53.9)	44.5

Abbreviation: ICU, intensive care unit.

[a] Comparisons were statistically significant unless otherwise specified.

[b] Standard deviation not provided.

[c] *P* value not provided

Réduction des prélèvements

R1.1 – Les experts suggèrent d'appliquer une stratégie de réduction des prélèvements sanguins (en volume et en nombre) pour diminuer l'incidence de l'anémie et la transfusion en soins critiques.
Avis d'experts

Conclusion

L'anémie est extrêmement fréquente chez les patients de soins critiques

Les experts recommandent:

- Des seuils transfusionnels restrictifs
  - ✓ Hb: 7 à 9 g/dl (réanimation générale, sepsis , traumatisme...)
  - ✓ Pas de cible d'Hb > 10g/dl (cérébrolésé, syndrome coronarien aigu)
- Une politique de transfusion unitaire
- De traiter par érythropoïétine les patients anémiques (traumatisme+++, absence de contre-indications)
- De ne pas donner de Fer
- Des stratégies de réduction des prélèvements sanguins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Merci