JAMA | Special Communication

Platelet Transfusion
2025 AABB and ICTMG International Clinical Practice Guidelines

Ryan A. Metcalf, MD; Susan Nahirniak, MD; Gordon Guyatt, MD; Aarti Bathla, MPH; Sandra K. White, MS; Arwa Z. Al-Riyami, MD; Rachel C. Jug, MB, BCh, BAO; Ursula La Rocca, MD; Jeannie L. Callum, MD; Claudia S. Cohn, MD; Abe DeAnda, MD; Robert A. DeSimone, MD; Allan Dubon, MLS; Lise J. Estcourt, MB, BChir; Daniela C. Filipescu, MD; Mark K. Fung, MD; Ruchika Goel, MD; Aaron S. Hess, MD; Heather A. Hume, MD; Richard M. Kaufman, MD; Peter Kranke, MD; Vernon J. Louw, MBChB, MMed, PhD; Morten H. Møller, MD; Michael F. Murphy, MD; Jennifer A. Muszynski, MD; Cian J. O'Kelly, MD; Monica B. Pagano, MD; Gopal K. Patidar, MD; Katerina Pavenski, MD; Jacqueline N. Poston, MD; Nabiha H. Saifee, MD, PhD; Moritz Stolla, MD; Zbigniew M. Szczepiorkowski, MD, PhD; Aaron A.R. Tobian, MD; Raman Uberoi, MD; Jonathan Waters, MD; Brittney Williams, MD; Erica M. Wood, MD; Nicole D. Zantek, MD, PhD; Michelle P. Zeller, MD; Brenda J. Grossman, MD; Simon J. Stanworth, MD, DPhil

IMPORTANCE Platelet transfusion is a frequent procedure with benefits and risks.

OBJECTIVE To provide recommendations in adult and pediatric populations in whom platelet transfusions are commonly performed.

EVIDENCE REVIEW Grading of Recommendations Assessment Development and Evaluation (GRADE) methodology was applied to findings from 21 randomized trials and 13 observational studies in contexts of limited randomized clinical trial data. Transfusion strategies using fewer (restrictive) vs greater (liberal) amounts of platelets were compared.

FINDINGS Evidence demonstrated that restrictive transfusion strategies probably did not cause increases in mortality or bleeding relative to liberal strategies across predefined clinical populations. Exceedingly low incidence of spinal hematoma was identified in patients with thrombocytopenia undergoing lumbar puncture. Because definitions of restrictive strategies varied across trials, recommendations reflect practical guidance. The following recommendations are strong recommendations with high/moderate–certainty evidence. For hypoproliferative thrombocytopenia in nonbleeding patients receiving chemotherapy or undergoing allogeneic stem cell transplant, platelet transfusion is recommended when platelet count is less than 10×10^3/μL. For consumptive thrombocytopenia in neonates without major bleeding, platelet transfusion is recommended when platelet count is less than 25×10^3/μL. In patients undergoing lumbar puncture, platelet transfusion is recommended when platelet count is less than 20×10^3/μL. In patients with consumptive thrombocytopenia due to Dengue without major bleeding, platelet transfusion is not recommended. The following recommendations are conditional recommendations with low/very low–certainty evidence. For hypoproliferative thrombocytopenia in nonbleeding adults undergoing autologous stem cell transplant or with aplastic anemia, prophylactic platelet transfusion is not recommended. In adults with consumptive thrombocytopenia without major bleeding, platelet transfusion is recommended when platelet count is less than 10×10^3/μL. In adults undergoing central venous catheter placement in compressible anatomic sites, platelet transfusion is recommended when platelet count is less than 10×10^3/μL. In adults undergoing interventional radiology, platelet transfusion is recommended when platelet count is less than 20×10^3/μL for low-risk procedures and less than 50×10^3/μL for high-risk procedures. For adults undergoing major nonneuraxial surgery, platelet transfusion is recommended when platelet count is less than 50×10^3/μL. For patients without thrombocytopenia undergoing cardiovascular surgery in the absence of major hemorrhage, including those receiving cardiopulmonary bypass, platelet transfusion is not recommended. For nonoperative intracranial hemorrhage in adults with platelet count greater than 100×10^3/μL, including those receiving antiplatelet agents, platelet transfusion is not recommended.

CONCLUSIONS AND RELEVANCE A consistent pattern of evidence supports the implementation of restrictive platelet transfusion strategies. Restrictive strategies reduce risk of adverse reactions, mitigate platelet shortages, and reduce costs. It is good practice to consider overall clinical context and alternative therapies in the decision to perform platelet transfusion.

JAMA. doi:10.1001/jama.2025.7529
Published online May 29, 2025.

Multimedia

Supplemental content

CME at jamacmelookup.com

Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Authors: Ryan A. Metcalf, MD, Department of Pathology, University of Utah, 50N Medical Dr, Salt Lake City, UT 84132 (ryan.metcalf@path.utah.edu); Simon J. Stanworth, MD, DPhil, NHS Blood and Transplant, Level 2, John Radcliffe Hospital, Headley Way, Headington, Oxford, OX3 9BQ, United Kingdom (simon.stanworth@nhsbt.nhs.uk).

Platelet transfusions are a common intervention in different populations with thrombocytopenia or platelet dysfunction.[1] Thrombocytopenia is linked to bleeding and, because transfusions raise platelet counts, transfusions should reduce bleeding without causing harm.[2] Platelet units have a short shelf-life (5-7 days) and maintaining adequate supply to meet demand is challenging.[3] While red blood cell transfusion usage has decreased in many countries, platelet usage has not.[4,5] Risk of adverse events accompanies any transfusion, but occur more commonly after platelet transfusion[6] (**Table 1**[7-11]). Particularly in the US, clinicians' concerns about litigation after a bleeding event in a patient who did not undergo transfusion may also influence clinicians' behavior.

Randomized clinical trials (RCTs) have evaluated the effects of platelet transfusion.[12-31] A typical trial design compares patients receiving fewer (restrictive) vs greater (liberal) amounts of platelets,[32] although definitions for restrictive and liberal transfusion strategies vary between trials (**Figure**). The 2025 Association for the Advancement of Blood and Biotherapies (AABB) and the International Collaboration for Transfusion Medicine Guidelines (ICTMG) international clinical practice guidelines aimed to meet the need for updated recommendations for health care professionals and their patients, with practical advice on appropriate use of platelets.[33,34]

Guideline Development Process

Panel Composition and Conflicts

We (the international platelet transfusion guidelines panel) followed Grading of Recommendations Assessment Development and Evaluation (GRADE) methodology to summarize evidence and formulate recommendations.[35,36] The AABB and ICTMG commissioned and funded the guideline, recruiting patient partners and experts from relevant organizations across different resource settings (eTable 1 in the Supplement). Experts were selected for inclusion in the panel from the AABB clinical transfusion medicine committee, AABB members with prior guideline leadership experience, ICTMG's platelet guideline panel and leadership, and clinician experts from various specialties that commonly perform platelet transfusions. One investigator (G.G.) was our GRADE methodologist, supported by AABB. E.M.W.,[23] L.J.E.,[23] M.M.,[23] and S.J.S.[23,28] were excluded from discussion and voting on topics of trials as primary investigators of those studies.

Values and Preferences

Recommendations were based on several values and preferences. While placing a high value on mortality reduction, the panel accepted the remaining possibility of a small increase in mortality or bleeding with a restrictive strategy. The panel placed high value on avoiding unnecessary exposure to platelets and conserving platelet transfusions for circumstances in which benefit is considered likely. The panel placed value on quality of life in chronic conditions, such as time away from activities and personal cost burdens for prophylactic platelet transfusion support. Values and preferences may vary depending on the acuity and severity of the patient's condition, and patients or family members in acute situations, following an informed consent process, may choose platelet transfusion in the face of substantial uncertainty of benefit.

Perspective

The primary perspective is the individual patient/family, including medical, psychological, and financial impacts. A secondary perspective is public health, including security of the blood supply.

Population, Intervention, Comparator, Outcome Questions

The panel recognized common rationales for platelet transfusions, and there was no strong clinical/biological basis for expecting relative effects of transfusion to vary significantly by population. The overarching PICO (population, intervention, comparator, outcome) question was "For patients in whom platelet transfusion might reduce bleeding, what is the impact of a restrictive vs a liberal strategy on mortality and bleeding?"

Specific populations of interest identified reflected the main clinical settings in which platelets may be administered.[1] (1) For nonbleeding patients with hypoproliferative thrombocytopenia (HPT), what is the impact of restrictive vs liberal platelet transfusion strategies on mortality and bleeding? A predefined subgroup was autologous stem cell transplant (SCT) recipients. (2) For patients with consumptive thrombocytopenia associated with critical illness, what is the impact of restrictive vs liberal platelet transfusion strategies on mortality and bleeding? Predefined subgroups were neonates and adults. (3) For patients with thrombocytopenia requiring invasive procedures, what is the impact of restrictive vs liberal platelet transfusion strategies on mortality and serious procedure-related bleeding? Predefined subgroups were patients undergoing central venous catheter (CVC) placement, lumbar puncture (LP), and interventional radiology procedures. (4) For patients undergoing cardiovascular surgery including those on cardiopulmonary bypass, what is the impact of restrictive vs liberal platelet transfusion strategies on mortality and bleeding? (5) For patients with intracranial hemorrhage (ICH), what is the impact of restrictive vs liberal platelet transfusion strategies on mortality and hemostasis? Predefined subgroups were patients with spontaneous and traumatic ICH.

Scope

Topics out of scope included platelet component types, platelet transfusion refractoriness, massive hemorrhage protocols, viscoelastic testing, and alternatives/adjuncts.

Evidence Review and Grading

Systematic Review

A systematic review[37] informed recommendations, with searches of RCTs and observational studies evaluating platelet transfusions published from 1950 to April 2024. Primary analyses focused on RCTs, but if they provided very low–certainty evidence, observational studies were considered. Eligible observational studies generated propensity-matched cohorts, except for LP, for which published spinal hematoma incidence data were synthesized.

Outcomes

A survey of ICTMG members on outcome importance rated mortality and clinically significant bleeding highly (eTable 2 in the Supplement). Definitions of significant bleeding were context-specific. Variation exists in definitions used between and within populations across trials.[38] Statistical criteria for interaction tests were

Table 1. Approximate Risks of Transfusion-Related Adverse Events

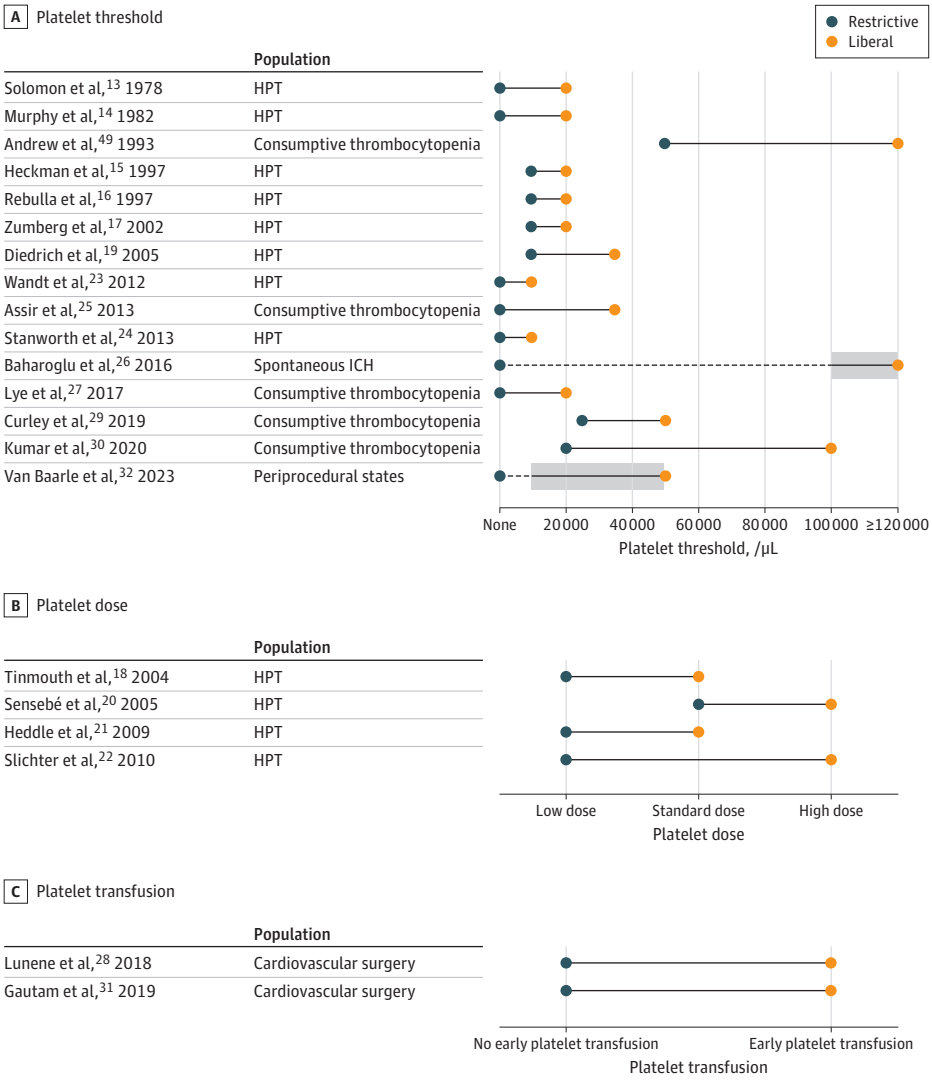
Reaction type	Source	Rate per transfusion episode	Rate per platelet transfused	No. needed to harm
Allergic	AABB Technical Manual	NA	10-30/1000	33-100 units
Anaphylactic	AABB Technical Manual	NA	0.02-0.05/1000	20 000-50 000 units
Febrile nonhemolytic	AABB Technical Manual	NA	1-10/1000	100-1000 units
Septic[a]	Hong et al,[7] 2016	NA	≤0.1/1000	10 000 units
TACO[b]	White et al,[8] 2025	6.6/1000 (95% CI, 2.9-11.8)	2.6/1000 (95% CI, 0.6-5.9)	385 units or 152 episodes
	Hendrickson et al,[9] 2016	8.0/1000	NA	125 episodes
TRALI	White et al,[10] 2024	NA	0.03/1000 (95% CI, 0.022-0.042)	33 333 units
	Hendrickson et al,[9] 2016	0.8/1000	NA	1250 episodes

Abbreviations: NA, not available; TACO, transfusion-associated circulatory overload; TRALI, transfusion-related acute lung injury.

[a] Septic transfusion reaction rates may vary depending on the bacterial risk control strategy used.

[b] The rate of TACO per patient (point estimate) is 22/1000 (number needed to harm = 45).

Figure. Restrictive and Liberal Transfusion Strategies Used Across Randomized Trials



Most trials used platelet count thresholds, with less using different platelet doses or varying timing of platelet transfusion. Gray shading indicates platelet count ranges of included patients in 2 trials; the dashed lines denote platelet count ranges that were not included in these trials. Although restrictive and liberal definitions varied across studies, in general, they refer to fewer vs greater amounts of platelets transfused. Sensebe et al, 2005: low-dose, 0.5 × 10^{11}/10 kg; high-dose, 1 × 10^{11}/10 kg; Tinmouth et al, 2004: low-dose, 3 prophylactic platelet transfusions (PLTs); standard-dose, 5 PLTs; Heddle et al, 2009: low-dose, 1.5-3.0 × 10^{11} PLTs/product; standard dose, 3.0-6.0 × 10^{11} platelets/transfusion; Slichter et al, 2010: low-dose, 1.1 × 10^{11} platelets/m^2; high dose, 4.4 × 10^{11} platelets/m^2. HPT indicates hypoproliferative thrombocytopenia; ICH, intracranial hemorrhage.

applied to assess significant variation in effects, with application of the Instrument for Assessing the Credibility of Effect Modification Analyses criteria for credible effects.[39] The eAppendix (eTable 3) in the Supplement provides a summary of World Health Organization (WHO) bleeding grades.[40]

Analysis

We applied Cochrane's Risk of Bias tool for RCTs[41] and separate tools for observational studies.[42,43] We followed GRADE to evaluate between-study variability and inferences regarding subgroup effects.[39,44] Analyses were performed using Cochrane

Collaboration Review Manager.[45] Odds ratios (ORs) with 95% CIs were calculated using random effects models. Absolute risk differences (ARDs) were calculated by applying ORs to estimated baseline risks.[46] A sensitivity analysis in HPT evaluated the impact of a restrictive strategy on 30-day mortality.

Grading Evidence Certainty and Making Recommendations

We rated certainty in relation to thresholds of minimal important differences (MIDs)[35]: mortality: 2%; grade 2-4 bleeding (or equivalent): 20%; and grade 3-4 bleeding (or equivalent): 5%. Using GRADE summary of findings,[47] the panel formulated recommendations using the GRADE evidence to decision framework.[48] Unless specified, recommendations apply to adult and pediatric patients. In the absence of unanimous agreement, a panel vote would be performed and an agreement threshold of greater than 50% was required to make a decision.

Results

Overview

Analyses of RCTs across clinical populations provided high- or moderate-certainty evidence that restrictive platelet transfusion strategies probably did not result in important increases in mortality (ARD, −0.4% [95% CI, −2.2% to 1.7%]), WHO grade 2-4 bleeding (ARD, 6.8% [95% CI, 0.9% to 12.8%]), or WHO grade 3-4 bleeding (ARD, 0.3% [95% CI, −1.4% to 2.4%]), as shown in **Table 2** and eFigures 1-3 in the Supplement. Given that specific definitions of restrictive and liberal in studies depended on clinical population, further analyses were undertaken by population.

Strong Recommendations (1.1-1.4)

The panel strongly recommends restrictive over liberal platelet transfusion strategies based on high- or moderate-certainty evidence in the 4 populations defined below. Table 2 provides the summary of findings and **Table 3** summarizes all recommendations.

Recommendation 1.1: in nonbleeding patients with hypoproliferative thrombocytopenia actively receiving chemotherapy or undergoing allogeneic stem cell transplant, platelet transfusion should be administered when the platelet count is less than 10 × 10^3/μL (strong recommendation, moderate-certainty evidence).

Recommendation 1.2: in preterm neonates without major bleeding, platelet transfusion should be administered when the platelet count is less than 25 × 10^3/μL (strong recommendation, high-certainty evidence).

Recommendation 1.3: in patients undergoing lumbar puncture, platelet transfusion should be administered when the platelet count is less than 20 × 10^3/μL (strong recommendation, moderate-certainty evidence).

Recommendation 1.4: in patients with Dengue-related consumptive thrombocytopenia in the absence of major bleeding, the panel recommends no platelet transfusion (strong recommendation, moderate-certainty evidence).

Synopsis of Identified Evidence

See the Supplement for details of identified evidence. Twelve RCTs in patients with HPT compared restrictive vs liberal platelet transfusion strategies on all-cause mortality or bleeding.[12-23] For mortality, the ARD was 1.8% (95% CI, −0.4% to 4.8%). Three RCTs in critically ill preterm neonates compared restrictive vs liberal platelet transfusion strategies. With baseline mortality risk of 16.9%, the ARD was −4.5% (95% CI, −8.2% to 0.4%).[28,29,49] Two RCTs in patients with Dengue and platelet counts less than 20 × 10^3/μL to 30 × 10^3/μL compared platelet transfusion with no platelet transfusion,[24,26] but baseline risks of mortality were very low. Six (nonrandomized) pediatric and adult studies reported spinal hematoma rates after LP of 0.8 (95% CI, 0-10.4) per 1000 procedures when platelet counts prior to LP were less than 50 × 10^3/μL.[50-55]

Rationale for Strong Recommendations

Although some point estimates indicated a possible increase in mortality with a restrictive strategy approaching the minimally important difference (ARD of 1.8% favoring liberal strategy in HPT), the overall results across all conditions showed no suggestion of benefit for liberal strategies (ARD, −0.4% [95% CI, −2.2% to 1.7%]). Furthermore, a sensitivity analysis evaluating 30-day mortality in HPT showed an ARD point estimate of 0.4%. The panel judged a lack of evidence of important harm with restrictive strategies applying predefined minimally important differences of 2% for mortality.

Event rates of important outcomes were so low in LP that liberal platelet transfusion could not be expected to importantly reduce spinal hematoma incidence.

Presumed benefits of restrictive platelet transfusion strategies extend to minimizing transfusion-related patient harms, maintaining adequate supply for clinical situations (eg, bleeding) in which platelet transfusion may yield important benefits, and reducing health care expenditures, given that platelets have high acquisition costs and associated costs of blood banking and safe administration.[4,56] Active surveillance has helped quantify risk of transfusion-related adverse events, but other potential negative effects of platelet transfusions (eg, immunomodulatory effects) are poorly understood.[57]

Conditional Recommendations (2.1-2.7)

In the predefined clinical populations mentioned below, certainty of evidence was low or very low, with the exception of CVC placement at compressible anatomic sites (moderate certainty for grade 2-4 bleeding; very low certainty for grade 3-4 bleeding). The panel made conditional recommendations in favor of restrictive over liberal platelet transfusion.

Recommendation 2.1: in nonbleeding adult patients with hypoproliferative thrombocytopenia undergoing autologous SCT or with aplastic anemia, the panel recommends a no-prophylaxis strategy (conditional recommendation; low- to very low–certainty evidence).

Recommendation 2.2: in adult patients with consumptive thrombocytopenia due to critical illness (non-Dengue) and without major bleeding, platelet transfusion should be administered when the platelet count is less than 10 × 10^3/μL (conditional recommendation; very low–certainty evidence).

Recommendation 2.3: in adult patients undergoing CVC placement at anatomic sites amenable to manual compression, platelet transfusion should be administered when the platelet count is less than 10 × 10^3/μL (conditional recommendation; moderate- to very low–certainty evidence).

Recommendation 2.4: in adult patients undergoing interventional radiology procedures, platelet transfusion should be administered

Table 2. Summary of Findings of Overall Combined Studies and Populations[a]

Outcomes	No. of participants (No. of trials)	No. of events/No. of patients (%)		Risk differences (95% CI)	Odds ratio (95% CI)	Certainty of the evidence (GRADE)	Summary
		Restrictive platelet strategy	Liberal platelet strategy				
Overall population							
All-cause mortality	4867 (20 RCTs)	255/2424 (10.5)	268/2443 (11.0)	−0.4% (−2.2% to 1.7%) 22 fewer to 17 more deaths per 1000	0.96 (0.78 to 1.18)	High	Restrictive probably results in little to no difference in all-cause mortality
WHO grades 2-4 bleeding or equivalent	2860 (11 RCTs)	589/1414 (41.7)	544/1446 (37.6)	6.8% (0.9% to 12.8%) 9 to 128 more patients per 1000 experiencing grade 2-4 bleeding with restrictive	1.32 (1.04 to 1.68)	Moderate[b]	Restrictive probably results in little or no difference in grade 2-4 bleeding or equivalent
WHO grades 3-4 bleeding or equivalent	3433 (11 RCTs)	148/1705 (8.7)	146/1728 (8.4)	0.3% (−1.9% to 3.0%) 19 fewer to 30 more patients per 1000 experiencing grade 3-4 bleeding with restrictive	1.04 (0.76 to 1.41)	Moderate[b]	Restrictive probably results in little or no difference in grade 3-4 bleeding
Hypoproliferative thrombocytopenia							
All-cause mortality	2851 (11 RCTs)	104/1417 (7.3)	91/1434 (6.3)	1.8% (−0.4% to 4.8%) 4 fewer to 48 more deaths per 1000 with restrictive	1.32 (0.93 to 1.86)	Moderate[c]	Restrictive probably results in little or no difference in mortality
WHO grades 2-4 bleeding or equivalent	2487 (10 RCTs)	567/1229 (46.1)	535/1258 (42.5)	5.2% (0.0% to 10.5%) 0 to 105 more patients per 1000 experiencing grade 2-4 bleeding	1.23 (1.00 to 1.53)	Moderate[b]	Restrictive probably results in little or no difference in grade 2-4 bleeding
WHO grades 3-4 bleeding or equivalent	2016 (6 RCTs)	82/1001 (8.2)	68/1015 (6.7)	1.5% (−0.8% to 4.4%) 8 fewer to 44 more patients per 1000 experiencing grade 3-4 bleeding	1.24 (0.88 to 1.75)	Moderate[b]	Restrictive probably results in little or no difference in grade 3-4 bleeding
Consumptive thrombocytopenia: neonates							
All-cause mortality	852 (3 RCTs)	53/426 (12.4)	72/426 (16.9)	−4.5% (−8.2% to 0.4%) 82 fewer to 4 more deaths per 1000 with restrictive	0.69 (0.47 to 1.03)	High	Restrictive results in little or no increase in harm
WHO grades 3-4 bleeding or equivalent	854 (3 RCTs)	44/426 (10.3)	59/428 (13.8)	−2.7% (−6.0% to 2.8%) 60 fewer to 28 more patients per 1000 experiencing grade 3-4 bleeding with restrictive	0.72 (0.39 to 1.31)	Moderate[b]	Restrictive probably results in little or no difference in grade 3-4 bleeding
Lumbar puncture[d]							
Hematoma incidence, PLT<50 000	4418 (6 studies)	42/4418 (1.0)		0.78 (0.00 to 10.02) Events per 1000 procedures	NA	Moderate[b]	Restrictive probably results in little or no difference in hematoma rates given very low baseline risk
Hematoma incidence, PLT<20 000	324 (4 studies)	0/324		0.00 (0.00 to 2.96) Events per 1000 procedures	NA	Moderate[b]	Restrictive probably results in little or no difference in hematoma rates given very low baseline risk
Consumptive thrombocytopenia due to Dengue: adults							
All-cause mortality	453 (2 RCTs)	0/226	1/227 (0.4)	−0.3% (−0.4% to 2.5%) 4 fewer to 25 more deaths per 1000 with restrictive	0.30 (0.01 to 7.47)	Moderate[c]	Restrictive probably results in little or no difference in mortality

(continued)

Table 2. Summary of Findings of Overall Combined Studies and Populations[a] (continued)

Outcomes	No. of participants (No. of trials)	No. of events/No. of patients (%)		Risk differences (95% CI)	Odds ratio (95% CI)	Certainty of the evidence (GRADE)	Summary
		Restrictive platelet strategy	Liberal platelet strategy				
Hypoproliferative thrombocytopenia							
WHO grades 2-4 bleeding or equivalent: Autologous transplant subgroup	698 (3 RCTs)	130/353 (36.8)	103/346 (29.8)	19.5% (−7.7% to 47.2%) 77 fewer to 472 more patients per 1000 experiencing grade 2-4 bleeding	2.30 (0.67 to 7.88)	Very low[c]	Effect is very uncertain
WHO grades 3-4 bleeding or equivalent: Autologous transplant subgroup	622 (2 RCTs)	4/314 (1.3)	0/308	0.6% (−0.1% to 6.1%) 1 fewer to 61 more patients per 1000 experiencing grade 3-4 bleeding	4.68 (0.53 to 41.38)	Low[c]	Restrictive possibly results in little or no difference in grade 3-4 bleeding
Consumptive thrombocytopenia: adults							
All-cause mortality	3324 (2 adjusted observational studies)	368/1662 (22.1)	434/1662 (26.1)	−4.1% (−6.8% to −1.2%) 68 to 12 fewer deaths per 1000 individuals with restrictive	0.80 (0.68 to 0.94)	Very low[c]	Effect is very uncertain
CVC placement[e]							
WHO grades 2-4 bleeding or equivalent: Compressible sites	232 (1 RCT)	8/115 (7.0)	7/117 (6.0)	1.0% (−3.4% to 11.6%) 34 fewer to 116 more patients per 1000 experiencing grade 2-4 bleeding	1.18 (0.41 to 3.35)	Moderate[b]	Restrictive probably results in little or no difference in bleeding for compressible sites
WHO grades 3-4 bleeding or equivalent: Compressible sites	232 (1 RCT)	6/115 (5.2)	4/117 (3.4)	1.8% (−1.9% to 13.2%) 19 fewer to 132 more patients per 1000 experiencing grade 3-4 bleeding	1.56 (0.43 to 5.66)	Very low[b,c]	Effect is very uncertain
Periprocedural settings (interventional radiology)							
Periprocedural RBC transfusion	521 (1 adjusted observational study)	69/342 (20.2)	48/179 (26.8)	−6.6% (−12.6% to 1.0%) 126 fewer to 10 more periprocedural RBC transfusions per 1000 individuals with restrictive	0.69 (0.45 to 1.05)	Very low[c]	Effect is very uncertain
ICU admission	521 (1 adjusted observational study)	91/342 (26.6)	65/179 (36.3)	−9.7% (−16.5% to −1.5%) 165 to 15 fewer ICU admissions per 1000 individuals with restrictive	0.64 (0.43 to 0.94)	Very low[c]	Effect is very uncertain
Cardiovascular surgery: adults							
All-cause mortality (RCT)	122 (1 RCT)	19/61 (31.1)	22/61 (36.1)	−4.9% (−18.5% to 12.9%) 185 fewer to 129 more deaths per 1000 individuals with restrictive	0.80 (0.38 to 1.70)	Very low[c]	Effect is very uncertain
All-cause mortality (observational)	10 036 (4 adjusted observational studies)	142/5187 (2.7)	143/4849 (2.9)	−0.6% (−1.8% to 2.0%) 18 fewer to 20 more deaths per 1000 individuals with restrictive	0.79 (0.37 to 1.72)	Very low[c]	Effect is very uncertain
Cardiovascular surgery: neonates							
All-cause mortality	42 (1 RCT)	0/21	0/21	0.0% (−2.3% to 27.2%) 23 fewer to 272 more deaths per 1000 individuals with restrictive	Not estimable	Very low[c]	Effect is very uncertain

(continued)

Table 2. Summary of Findings of Overall Combined Studies and Populations[a] (continued) (continued)

Outcomes	No. of participants (No. of trials)	No. of events/No. of patients (%)		Risk differences (95% CI)	Odds ratio (95% CI)	Certainty of the evidence (GRADE)	Summary
		Restrictive platelet strategy	Liberal platelet strategy				
Spontaneous intracranial hemorrhage							
All-cause mortality	190 (1 RCT)	21/93 (22.6)	31/97 (32.0)	−9.4% (−18.7% to 3.8%) 187 fewer to 38 more deaths per 1000 individuals with restrictive	0.62 (0.33 to 1.19)	Low[b,c]	Restrictive results in little or no difference in mortality

Abbreviations: GRADE, Grading of Recommendations Assessment Development and Evaluation; NA, not applicable; RCT, randomized clinical trial; WHO, World Health Organization.

[a] Included randomized trial data were based on the primary analysis reported for a given trial (intention to treat or per protocol). The WHO bleeding scale is on a semiquantitative scale ranging from 0 (no bleeding) to 4 (life-threatening bleeding). The degree of bleeding in trials is typically determined by study staff who evaluate patients at intervals specified by the trial. Ideally, bleeding outcome assessors are blinded, but this was not always the case. For additional detail on typical definitions of important bleeding (ie, grades 2, 3, and 4), see Supplement 1. The certainty of evidence was determined using GRADE methodology and synthesizing effect estimates across multiple studies, when applicable. GRADE considers imprecision, inconsistency, indirectness, and risk of bias. Imprecision depended on predefined minimal important differences (MIDs). The MIDs chosen by the panel were: 2% for mortality, 5% for grade 3-4 bleeding or equivalent, and 20% for grade 2-4 bleeding or equivalent.

[b] Downgraded for risk of bias.

[c] Downgraded for imprecision.

[d] Lumbar puncture evidence was synthesized from observational studies reporting incidence of spinal hematoma where platelet counts were measured before the procedure. Although most did not receive any platelet transfusion, those who did were only included if the platelet count was remeasured prior to the procedure and found to be less than 50×10^3/μL or 20×10^3/μL.

[e] Compressible sites refer to internal jugular and femoral vein central venous catheter placements, as opposed to the subclavian vein which may be less amenable to manual compression.

when the platelet count is less than 20×10^3/μL for low-risk procedures and less than 50×10^3/μL for high-risk procedures (conditional recommendation; very low–certainty evidence).

Recommendation 2.5: in adult patients undergoing major nonneuraxial surgery, platelet transfusion should be administered when the platelet count is less than 50×10^3/μL (conditional recommendation; very low–certainty evidence).

Recommendation 2.6: in nonthrombocytopenic patients undergoing cardiovascular surgery in the absence of major hemorrhage, including those undergoing cardiopulmonary bypass, the panel recommends no platelet transfusion (conditional recommendation; very low—certainty evidence).

Recommendation 2.7: in adult patients with spontaneous or traumatic, nonoperative intracranial hemorrhage when the platelet count is greater than 100×10^3/μL, including for those receiving antiplatelet agents, the panel recommends no platelet transfusion (conditional recommendation; low- to very low–certainty evidence).

Synopsis of Identified Evidence

Full details of the identified evidence are shown in the Supplement. Three RCTs evaluated patients with HPT undergoing autologous SCT.[17,22,23] For WHO grade 2-4 bleeding, the ARD was 19.5% (95% CI, −7.7% to 47.2%). Direct evidence comparing platelet transfusion strategies in adults patients with consumptive thrombocytopenia with critical illness was limited to 2 (nonrandomized) observational studies with propensity-matched cohorts.[58,59] The ARD for mortality was −4.1% (95% CI, −6.8% to 1.2%). One RCT compared no platelet transfusion vs platelet transfusion among adults undergoing CVC placement with pretransfusion platelet counts of 10×10^3/μL to 50×10^3/μL.[31] Direct evidence comparing restrictive vs liberal strategies in patients undergoing a variety of low- and high-risk interventional radiology procedures was limited to a single observational study with propensity-matched cohorts.[60] Evidence in cardiovascular surgery included 3 small RCTs and 4 observational studies with propensity-matched cohorts.[27,30,61,62] One RCT evaluated the impact of platelet transfusion following nonoperative spontaneous ICH.[25] The ARD for mortality was −9.4% (95% CI, −18.7% to 3.8%).

Rationale for Conditional Recommendations

For populations with conditional recommendations, restrictive strategies also showed lack of clear evidence of harm but less evidence certainty. Relative effects were consistent and point estimates for absolute effects of mortality and/or bleeding were consistent with what the panel judged to be unimportant effects based on the MIDs. Of note, the panel felt mortality was not a practically applicable outcome for minor procedures. For WHO grade 2-4 bleeding in patients undergoing autologous SCT, there was inconsistency due to greater difference in event rates between groups in a study.[22] Inconsistency was not observed for the outcome of WHO grade 3-4 bleeding events. The panel chose the subpopulation of autologous SCT for a no-prophylaxis recommendation given that duration of thrombocytopenia is typically short. The benefit from prophylactic platelet transfusion is less likely in this HPT subpopulation compared with the HPT subpopulation for which the panel made a strong recommendation to transfuse platelets when the platelet count is less than 10×10^3/μL.[63] In contrast, although the duration of thrombocytopenia in aplastic anemia is often prolonged, the panel conditionally recommended a no-prophylaxis strategy given value placed on quality of life.

Although the upper bounds of the CIs for mortality and/or bleeding included important harm for a restrictive strategy in autologous SCT, CVC placement at compressible anatomic sites (grade 3-4 bleeding only), cardiovascular surgery, and spontaneous ICH, there remained no clear evidence of a benefit to a liberal transfusion strategy. Relative effects appeared consistent, and the panel saw no compelling reason for relative effects to vary by population.

Accordingly, the panel suggested implementation of restrictive strategies to avoid undesirable effects of transfusion while

Table 3. Recommendations for Platelet Transfusion

Population	Recommendation and guidance	Certainty of the evidence[a]	Summary justification
1. Strong recommendations			
1.1: Nonbleeding patients with hypoproliferative thrombocytopenia actively receiving chemotherapy or undergoing allogeneic stem cell transplant (SCT)	Platelet transfusion should be administered when the platelet count is <10 × 10^3/μL	Moderate	The data support no benefit with liberal strategies and a platelet count threshold <10 × 10^3/μL is practical for implementation
1.2: Preterm neonates without major bleeding	Platelet transfusion should be administered when the platelet count is <25 × 10^3/μL	High	The data support no benefits with liberal policies of <50 × 10^3/μL and the possibility of harm.
1.3: Patients undergoing lumbar puncture	Platelet transfusion should be administered when the platelet count is <20 × 10^3/μL	Moderate	A platelet count threshold <20 × 10^3/μL is practical for implementation, and minimizes need for platelet transfusion, while recognizing the extremely low event rate estimate
1.4: Patients with Dengue-related consumptive thrombocytopenia in the absence of major bleeding	No platelet transfusion	Moderate	The data support no benefits with use of platelets as prophylaxis and possibility of harm
2. Conditional recommendations			
2.1: Nonbleeding adult patients with hypoproliferative thrombocytopenia undergoing autologous SCT or with aplastic anemia	No-prophylaxis strategy	Low to very low	The evidence includes subgroup analyses of bleeding outcomes in trials
2.2: Adult patients with consumptive thrombocytopenia due to critical illness (non-Dengue) and without major bleeding	Platelet transfusion should be administered when the platelet count is <10 × 10^3/μL	Very low	Lack of direct randomized trial data; a platelet count threshold <10 × 10^3/μL is practical for implementation and minimizes requirements for platelet transfusions with attendant risks
2.3: Adult patients undergoing central venous catheter (CVC) placement at anatomic sites amenable to manual compression	Platelet transfusion should be administered when the platelet count is <10 × 10^3/μL	Moderate to very low	A platelet count threshold <10 × 10^3/μL is practical for implementation and minimizes need for platelet transfusion
2.4: Adult patients undergoing interventional radiology procedures	Platelet transfusion should be administered when the platelet count is <20 × 10^3/μL for low-risk procedures and <50 × 10^3/μL for high-risk procedures[7]	Very low	A platelet count threshold <20 × 10^3/μL or <50 × 10^3/μL is practical for implementation; recognizes the varying degrees of bleeding risk by procedure
2.5: Adult patients undergoing major nonneuraxial surgery	Platelet transfusion should be administered when the platelet count is <50 × 10^3/μL	Very low	A platelet count threshold <50 × 10^3/μL is practical for implementation; recognizes the degree of potential risk of severe bleeding for these procedures
2.6: Nonthrombocytopenic patients undergoing cardiovascular surgery in the absence of major hemorrhage, including those receiving cardiopulmonary bypass	No platelet transfusion	Very low	The limited data available support no benefit with use of platelets
2.7: Adult patients with spontaneous or traumatic, nonoperative intracranial hemorrhage with platelet counts >100 × 10^3/μL, including those receiving antiplatelet agents	No platelet transfusion	Low to very low	The limited data available support no benefit with use of platelets and the possibility of harm

[a] The certainty of evidence was determined using GRADE methodology and synthesizing effect estimates across multiple studies, when applicable. GRADE considers imprecision, inconsistency, indirectness, and risk of bias. Imprecision depended on predefined minimal important differences (MIDs). The MIDs chosen by the panel were 2% for mortality, 5% for grade 3-4 bleeding or equivalent, and 20% for grade 2-4 bleeding or equivalent.

accepting the remaining possibility of harm based on the upper bounds of some CIs.

Good Practice Statement

The panel considered it good clinical practice to also consider symptoms, signs, other laboratory parameters, bleeding history, medications, patients' values and preferences, alternative therapies, and overall clinical context when deciding to perform a platelet transfusion on a particular patient. It is possible that this recommendation, although not intended for legal proceedings but rather as a guide for patient care, may reassure clinicians contemplating not administering unnecessary platelet transfusions whose behavior may be influenced by worries about litigation.

Discussion

This guideline advocates for restrictive platelet transfusion strategies. There was no consistent evidence across RCTs to support benefit of platelets impacting clinical outcomes. The panel applied and analyzed the restrictive vs liberal paradigm to platelet transfusion and found no significant varying effect by population for mortality

and bleeding. Hematoma incidence was very low across the observational literature for thrombocytopenic patients undergoing LP, and it is highly unlikely that liberal platelet transfusion achieves important benefit.[50-55]

Definitions of restrictive strategies varied by population and even by trial among the same populations (Figure). Ideally a single restrictive strategy that is easy to implement for clinicians could be adopted widely, but heterogeneity of trial protocols limits options for standardized guidance. The most restrictive policy is no-prophylaxis strategy—a therapeutic-only strategy—which has been tested in some but not all populations (Figure). A summary of policies tested in trials alongside practical recommendations for restrictive policies by population is provided in Table 3.

Although some recommendations were similar to previous guidelines[33,34,64] (HPT, interventional radiology, major nonneuraxial surgery, and cardiovascular surgery), the current guideline introduces new recommendations in certain groups, including neonates and those with Dengue. Some prior recommendations were less restrictive (LP, autologous SCT, CVC placement) or no recommendation was made (ICH).[33,34] Although some clinicians may wish to consider less-restrictive platelet transfusion strategies for diagnostic LP with the intent of reducing likelihood of traumatic LP, the relevance of this outcome may be questioned given it is unlikely to impact treatment.[65]

The panel made a strong recommendation for a restrictive strategy in preterm neonates, although the meta-analyses were dominated by results of a single trial.[28] There was heterogeneity in the enrolled neonatal population in this study (eg, by gestational and postnatal age), although secondary analysis of this trial failed to identify significant differences in effects by varying baseline risk.[66] A future trial is due to begin in 2026.[67]

For CVC placement, a 2023 RCT showed variation in grade 2-4 bleeding by anatomic site, with no difference in event rates at compressible sites using restrictive or liberal strategies.[31] The Instrument for Assessing the Credibility of Effect Modification Analyses judged the effect modification to be of moderate credibility (eTable 4 in the Supplement). However, the importance of reported bleeding events in this study is unclear, with small numbers of mixed populations enrolled. A larger international RCT evaluating multiple platelet thresholds is ongoing.[68,69]

RCTs in clinical settings, including different age groups, for which data are absent or very low certainty, could provide additional certainty supporting recommendations. Research should develop personalized approaches to platelet transfusion incorporating a range of individual factors. It was noted that for many populations in whom baseline risks represent an important incidence of bleeding, rates of bleeding remained important irrespective of transfusion strategy tested; alternative approaches to reduce risk should be developed. See further descriptions in the Supplement. We will consider updating guidelines as new and important published trial data become available.

Strengths of this guideline include adherence to standards for trustworthy guidelines, application of GRADE, identification of consistent patterns in the relative impacts of platelet transfusion strategies across populations, involvement of patient partners, the variety of physician expert participants, and its international applicability.

Limitations

This guideline also has limitations. Patients with thrombocytopenia are heterogeneous for factors relevant to bleeding risk, which may not be captured by inclusion criteria in trials or baseline features of enrolled patients. This reiterates the importance of clinical judgment and application of the good practice statement. Evidence in some settings was very low certainty. Baseline risk was not always clear when there was variation in event rates across studies. The panel made judgements about MIDs for key outcomes, informed by values and preferences that considered the potential negative effects of liberal transfusion strategies. Some uncertainty persists about the impact of different platelet strategies on mortality. MIDs vary by guideline panels and may impact evidence certainty ratings. More conservative MIDs could have downgraded evidence certainty in some settings and the possibility of conditional rather than strong recommendations might have arisen. The panel incorporated the value of indirect evidence given the lack of significant variation in relative effects across populations and the common rationale for use of platelets, which may not be valid. The panel considered a framework to ensure guideline quality (Appraisal of Guidelines for Research and Evaluation II) and plans to address the domain of applicability with future implementation work (described in the Supplement).[70]

Conclusions

Restrictive transfusion strategies should be implemented. Recommendations may not apply to all individual patient scenarios, as noted in the good practice statement, and for conditional recommendations, clinicians should carefully consider the individual patient's values and preferences in the decision.[35]

ARTICLE INFORMATION

Accepted for Publication: April 14, 2025.

Published Online: May 29, 2025. doi:10.1001/jama.2025.7529

Author Affiliations: Department of Pathology, University of Utah, Salt Lake City (Metcalf, White); ARUP Laboratories, Salt Lake City, Utah (Metcalf); Department of Laboratory Medicine and Pathology, University of Alberta, Edmonton, Alberta, Canada (Nahirniak); Departments of Clinical Epidemiology and Biostatistics and Medicine, McMaster University, Hamilton, Ontario, Canada (Guyatt); Canadian Blood Services, Toronto, Ontario, Canada (Bathla); Department of Hematology, Sultan Qaboos University Hospital, University Medical City, Muscat, Oman (Al-Riyami); College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman (Al-Riyami); Department of Pathology, University of Cincinnati, Cincinnati, Ohio (Jug); National Blood Centre, Italian National Institute of Health, Rome, Italy (La Rocca); Sapienza University of Rome, Rome, Italy (La Rocca); Department of Pathology and Molecular Medicine, Queen's University and Kingston Health Sciences Centre, Kingston, Ontario, Canada (Callum); Sunnybrook Research Institute, Toronto, Ontario, Canada (Callum); Department of Laboratory Medicine and Pathology, University of Minnesota, Minneapolis (Cohn, Zantek); Cardiovascular Surgery Division, University of Texas Medical Branch, Galveston (DeAnda); Department of Pathology and Laboratory Medicine, Weill Cornell Medicine, New York, New York (DeSimone); Patient Partner, Salt Lake City, Utah (Dubon); NHS Blood and Transplant, Oxford University Hospitals NHS Trust, and Radcliffe Department of Medicine, University of Oxford, United Kingdom (Estcourt, Murphy, Stanworth); Department of Anesthesiology, University of Carol Davila, Bucharest, Romania (Filipescu); Department of Pathology and Laboratory Medicine, University of Vermont,

Burlington (Fung, Poston); Department of Pathology, Johns Hopkins University, Baltimore, Maryland (Goel, Tobian); Department of Internal Medicine, Southern Illinois University, Springfield (Goel); New Zealand Blood Service, Christchurch, New Zealand (Hess); Centre Hospitalier Universitaire Ste-Justine, University of Montreal, Montreal, Quebec, Canada (Hume); Department of Pathology and Laboratory Medicine, Dartmouth Geisel School of Medicine, Hanover, New Hampshire (Kaufman, Szczepiorkowski); University of Wurzburg, Wurzburg, Germany (Kranke); Division of Clinical Haematology, Department of Medicine, University of Cape Town and Groote Schuur Hospital, Cape Town, South Africa (Louw); Department of Medicine, University of Stellenbosch and Tygerberg Hospital, Cape Town, South Africa (Louw); Department of Intensive Care University of Copenhagen – Rigshospitalet and Department of Clinical Medicine, Copenhagen, Denmark (Møller); Division of Critical Care Medicine, Nationwide Children's Hospital, Columbus, Ohio (Muszynski); Department of Neurosurgery, University of Alberta, Edmonton, Alberta, Canada (O'Kelly); Department of Laboratory Medicine and Pathology, University of Washington, Seattle (Pagano); Department of Transfusion Medicine, All India Institute of Medical Sciences, New Delhi, India (Patidar); Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, Ontario, Canada (Pavenski); Department of Laboratory Medicine and Pathology, Seattle Children's Hospital and University of Washington, Seattle (Saifee); Bloodworks Northwest Research Institute, Seattle, Washington (Stolla); Interventional Radiology, Oxford University Hospitals, University of Oxford, Oxford, United Kingdom (Uberoi); Department of Anesthesiology, University of Pittsburgh, Pittsburgh, Pennsylvania (Waters); Department of Anesthesiology, University of Maryland, Baltimore (Waters); Department of Haematology, Monash University, Melbourne, Victoria, Australia (Williams); Division of Hematology and Thromboembolism and Michael G. DeGroote Center for Transfusion Research, McMaster University, Hamilton, Ontario, Canada (Wood); Canadian Blood Services, Hamiton, Ontario, Canada (Zeller); Department of Pathology and Immunology, Washington University, St Louis, Missouri (Grossman).

Conflict of Interest Disclosures: Dr Metcalf reported receiving personal fees from Werfen and Cerus Corporation and grants Octapharma, Hemosonics, Werfen, and Haemonetics outside the submitted work; co-developing a data visualization tool for patient blood management that has been disclosed as an invention to the University of Utah, but is not currently commercialized; and serving as chair of the Advancement of Blood and Biotherapies (AABB) clinical transfusion medicine committee; ARUP Laboratories is a nonprofit enterprise (academic national reference laboratory) of the University of Utah. Dr Nahirniak reported receiving funding for project coordinator support and travel reimbursement for in-person guideline meeting from the International Collaboration for Transfusion Medicine Guidelines secretariat/ Canadian Blood Services during the conduct of the study and reported membership on the Canadian Blood Services scientific research advisory board and the Edmonton Zone Medical Staff Advisory; being the medical director of Alberta Precision Laboratories; and receiving research grants from Partnership for Research and Innovation in the Health System/Alberta Heath Services. Dr Callum reported receiving grants from Canadian Blood Services and Octapharma and being on the board of directors for the Canadian Hematology Society outside the submitted work. Dr Cohn reported serving on an advisory board for Fresenius Kabi and as chief medical officer for the AABB and receiving financial support from Quidel Ortho. Dr La Rocca reported serving on the advisory board for Novartis. Dr Estcourt reported receiving funds from the British Society of Haematology guideline panel, National Health Service Blood and Transplant, and the National Health and Medical Research Council. Dr Filipescu reported receiving grants from CSL Vifor, personal fees from GPATI Foundation, and nonfinancial support from Foundation for Health, Patient Safety, and Patient Blood Management (PBM) outside the submitted work and serving as co-chair of the Romanian PBM working group and the World Federation Society of Anesthesiologists perioperative PBM working group. Dr Fung reported receiving personal fees from Cerus Corporation as a data and safety monitoring board member for clinical trials on pathogen inactivated blood products, serving on the board of directors for the Project Santa Fe Foundation/Clinical Lab 2.0, and being the treasurer for the American Board of Pathology and the Vermont Medical Society outside the submitted work. Dr Goel reported serving as a consultant for the National Heart, Lung, and Blood Institute–led studies. Dr Kaufman reported receiving personal fees from ACI Clinical/ Velico Medical outside the submitted work and serving as editor-in-chief of *Transfusion* and serving on the scientific and medical advisory committee for Hema-Quebec. Dr Kranke reported receiving fees from FreseniusKabi, Baxter Healthcare, TEVA Ratiopharm, CSL Behring, CSL Vifor, Sintetica, Pajunk Medical, Senzyme, Livanova, Pharmacosmos, and Gruenenthal outside the submitted work. Dr Louw reported receiving personal fees from Western Cape Blood Service during the conduct of the study and serving on the World Health Organization advisory committee for PBM, as a board member for the Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis, and as a nonexecutive director for Western Cape Blood service. Dr O'Kelly reported receiving personal fees from Stryker and honoraria from Medtronic outside the submitted work. Dr Pavenski reported serving on the board of the ISBT, a professional organization dedicated to improving transfusion medicine practice, receiving reimbursement for travel from Octapharma, and participation in industry-funded trials from Roche, SOBI, Sanofi, and Takeda. Dr Saifee reported receiving nonfinancial support from AABB for travel expenses during the conduct of the study and nonfinancial support from Japan Society of Transfusion Medicine and Cell Therapy receiving speakers honoraria and travel expenses outside the submitted work. Dr Stolla reported receiving grants from Cerus Corp and grants from Terumo BCT outside the submitted work. Dr Szczepiorkowski reported receiving personal fees from Fresenius Kabi SAB and grants from Cellphire, Hemanext, and Erydel outside the submitted work. Dr Tobian reported receiving grants from Grifols Therapeutics and being a principal investigator on a US government grant evaluating Mirasol PRT in Uganda outside the submitted work. Dr Uberoi reported providing expert testimony and serving on the advisory board and received honoraria from Vascutek. Dr Waters reported serving as a consultant for LivaNova, Haemonetics, and Procell. Dr Wood reported receiving grants from AbbVie, Alexion, Amgen, Antengene, AstraZeneca, Beigene, Bristol Myers Squibb, CSL Behring, Gilead, Janssen, Novartis, Roche, Sanofi, Takeda, New Zealand Blood Service, and Sobi paid to the institution outside the topic of this work and nonfinancial support from Sobi (trial drug [avatrombopag] provided for investigator-initiated clinical trial) outside the submitted work and serving as membership of the board of directors of the International Society of Blood Transfusion during the period of developing these guidelines. Dr Zantek reported serving as vice president, North American Specialized Coagulation Laboratory Association and secretary/treasurer of External Quality Assurance in Thrombosis and Hemostasis, board member of the American Society for Apheresis; and spouse employment and financial interest in Boston Scientific and financial interest in Endo International. Dr Zeller reported receiving grants and personal fees from Pfizer; salary support for research-related initiatives from Internal Career Award from Department of Medicine McMaster University; personal fees from American Society Hematology; grants from Canadian Institutes of Health Research Project; personal fees from Canadian Blood Services; travel expenses from American Society Hematology Practice Guideline Panel; personal fees from Queens University; and honorarium from Oregon Health & Science University outside the submitted work. Dr Stanworth reported receiving grants as an investigator on funded trials during the conduct of the study and serving as the chair of the International Collaboration for Transfusion Medicine Guidelines. No other disclosures were reported.

Funding/Support: Support for guideline development was provided by Association for the Advancement of Blood and Biotherapies, the International Collaboration for Transfusion Medicine Guidelines, and international partner organizations.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Information: The platelet guideline steering committee consisted of Ryan Metcalf and Brenda Grossman representing AABB and Susan Nahirniak and Simon Stanworth representing International Collaboration for Transfusion Medicine Guidelines (ICTMG). Dr Metcalf is chair of the AABB Clinical Transfusion Medicine Committee and Dr Stanworth is chair of the ICTMG.

Additional Contributions: With gratitude, we thank Justice Manjusha Pawagi, LLB (Osgoode Hall Law School, York University), for her participation as a patient partner. We thank the authors of the PACER trial for supplying grade 3-4 bleeding outcome data in the compressible anatomic sites subgroup. We thank Jack Wilburn, BS (Scientific Computing and Imaging Institute, University of Utah), and Alex Lex, PhD (Scientific Computing and Imaging Institute, University of Utah), for assistance with creating the figure visualizing different platelet transfusion strategies by randomized clinical trial.

We thank Cassandra Josephson, MD (Johns Hopkins All Children's Cancer and Blood Institute), for feedback regarding lumbar puncture and pediatric patient populations, and Lara Roberts, MBBS, MD(Res) (King's College Hospital), for feedback as a hemostasis-thrombosis physician. We acknowledge discussions on the neonatal recommendations with Robert Christensen, MD (University of Utah); Ravi Patel, MD (Emory University School of Medicine); and Martha Sola-Visner, MD (Boston Children's Hospital). None of these individuals received compensation for their contributions.

Disclaimer: These guidelines should not be used to deny reimbursement or coverage for clinical care.

REFERENCES

1. Hill-Strathy M, Pinkerton PH, Thompson TA, et al. Evaluating the appropriateness of platelet transfusions compared with evidence-based platelet guidelines: an audit of platelet transfusions at 57 hospitals. *Transfusion*. 2021;61(1):57-71. doi:10.1111/trf.16134

2. Stanworth SJ, Shah A. How I use platelet transfusions. *Blood*. 2022;140(18):1925-1936. doi:10.1182/blood.2022016558

3. Gehrie EA, Young PP, Basavaraju SV, et al. Addressing platelet insecurity: a national call to action. *Transfusion*. 2024;64(10):2001-2013. doi:10.1111/trf.17987

4. McDavid K, Lien R, Chavez Ortiz J, et al. Have we reached a new baseline for blood collection and transfusion in the United States? National Blood Collection and Utilization Survey, 2023. *Transfusion*. Published online March 11, 2025. doi:10.1111/trf.1818710

5. Serious Hazards of Transfusion. SHOT annual reports and summaries. Accessed August 16, 2024. https://www.shotuk.org/shot-reports/

6. Narayan DS, Baker DP, Bellamy PM, et al. Annual 2023 SHOT report. Accessed May 12, 2025. https://www.shotuk.org/shot-reports/annual-shot-report-2023/

7. Hong H, Xiao W, Lazarus HM, Good CE, Maitta RW, Jacobs MR. Detection of septic transfusion reactions to platelet transfusions by active and passive surveillance. *Blood*. 2016;127(4):496-502. doi:10.1182/blood-2015-07-655944

8. White SK, Walker BS, Potter S, Anderson D, Metcalf RA. Estimating the incidence of transfusion associated circulatory overload using active surveillance: a systematic review and meta-analysis. *Transfusion*. In Press.

9. Hendrickson JE, Roubinian NH, Chowdhury D, et al; National Heart, Lung, and Blood Institute (NHLBI) Recipient Epidemiology and Donor Evaluation Study (REDS-III). Incidence of transfusion reactions: a multicenter study utilizing systematic active surveillance and expert adjudication. *Transfusion*. 2016;56(10):2587-2596. doi:10.1111/trf.13730

10. White SK, Walker BS, Schmidt RL, Metcalf RA. The incidence of transfusion-related acute lung injury using active surveillance: a systematic review and meta-analysis. *Transfusion*. 2024;64(2):289-300. doi:10.1111/trf.17688

11. *Technical Manual, 21st Edition*. Association for the Advancement of Blood and Bioethics; 2023.

12. Solomon J, Bofenkamp T, Fahey JL, Chillar RK, Beutel E. Platelet prophylaxis in acute non-lymphoblastic leukaemia. *Lancet*. 1978;1(8058):267. doi:10.1016/S0140-6736(78)90505-6

13. Murphy S, Litwin S, Herring LM, et al. Indications for platelet transfusion in children with acute leukemia. *Am J Hematol*. 1982;12(4):347-356. doi:10.1002/ajh.2830120406

14. Heckman KD, Weiner GJ, Davis CS, Strauss RG, Jones MP, Burns CP. Randomized study of prophylactic platelet transfusion threshold during induction therapy for adult acute leukemia: 10,000/microL versus 20,000/microL. *J Clin Oncol*. 1997;15(3):1143-1149. doi:10.1200/JCO.1997.15.3.1143

15. Rebulla P, Finazzi G, Marangoni F, et al. The threshold for prophylactic platelet transfusions in adults with acute myeloid leukemia. *N Engl J Med*. 1997;337(26):1870-1875. doi:10.1056/NEJM199712253372602

16. Zumberg MS, del Rosario MLU, Nejame CF, et al. A prospective randomized trial of prophylactic platelet transfusion and bleeding incidence in hematopoietic stem cell transplant recipients: 10,000/L versus 20,000/microL trigger. *Biol Blood Marrow Transplant*. 2002;8(10):569-576. doi:10.1053/bbmt.2002.v8.pm12434952

17. Tinmouth A, Tannock IF, Crump M, et al. Low-dose prophylactic platelet transfusions in recipients of an autologous peripheral blood progenitor cell transplant and patients with acute leukemia: a randomized controlled trial with a sequential Bayesian design. *Transfusion*. 2004;44(12):1711-1719. doi:10.1111/j.0041-1132.2004.04118.x

18. Diedrich B, Remberger M, Shanwell A, Svahn BM, Ringdén O. A prospective randomized trial of a prophylactic platelet transfusion trigger of 10 x 10(9) per L versus 30 x 10(9) per L in allogeneic hematopoietic progenitor cell transplant recipients. *Transfusion*. 2005;45(7):1064-1072. doi:10.1111/j.1537-2995.2005.04157.x

19. Sensebé L, Giraudeau B, Bardiaux L, et al. The efficiency of transfusing high doses of platelets in hematologic patients with thrombocytopenia: results of a prospective, randomized, open, blinded end point (PROBE) study. *Blood*. 2005;105(2):862-864. doi:10.1182/blood-2004-05-1841

20. Heddle NM, Cook RJ, Tinmouth A, et al; SToP Study Investigators of the BEST Collaborative. A randomized controlled trial comparing standard- and low-dose strategies for transfusion of platelets (SToP) to patients with thrombocytopenia. *Blood*. 2009;113(7):1564-1573. doi:10.1182/blood-2008-09-178236

21. Slichter SJ, Kaufman RM, Assmann SF, et al. Dose of prophylactic platelet transfusions and prevention of hemorrhage. *N Engl J Med*. 2010;362(7):600-613. doi:10.1056/NEJMoa0904084

22. Wandt H, Schaefer-Eckart K, Wendelin K, et al; Study Alliance Leukemia. Therapeutic platelet transfusion versus routine prophylactic transfusion in patients with haematological malignancies: an open-label, multicentre, randomised study. *Lancet*. 2012;380(9850):1309-1316. doi:10.1016/S0140-6736(12)60689-8

23. Stanworth SJ, Estcourt LJ, Powter G, et al; TOPPS Investigators. A no-prophylaxis platelet-transfusion strategy for hematologic cancers. *N Engl J Med*. 2013;368(19):1771-1780. doi:10.1056/NEJMoa1212772

24. Khan Assir MZ, Kamran U, Ahmad HI, et al. Effectiveness of platelet transfusion in Dengue fever: a randomized controlled trial. *Transfus Med Hemother*. 2013;40(5):362-368. doi:10.1159/000354837

25. Baharoglu MI, Cordonnier C, Al-Shahi Salman R, et al; PATCH Investigators. Platelet transfusion versus standard care after acute stroke due to spontaneous cerebral haemorrhage associated with antiplatelet therapy (PATCH): a randomised, open-label, phase 3 trial. *Lancet*. 2016;387(10038):2605-2613. doi:10.1016/S0140-6736(16)30392-0

26. Lye DC, Archuleta S, Syed-Omar SF, et al. Prophylactic platelet transfusion plus supportive care versus supportive care alone in adults with dengue and thrombocytopenia: a multicentre, open-label, randomised, superiority trial. *Lancet*. 2017;389(10079):1611-1618. doi:10.1016/S0140-6736(17)30269-6

27. Lunen TB, Johansson PI, Jensen LP, et al. Administration of platelets to ruptured abdominal aortic aneurysm patients before open surgery: a prospective, single-blinded, randomised study. *Transfus Med*. 2018;28(5):386-391. doi:10.1111/tme.12540

28. Curley A, Stanworth SJ, Willoughby K, et al; PlaNeT2 MATISSE Collaborators. Randomized trial of platelet-transfusion thresholds in neonates. *N Engl J Med*. 2019;380(3):242-251. doi:10.1056/NEJMoa1807320

29. Kumar J, Dutta S, Sundaram V, Saini SS, Sharma RR, Varma N. Platelet transfusion for PDA closure in preterm infants: a randomized controlled trial. *Pediatrics*. 2019;143(5):e20182565. doi:10.1542/peds.2018-2565

30. Gautam NK, Pierre J, Edmonds K, et al. Transfusing platelets during bypass rewarming in neonates improves postoperative outcomes: a randomized controlled trial. *World J Pediatr Congenit Heart Surg*. 2020;11(1):71-76. doi:10.1177/2150135119888155

31. van Baarle FLF, van de Weerdt EK, van der Velden WJFM, et al. Platelet transfusion before CVC placement in patients with thrombocytopenia. *N Engl J Med*. 2023;388(21):1956-1965. doi:10.1056/NEJMoa2214322

32. Carson JL, Stanworth SJ, Guyatt G, et al. Red blood cell transfusion: 2023 AABB International Guidelines. *JAMA*. 2023;330(19):1892-1902. doi:10.1001/jama.2023.12914

33. Kaufman RM, Djulbegovic B, Gernsheimer T, et al; AABB. Platelet transfusion: a clinical practice guideline from the AABB. *Ann Intern Med*. 2015;162(3):205-213. doi:10.7326/M14-1589

34. Nahirniak S, Slichter SJ, Tanael S, et al; International Collaboration for Transfusion Medicine Guidelines. Guidance on platelet transfusion for patients with hypoproliferative thrombocytopenia. *Transfus Med Rev*. 2015;29(1):3-13. doi:10.1016/j.tmrv.2014.11.004

35. Guyatt GH, Oxman AD, Vist GE, et al; GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336(7650):924-926. doi:10.1136/bmj.39489.470347.AD

36. Graham R, Mancher M, Miller Wolman D, Greenfield S, Steinberg E; Institute of Medicine (US) Committee on Standards for Developing Trustworthy Clinical Practice Guidelines. *Clinical*

Practice Guidelines We Can Trust. National Academies Press; 2011.

37. Jug R, La Rocca U, Al-Riyami AZ, et al. The clinical use of platelet transfusions: a systematic literature review and meta-analysis on behalf of the International Collaboration on Transfusion Medicine Guidelines (ICTMG). *Transfusion*. Published online May 29, 2025. doi:10.1111/trf.18277

38. Estcourt LJ, Heddle N, Kaufman R, et al; Biomedical Excellence for Safer Transfusion Collaborative. The challenges of measuring bleeding outcomes in clinical trials of platelet transfusions. *Transfusion*. 2013;53(7):1531-1543. doi:10.1111/trf.12058

39. Schandelmaier S, Briel M, Varadhan R, et al. Development of the Instrument to assess the Credibility of Effect Modification Analyses (ICEMAN) in randomized controlled trials and meta-analyses. *CMAJ*. 2020;192(32):E901-E906. doi:10.1503/cmaj.200077

40. Miller AB, Hoogstraten B, Staquet M, Winkler A. Reporting results of cancer treatment. *Cancer*. 1981;47(1):207-214. doi:10.1002/1097-0142(19810101)47:1<207::AID-CNCR2820470134>3.0.CO;2-6

41. Higgins JPT, Altman DG, Gøtzsche PC, et al; Cochrane Bias Methods Group; Cochrane Statistical Methods Group. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ*. 2011;343:d5928. doi:10.1136/bmj.d5928

42. Hoy D, Brooks P, Woolf A, et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. *J Clin Epidemiol*. 2012;65(9):934-939. doi:10.1016/j.jclinepi.2011.11.014

43. Sterne JA, Hernán MA, Reeves BC, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*. 2016;355:i4919. doi:10.1136/bmj.i4919

44. Guyatt GH, Oxman AD, Kunz R, et al; GRADE Working Group. GRADE guidelines: 7. rating the quality of evidence–inconsistency. *J Clin Epidemiol*. 2011;64(12):1294-1302. doi:10.1016/j.jclinepi.2011.03.017

45. RevMan: systematic review and meta-analysis tool for researchers worldwide. Cochrane RevMan. Accessed May 29, 2024. https://revman.cochrane.org/info

46. Murad MH, Wang Z, Zhu Y, Saadi S, Chu H, Lin L. Methods for deriving risk difference (absolute risk reduction) from a meta-analysis. *BMJ*. 2023;381:e073141. doi:10.1136/bmj-2022-073141

47. Guyatt GH, Oxman AD, Santesso N, et al. GRADE guidelines: 12. preparing summary of findings tables-binary outcomes. *J Clin Epidemiol*. 2013;66(2):158-172. doi:10.1016/j.jclinepi.2012.01.012

48. Alonso-Coello P, Schünemann HJ, Moberg J, et al; GRADE Working Group. GRADE Evidence to Decision (EtD) frameworks: a systematic and transparent approach to making well informed healthcare choices. 1: Introduction. *BMJ*. 2016;353:i2016. doi:10.1136/bmj.i2016

49. Andrew M, Vegh P, Caco C, et al. A randomized, controlled trial of platelet transfusions in thrombocytopenic premature infants. *J Pediatr*. 1993;123(2):285-291. doi:10.1016/S0022-3476(05)81705-6

50. Ning S, Kerbel B, Callum J, Lin Y. Safety of lumbar punctures in patients with thrombocytopenia. *Vox Sang*. 2016;110(4):393-400. doi:10.1111/vox.12381

51. Chung HH, Morjaria S, Frame J, et al. Rethinking the need for a platelet transfusion threshold of 50 × 10^9 /L for lumbar puncture in cancer patients. *Transfusion*. 2020;60(10):2243-2249. doi:10.1111/trf.15988

52. Veen JJ, Vora AJ, Welch JC. Lumbar puncture in thrombocytopenic children. *Br J Haematol*. 2004;127(2):233-234. doi:10.1111/j.1365-2141.2004.05178.x

53. Howard SC, Gajjar A, Ribeiro RC, et al. Safety of lumbar puncture for children with acute lymphoblastic leukemia and thrombocytopenia. *JAMA*. 2000;284(17):2222-2224. doi:10.1001/jama.284.17.2222

54. Kozak M, Hallan DR, Stoltzfus M, Rizk E. Lumbar puncture in thrombocytopenia: the floor is not firm. *Cureus*. 2023;15(7):e42019. doi:10.7759/cureus.42019

55. Foerster MV, Pedrosa F de PR, da Fonseca TCT, Couceiro TC de M, Lima LC. Lumbar punctures in thrombocytopenic children with cancer. *Paediatr Anaesth*. 2015;25(2):206-210. doi:10.1111/pan.12527

56. Shander A, Hofmann A, Ozawa S, Theusinger OM, Gombotz H, Spahn DR. Activity-based costs of blood transfusions in surgical patients at four hospitals. *Transfusion*. 2010;50(4):753-765. doi:10.1111/j.1537-2995.2009.02518.x

57. Scherlinger M, Richez C, Tsokos GC, Boilard E, Blanco P. The role of platelets in immune-mediated inflammatory diseases. *Nat Rev Immunol*. 2023;23(8):495-510. doi:10.1038/s41577-023-00834-4

58. Warner MA, Chandran A, Frank RD, Kor DJ. Prophylactic platelet transfusions for critically ill patients with thrombocytopenia: a single-institution propensity-matched cohort study. *Anesth Analg*. 2019;128(2):288-295. doi:10.1213/ANE.0000000000002794

59. He S, Fan C, Ma J, Tang C, Chen Y. Platelet transfusion in patients with sepsis and thrombocytopenia: a propensity score-matched analysis using a large ICU database. *Front Med (Lausanne)*. 2022;9:830177. doi:10.3389/fmed.2022.830177

60. Warner MA, Woodrum D, Hanson A, Schroeder DR, Wilson G, Kor DJ. Preprocedural platelet transfusion for thrombocytopenic patients undergoing interventional radiology procedures is not associated with reduced bleeding complications. *Transfusion*. 2017;57(4):890-898. doi:10.1111/trf.13996

61. Simon TL, Akl BF, Murphy W. Controlled trial of routine administration of platelet concentrates in cardiopulmonary bypass surgery. *Ann Thorac Surg*. 1984;37(5):359-364. doi:10.1016/S0003-4975(10)60755-2

62. Yanagawa B, Ribeiro R, Lee J, et al; Canadian Cardiovascular Surgery Meta-Analysis Working Group. Platelet transfusion in cardiac surgery: a systematic review and meta-analysis. *Ann Thorac Surg*. 2021;111(2):607-614. doi:10.1016/j.athoracsur.2020.04.139

63. Stanworth SJ, Hudson CL, Estcourt LJ, Johnson RJ, Wood EM; TOPPS study investigators. Risk of bleeding and use of platelet transfusions in patients with hematologic malignancies: recurrent event analysis. *Haematologica*. 2015;100(6):740-747. doi:10.3324/haematol.2014.118075

64. Patel IJ, Rahim S, Davidson JC, et al. Society of Interventional Radiology consensus guidelines for the periprocedural management of thrombotic and bleeding risk in patients undergoing percutaneous image-guided interventions: part II: recommendations endorsed by the Canadian Association for Interventional Radiology and the Cardiovascular and Interventional Radiological Society of Europe. *J Vasc Interv Radiol*. 2019;30(8):1168-1184. doi:10.1016/j.jvir.2019.04.017

65. Lee-Miller C, Kairalla JA, Hibbitts E, et al. Additional induction intrathecal cytarabine for patients with CNS2 disease at diagnosis is not beneficial for patients with B-ALL treated on Children's Oncology Group Protocols AALL0932 and AALL1131. Presented at Annual Society of Hematology Annual Meeting and Exposition; December 9, 2024. Accessed May 5, 2025. https://ash.confex.com/ash/2024/webprogram/Paper203456.html

66. Fustolo-Gunnink SF, Fijnvandraat K, van Klaveren D, et al; PlaNeT2 and MATISSE collaborators. Preterm neonates benefit from low prophylactic platelet transfusion threshold despite varying risk of bleeding or death. *Blood*. 2019;134(26):2354-2360. doi:10.1182/blood.2019000899

67. Neonatal platelet transfusion threshold trial. ClinicalTrials.gov. Accessed January 27, 2025. https://clinicaltrials.gov/study/NCT06676904

68. National Institute for Health Care and Research. T4P (threshold for platelets). NIHR Funding and Awards. Accessed August 28, 2024. https://fundingawards.nihr.ac.uk/award/NIHR131822

69. Stanworth SJ, Shah A, Doidge J, Watkinson P; Threshold for Platelets (T4P) Investigators. The ongoing dilemma of prophylactic platelet transfusions pre-procedure and the development of evidence-based recommendations. *Transfus Med*. 2023;33(5):428-430. doi:10.1111/tme.12994

70. Brouwers MC, Kho ME, Browman GP, et al; AGREE Next Steps Consortium. AGREE II: advancing guideline development, reporting and evaluation in health care. *CMAJ*. 2010;182(18):E839-E842. doi:10.1503/cmaj.090449