Avera

Laboratory Service Line

Indications for Transfusion

Jacquelyn Choate, MD
Medical Director, Blood Bank
Avera McKennan

- RBC Transfusion
  - Risks
  - Costs
  - Data
  - Red Blood Cell Indications
  - Platelets
  - Patient Blood Management at Avera

Risks of transfusion

- Transfusion transmitted disease
  - HIV 1, 2
  - Hepatitis B, C
  - HTLV
  - Syphilis
  - West Nile Virus
  - Trypanosoma cruzi (Chagas' disease)
  - CMV
  - Malaria, Babesia
  - vCJD
  - Dengue
  - Others ? (MERS, XMRV, arboviruses, anaplasma, etc.)

Risks of transfusion

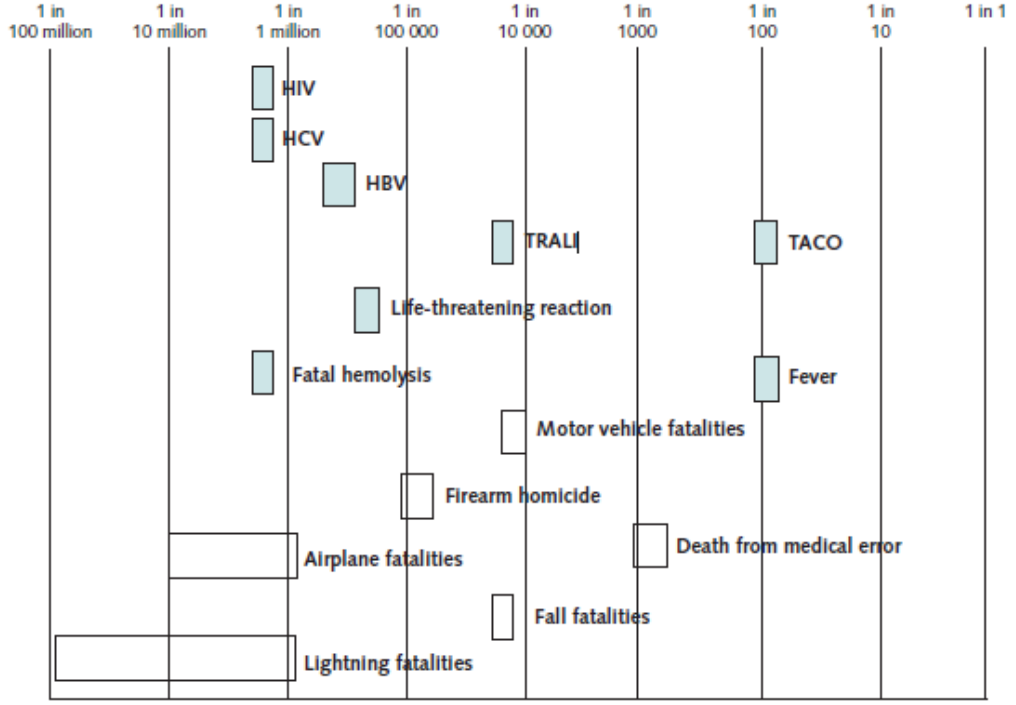
- Transfusion reaction
  - Acute hemolytic
  - Allergic/Anaphylactic
    - IgA-deficiency
  - Febrile non-hemolytic
  - TRALI
  - TACO

Risks of transfusion

- Allo-immunization
  - We always match for ABO and Rh; however there are hundreds of other RBC antigens
    - Kell, Duffy, Kidd….
  - Each transfusion poses the risk of the patient forming antibodies against unmatched antigens…
  - Making them difficult to impossible to transfuse in the future

- Other immune modulation
  - Cytokines, complement

Figure. **Adverse effects of RBC transfusion contrasted with other risks.**

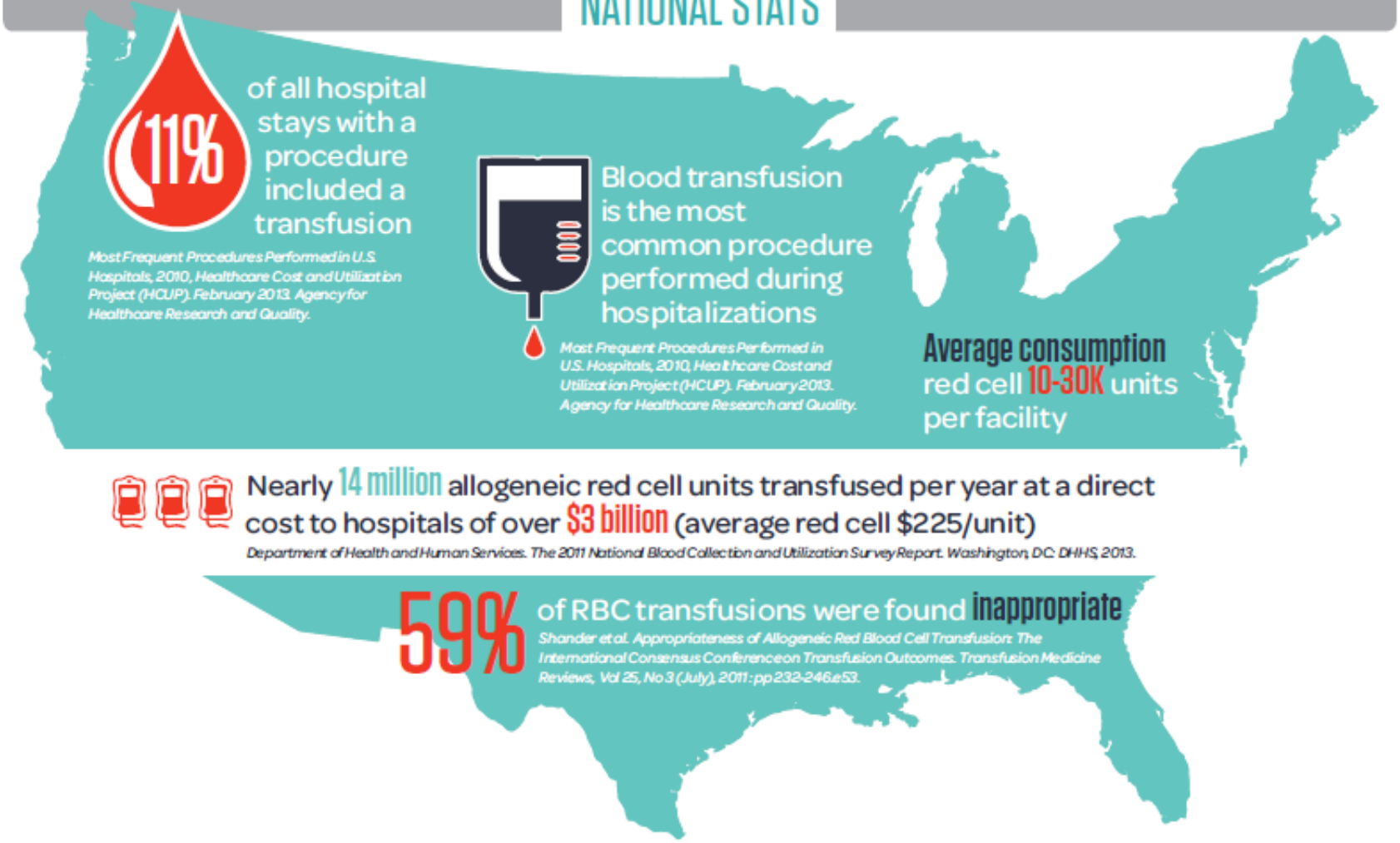


Risk is depicted on a logarithmic scale. Shaded bars represent the risk per RBC unit transfused, and unshaded bars represent the risk for fatality per person per year for various life events. During 2007 through 2008, HIV incidence in blood donors was 3.1 per 100 000 person-years. Residual risk was estimated as 1:1 467 000 transfused blood components or 6.8 per 10 million transfused components (10). During 2007 through 2008, HCV incidence in blood donors was 5.1 per 100 000 person-years with residual risk estimate of 0.87 per million transfused blood components (1:1 149 000) or 8.7 per 10 million transfused components (10). For 2006 to 2008, HBV incidence in blood donors was 3.41 to 3.43 per 100 000 person-years. The estimated residual risk for HBV was 1 in 282 000 to 1 in 357 000 transfused blood components (11) or 2.8 per million to 3.6 per million transfused blood components. In a recently published, large, prospective study with active recipient surveillance, the rate of TRALI occurrence in 2009 was 0.81 (95% CI, 0.44 to 1.49) per 10 000 transfused blood components or 8.1 per 100 000 transfused blood components (12). Although the literature has a wide range of TRALI risk estimates (1, 13–16), we have selected the rate reported in this recent prospective study. Three studies of TACO have produced similar results. In a study of 901 intensive care unit patients, 6% of patients who received transfusions developed TACO. Median units transfused were 2 RBCs and 3 overall (including plasma and platelets) (17). The rate per transfused RBC unit was 2 to 3 per 100. In 382 patients undergoing hip and knee replacement, 1% developed TACO after surgery (18). In a study of patients having total hip and knee arthroplasty, 8% developed fluid overload necessitating diuretic use and 4% of patients who did not receive transfusions developed fluid overload, leading to a TACO estimate of 4% (19). In published studies from the late 1990s, the risk for fatal hemolysis was estimated to range from 1.3 to 1.7 per million (5.9 to 7.7 per 10 million) transfused RBC units in one report (20) and 1 per 1 800 000 or 8.5 per 10 million in a second report (21). More recently, transfusion-related fatalities due to hemolysis reported to the U.S. Food and Drug Administration averaged 12.5 deaths per year from 2005 to 2010 (22). With 15 million RBC units transfused per year, the estimated risk for death due to hemolysis is 1:1 250 000 or 8 per 10 million RBC units. Fever (febrile nonhemolytic transfusion reactions) was estimated to be 1.1% with prestorage leukoreduction and 2.15% with poststorage leukoreduction (23). Death from medical error as reported by the Institute of Medicine was 1.3 to 2.9 per 1000 hospital admissions (24). Life-threatening transfusion reactions, defined as reactions requiring major medical intervention (for example, vasopressors, intubation, or transfer to an intensive care unit), occurred in 1:139 908 transfusions or 7.1 per million transfusions (1). Fatal motor vehicle accidents were estimated at 13.1 per 100 000 persons in 2008 or 1.3 per 10 000 persons (25). The rate of firearm homicide (which excludes suicide) was 4 per 100 000 persons in 2008 (25). Fatal falls were estimated at 8.2 deaths per 100 000 persons in 2008 (25). Lightning fatalities ranged from 0.02 per million (2 per 100 million) persons in California and Massachusetts to 2.0 per million persons in Wyoming (0 risk in Hawaii, Rhode Island, and Alaska) (26). The odds of being killed on a single airline flight on the 30 airlines with the best accident rates were 1 per 29.4 million. Among the 25 airlines with the worst accident records, rates were 1.7 per million per flight (27). Modified from Dzik (2002) (28). HBV = hepatitis B virus; HCV = hepatitis C virus; RBC = red blood cell; TACO = transfusion-associated circulatory overload; TRALI = transfusion-related acute lung injury.

Cost of transfusion

- Approximately 14 million Red Blood Cell units are transfused in the US every year
- 85 million worldwide
- Average cost per unit $225 (in Midwest)
  - Cumulative cost varies $776 to over $1,000
- Avera McKennan (2013): 6,485 units of pRBCs

NATIONAL STATS



Nearly 14 million allogeneic red cell units transfused per year at a direct cost to hospitals of over $3 billion (average red cell $225/unit)

Department of Health and Human Services. The 2011 National Blood Collection and Utilization Survey Report. Washington, DC: DHHS, 2013.

59% of RBC transfusions were found inappropriate

Shander et al. Appropriateness of Allogeneic Red Blood Cell Transfusion: The International Consensus Conference on Transfusion Outcomes. Transfusion Medicine Reviews, Vol 25, No 3 (July), 2011: pp 232-246.e53.

The decision to transfuse

- Physicians most often use hemoglobin concentration to decide when to transfuse
- Previous guidelines have identified coronary artery disease patients as an important subgroup with different oxygen delivery needs
- Optimal use balances delivering enough RBCs to maximize clinical outcome without increasing cost and exposure potential risks

Why do we want to consider PBM (Patient Blood Management)?

CASE STUDY STATS

Transfusion guideline implementations are associated with **47% reduction** in the odds of death and **50% decrease** of total hospitalization cost after cardiac surgery.

LaPar DJ, et al. J Thorac Cardiovasc Surg. 2013 Mar;145(3):796-803; discussion 803-4. doi: 10.1016/j.jtcvs.2012.12.041.

Implementation of an Anemia Management program resulted in a reduction of RBC transfusion by **62%.**

Hyo-Seok Na, et al. Transfusion 2011;51:118-24.

25% reduction in hospital stay for non-transfused vs. transfused patients.

Sarode R, et al. Transfusion 2010;50-487-92

First year of implementation expenses for blood products **decreased $510,000** in the first year.

Cole, K.M., & Waller, T. (2012). Implementing a Blood Management Program to Improve Patient Safety. Retrieved May 29, 2013, from http://www.perfusion.com/services/wp-content/uploads/downloads/2012/04/CLMA_CLMR_Q12012_FINAL.pdf

What makes a good PBM program?

- Restrictive transfusion strategies
- Using Intra-operative blood salvage where appropriate
- Managing elective pre-op anemia with iron replacement (oral or IV)

Choosing Wisely®

An initiative of the ABIM Foundation

aaBB®

Five Things Physicians and Patients Should Question

1 Don't transfuse more units of blood than absolutely necessary.

Each unit of blood carries risks. A restrictive threshold (7.0-8.0g/dL) should be used for the vast majority of hospitalized, stable patients without evidence of inadequate tissue oxygenation (evidence supports a threshold of 8.0g/dL in patients with pre-existing cardiovascular disease). Transfusion decisions should be influenced by symptoms and hemoglobin concentration. Single unit red cell transfusions should be the standard for non-bleeding, hospitalized patients. Additional units should only be prescribed after re-assessment of the patient and their hemoglobin value.

2 Don't transfuse red blood cells for iron deficiency without hemodynamic instability.

Blood transfusion has become a routine medical response despite cheaper and safer alternatives in some settings. Pre-operative patients with iron deficiency and patients with chronic iron deficiency without hemodynamic instability (even with low hemoglobin levels) should be given oral and/or intravenous iron.

3 Don't routinely use blood products to reverse warfarin.

Patients requiring reversal of warfarin can often be reversed with vitamin K alone. Prothromobin complex concentrates or plasma should only be used for patients with serious bleeding or requiring emergency surgery.

4 Don't perform serial blood counts on clinically stable patients.

Transfusion of red blood cells or platelets should be based on the first laboratory value of the day unless the patient is bleeding or otherwise unstable. Multiple blood draws to recheck whether a patient's parameter has fallen below the transfusion threshold (or unnecessary blood draws for other laboratory tests) can lead to excessive phlebotomy and unnecessary transfusions.

5 Don't transfuse O negative blood except to O negative patients and in emergencies for women of child bearing potential with unknown blood group.

O negative blood units are in chronic short supply due in part to overutilization for patients who are not O negative. O negative red blood cells should be restricted to: (1) O negative patients; or (2) women of childbearing potential with unknown blood group who require emergency transfusion before blood group testing can be performed.

Indications for transfusion

- Previous trails
  - FOCUS – Functioning Outcomes in Cardiovascular patients Undergoing Surgical hip fracture repair
  - TRICC – Transfusion Requirements in Critical Care
  - These looked at patients with pre-existing coronary artery disease
- Other
  - GI bleed, cardiac surgery, chronic kidney disease, ambulatory hematology, etc.

Indications for transfusion

- Red blood cell indications

Annals of Internal Medicine | CLINICAL GUIDELINE

Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB*

Jeffrey L. Carson, MD; Brenda J. Grossman, MD, MPH; Steven Kleinman, MD; Alan T. Tinmouth, MD; Marisa B. Marques, MD; Mark K. Fung, MD, PhD; John B. Holcomb, MD; Orieji Illoh, MD; Lewis J. Kaplan, MD; Louis M. Katz, MD; Sunil V. Rao, MD; John D. Roback, MD, PhD; Aryeh Shander, MD; Aaron A.R. Tobian, MD, PhD; Robert Weinstein, MD; Lisa Grace Swinton McLaughlin, MD; and Benjamin Djulbegovic, MD, PhD, for the Clinical Transfusion Medicine Committee of the AABB

- A meta-analysis including n=6264 patients

RBC transfusion: A clinical practice guideline from the AABB

- Systematic review of the literature
- Randomized, controlled trials
- Transfusion groups were assigned a “trigger” or “threshold” based on patient hemoglobin or hematocrit
- Primary outcome number of patients transfused
- Secondary outcomes illness, death, length of stay, number of units transfused

RBC transfusion: A clinical practice guideline from the AABB

- 19 trials were identified including medical and surgical patients (adults and children)
- These were trials that randomized patients to "liberal" (Hbg 8-10) vs. "restrictive" (Hgb 7-8) transfusion strategies
  - Most compared outcomes at Hgb thresholds between 7 and 10 g/dL
- Patient outcomes were tracked and recommendations made using GRADE methodology (Grading of Recommendations Assessement, Development and Evaluation)

RBC transfusion: A clinical practice guideline from the AABB

- Evaluated each trial for risk of bias
- Examined statistical heterogeneity
- Calculated relative risk (RR) for allogeneic transfusion in the intervention group compared with control and the corresponding 95% CI

Table 1—Continued

Patients, *n/N*		Effect		Quality	Importance
Restrictive Transfusion Strategy	Liberal Transfusion Strategy	Relative Risk (95% CI)	Absolute Effect		
1416/3059 (46.3%)	2575/3066 (84.0%)	0.61 (0.52 to 0.72)	Risk reduction, 328 fewer per 1000 (235 fewer to 403 fewer)	High	Important
1357	1358	–	Mean difference, −1.19 (−1.85 to −0.53)	High	Important
2653	2649	–	Mean difference, −1.48 (−1.92 to −1.03)	High	Important

- A 39% decrease in the probability of receiving a transfusion (46% vs. 84%)
- Mean number of RBC units transfuse per patient was 1.19 lower in the restrictive group
- Mean Hgb concentration before transfusion was 1.48 g/dL lower in the restrictive group

Table 2. **Evidence Tables for Clinical Outcomes**

Studies (References)	Quality Assessment*					
Variable	**Design**	**Risk of Bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other Considerations**
Thirty-day mortality (follow-up, 0–30 d; assessed with: Direct observation or telephone follow-up)						
11 (31, 32, 41–44, 47, 49, 50, 52, 53)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None
Myocardial infarction (assessed with: Systematic screening or clinical detection†)						
8 (32, 42, 43, 47, 48, 50, 51, 53)	Randomized trials	No serious risk of bias	Serious‡	No serious indirectness	Serious§	None
Pulmonary edema or congestive heart failure (assessed with: Clinically recognized)						
5 (32, 47, 50–52)	Randomized trials	Serious‖	Serious¶	No serious indirectness	No serious imprecision	None
Cerebrovascular accident (stroke) (assessed with: Clinically recognized)						
5 (31, 32, 44, 47, 51)	Randomized trials	Serious‖	No serious inconsistency	No serious indirectness	No serious imprecision	None
Thromboembolism (assessed with: Objective testing)						
3 (32, 44, 47)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	Serious§	None
Infection (assessed with: Clinically recognized)						
6 (31, 32, 42, 47, 52, 54)	Randomized trials	Serious‖	No serious inconsistency	No serious indirectness	No serious imprecision	None
Inability to walk or death at 60 d (mean follow-up, 60 d; assessed with: Telephone follow-up)						
1 (32)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	Serious**	None
Hospital length of stay (better indicated by lower values; assessed with: Direct observation)						
8 (32, 42–44, 47, 50, 51, 54)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None

- Restrictive strategy resulted in lower 30-day mortality than did liberal transfusion (RR, 0.85[95% CI, 0.7 to 1.03]) although not clinically significant, suggests that a liberal strategy is unlikely to result in a clinically important reduction in mortality.
- Also trend toward lower overall infection rate, and no increased risk in myocardial infarction.

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Description: Although approximately 85 million units of red blood cells (RBCs) are transfused annually worldwide, transfusion practices vary widely. The AABB (formerly, the American Association of Blood Banks) developed this guideline to provide clinical recommendations about hemoglobin concentration thresholds and other clinical variables that trigger RBC transfusions in hemodynamically stable adults and children.

Methods: These guidelines are based on a systematic review of randomized clinical trials evaluating transfusion thresholds. We performed a literature search from 1950 to February 2011 with no language restrictions. We examined the proportion of patients who received any RBC transfusion and the number of RBC units transfused to describe the effect of restrictive transfusion strategies on RBC use. To determine the clinical consequences of restrictive transfusion strategies, we examined overall mortality, nonfatal myocardial infarction, cardiac events, pulmonary edema, stroke, thromboembolism, renal failure, infection, hemorrhage, mental confusion, functional recovery, and length of hospital stay.

Recommendation 1: The AABB recommends adhering to a restrictive transfusion strategy (7 to 8 g/dL) in hospitalized, stable patients (Grade: strong recommendation; high-quality evidence).

Recommendation 2: The AABB suggests adhering to a restrictive strategy in hospitalized patients with preexisting cardiovascular disease and considering transfusion for patients with symptoms or a hemoglobin level of 8 g/dL or less (Grade: weak recommendation; moderate-quality evidence).

Recommendation 3: The AABB cannot recommend for or against a liberal or restrictive transfusion threshold for hospitalized, hemodynamically stable patients with the acute coronary syndrome (Grade: uncertain recommendation; very low-quality evidence).

Recommendation 4: The AABB suggests that transfusion decisions be influenced by symptoms as well as hemoglobin concentration (Grade: weak recommendation; low-quality evidence).

Ann Intern Med. 2012;157:49-58. www.annals.org
For author affiliations, see end of text.
This article was published at www.annals.org on 27 March 2012.

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Avera guidelines for RBC trasfusion

SPECIFIC GUIDELINES: RED BLOOD CELL (RBC) TRANSFUSIONS

RBC transfusions should not be given simply in response to a given blood hemoglobin or hematocrit laboratory value; a clinical indication must also be present. No further justification for RBC transfusion is required if one or more of the following can be found in the medical record:

1. **Acute blood loss:** Rapid blood loss of > 20% of total blood volume regardless of the measured blood hemoglobin or hematocrit value (1000 mL or 10 mL per kg patient body weight). Consider Massive Transfusion Protocol.
2. **Critically ill patients**:
    a. Hgb < 7 g/dL without significant heart, lung, vascular, renal, liver or neural disease.
    b. Hgb < 8 g/dL **with** significant underlying heart, lung, vascular, renal, liver or neural disease or immediate postoperative patients.
    c. Hgb < 10 g/dL in patients with active myocardial infarction.
3. **Other patients with anemia** (with Hgb below 10 g/dL but above 7 g/dL): Consider transfusion only with symptomatic anemia. Symptoms and signs of anemia include: shortness of breath, chest pain, syncope, orthostatic hypotension, ST depression, tachycardia, and hypotension.

Platelets

Annals of Internal Medicine CLINICAL GUIDELINE

Platelet Transfusion: A Clinical Practice Guideline From the AABB

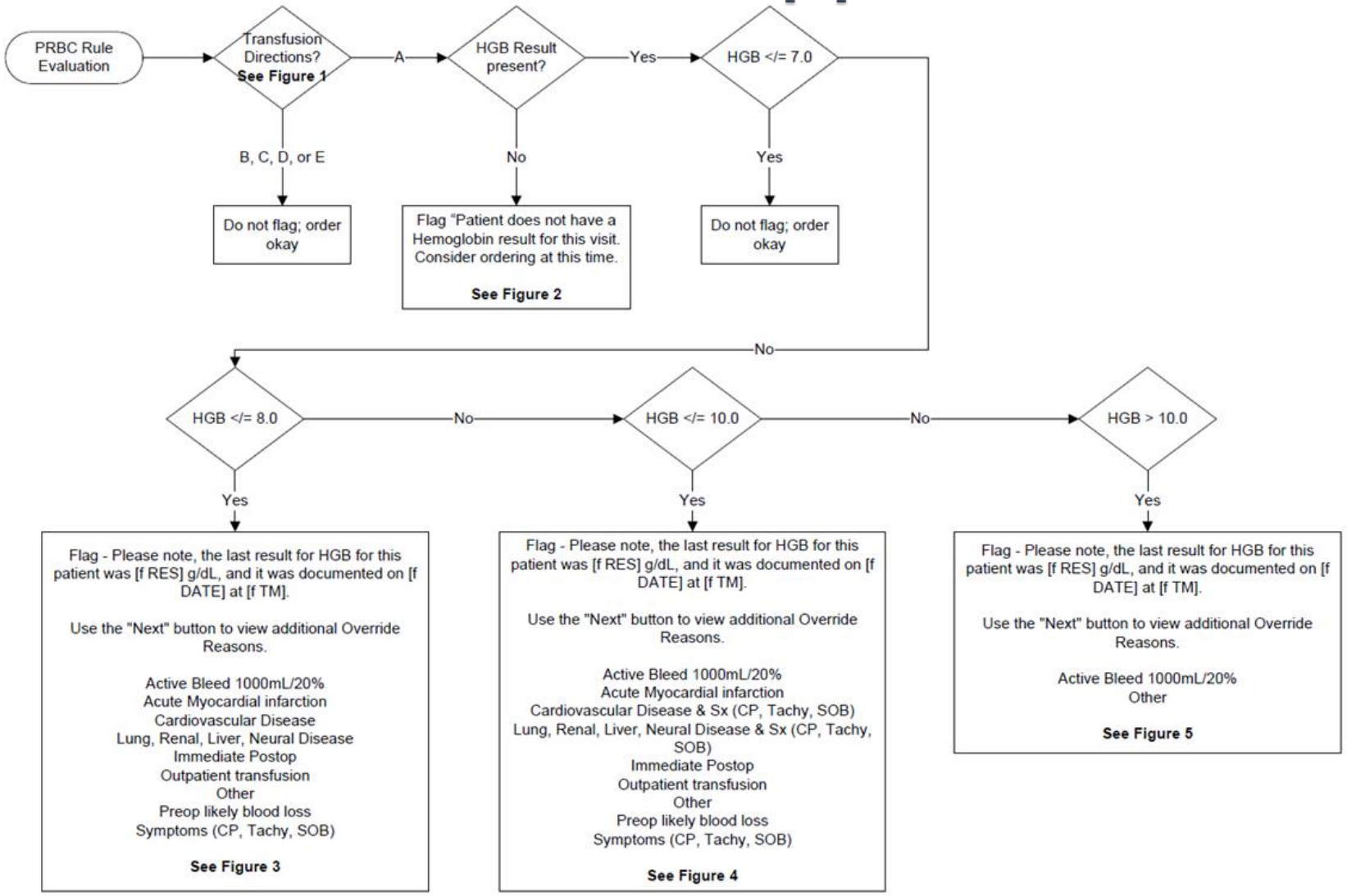
Richard M. Kaufman, MD; Benjamin Djulbegovic, MD, PhD; Terry Gernsheimer, MD; Steven Kleinman, MD; Alan T. Tinmouth, MD; Kelley E. Capocelli, MD; Mark D. Cipolle, MD, PhD; Claudia S. Cohn, MD, PhD; Mark K. Fung, MD, PhD; Brenda J. Grossman, MD, MPH; Paul D. Mintz, MD; Barbara A. O'Malley, MD; Deborah A. Sesok-Pizzini, MD; Aryeh Shander, MD; Gary E. Stack, MD, PhD; Kathryn E. Webert, MD, MSc; Robert Weinstein, MD; Babu G. Welch, MD; Glenn J. Whitman, MD; Edward C. Wong, MD; and Aaron A.R. Tobian, MD, PhD

SPECIFIC GUIDELINES: PLATELET TRANSFUSIONS

Platelet transfusions should not be given simply in response to a given blood platelet count. The underlying mechanism causing thrombocytopenia and the clinical risks of thrombocytopenia must be considered. No further justification for platelet transfusions is required if one or more of the following can be found in the medical record:

1. **Blood platelet count < 50,000/ul and either significant active bleeding as recorded in physician notes or suggested by fall in hemoglobin of 2 g/dl** within 24 hours prior to transfusion **or** in the perioperative period (up to 3 days postop or patient in ICU), **or** in a patient scheduled to undergo surgery or an invasive procedure. In patients with brain injury or surgery, platelet transfusion may be considered with platelet counts <100,000/ul.
2. **Blood platelet count < 10,000/ul and no evidence of significant bleeding** AND bone marrow failure undergoing progenitor cell transplant, **or** with a diagnosis of cancer (carcinoma, leukemia/lymphoma, sarcoma) or with severe bone marrow hypoplasia in aplastic anemia or myelodysplastic syndrome. Transfusion at a blood platelet count of 10,000 to 20,000/ul is justified by factors that increase the risk of bleeding (e.g. active infection, fever, sever liver disease, renal failure) **or** if there is reason to believe that counts will decrease below 10,000/μL in the subsequent 24 hours.
3. **Active bleeding in patients likely to have qualitative (functional) platelet defects**, regardless of blood platelet counts. If possible, the underlying cause of the platelet dysfunction (e.g. medication such as aspirin) should be corrected in an elective situation. Treatment of uremic platelet dysfunction better includes DDAVP, cryoprecipitate and conjugated estrogens.
4. **Acute, massive bleeding,** as part of the massive transfusion protocol.

Ordering Algorithm (RBCs) for Clinical Decision Support

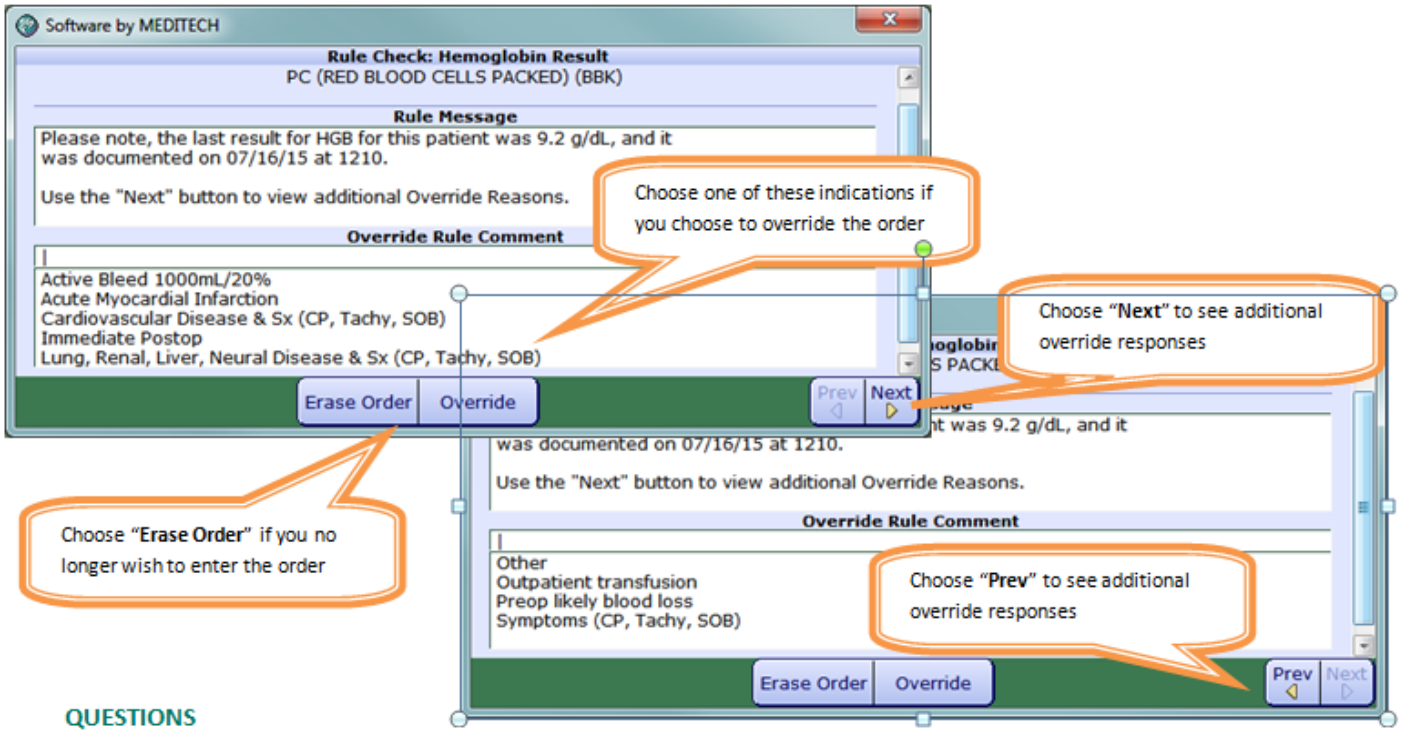


Meditech Clinical Decision Support

HOW WILL IT IMPACT ME

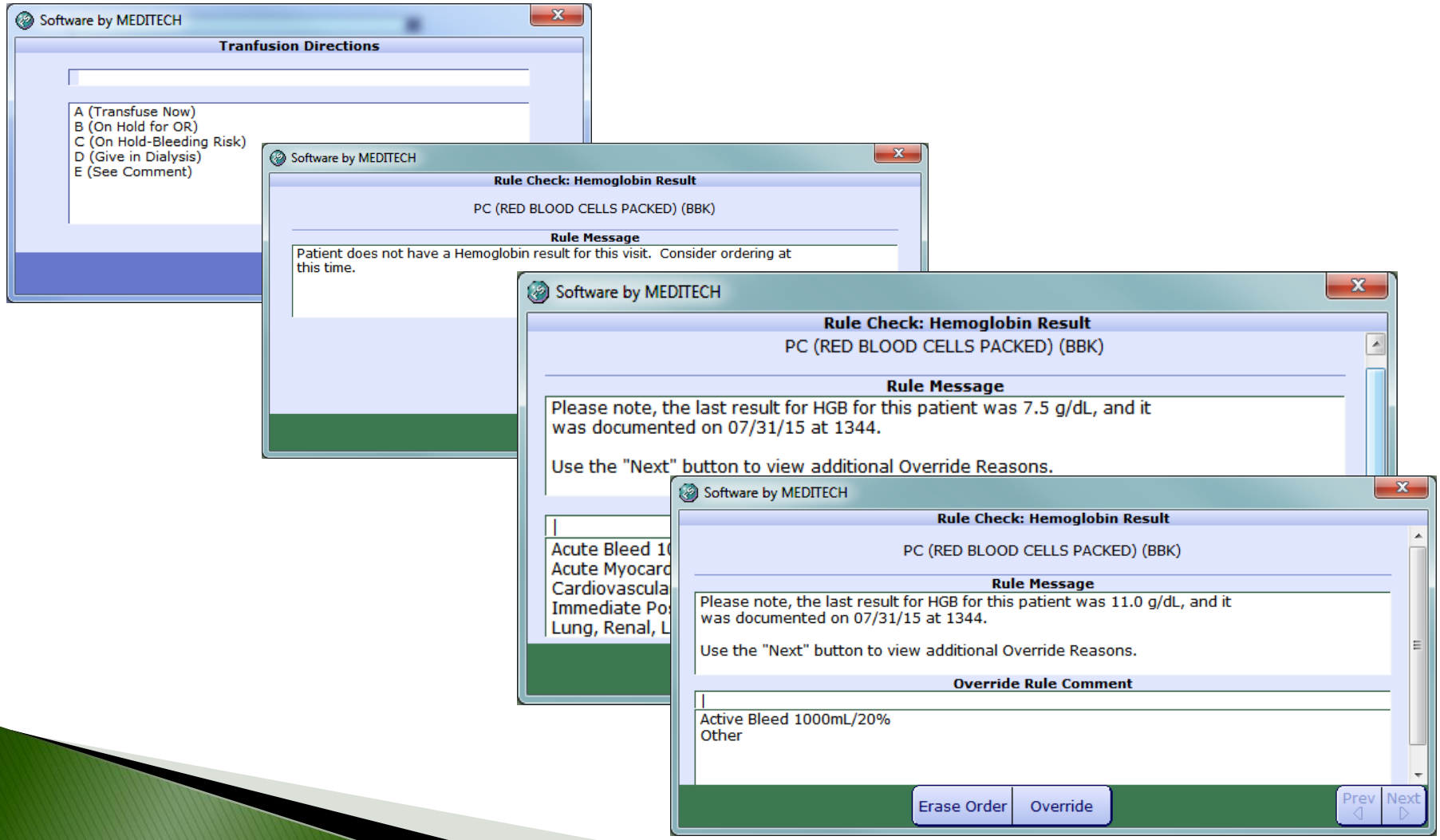
- **When ordering Red Blood Cell products, if the hemoglobin is greater than 7.0, you will be required to put in a clinical indication for the order or erase the order.**

After saving the red blood cell transfusion order, the provider will be flagged with a hemoglobin level and the ability to either erase the order or override the order. If you choose to override you will need to click on one of the clinical indications. Be sure to click on "Next" for other options.



QUESTIONS

Meditech Clinical Decision Support



Patient Blood Management

Driven by the Data

Avera Clinical Intelligence

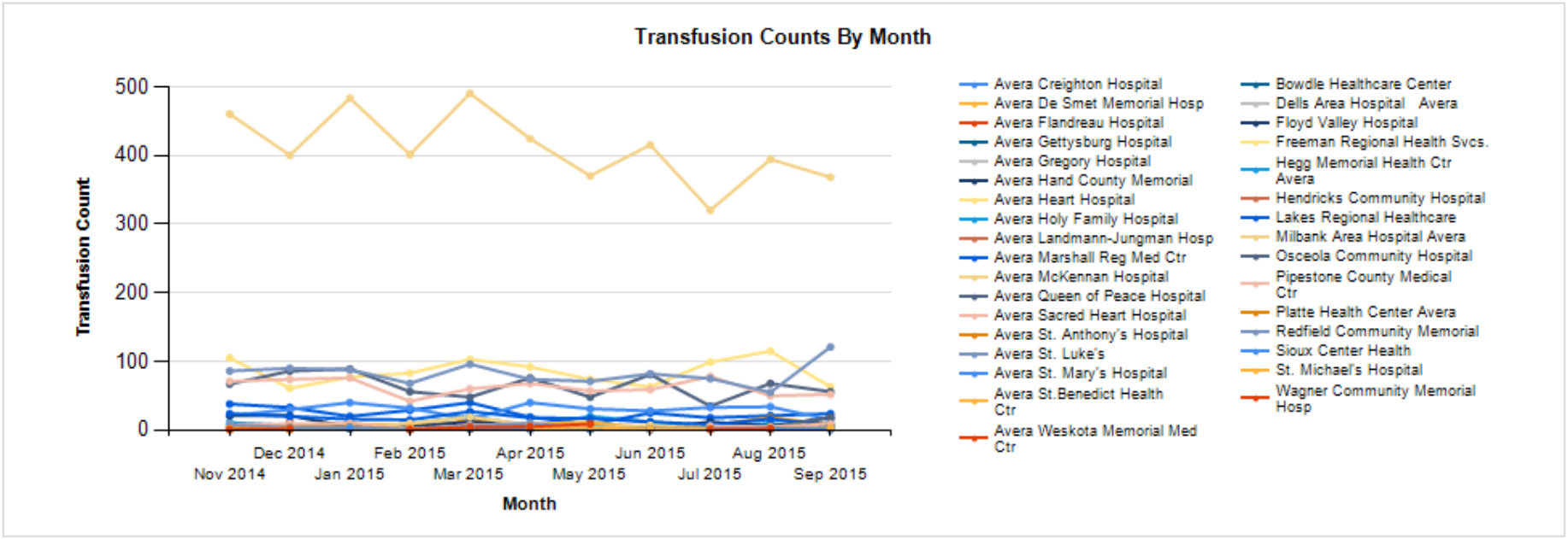
RBC Transfusion Summary By Facility and Hgb Range (Past 12 Months)

(Data updated on the 3rd day of each month)
* Unknown - when there was no Hgb test result less than 7 days before transfusion

Facility Name	6.0 and lower	6.1 to 7.0	7.1 to 8.0	8.1 to 9.0	9.1 and above	Unknown*
Avera Creighton Hospital	9.5% (2)	19.0% (4)	38.1% (8)	28.6% (6)	4.8% (1)	
Avera De Smet Memorial Hosp		20.0% (2)	30.0% (3)	50.0% (5)		
Avera Flandreau Hospital	23.8% (5)	38.1% (8)	33.3% (7)	4.8% (1)		
Avera Gettysburg Hospital		28.6% (2)	57.1% (4)	14.3% (1)		
Avera Gregory Hospital	21.0% (13)	16.1% (10)	32.3% (20)	14.5% (9)	16.1% (10)	
Avera Hand County Memorial	9.1% (2)	18.2% (4)	59.1% (13)	9.1% (2)	4.5% (1)	
Avera Heart Hospital	0.3% (3)	4.4% (46)	23.7% (248)	33.1% (347)	36.6% (384)	1.9% (20)
Avera Holy Family Hospital	5.8% (7)	12.5% (15)	39.2% (47)	26.7% (32)	14.2% (17)	1.7% (2)
Avera Landmann-Jungman Hosp		100.0% (2)				
Avera Marshall Reg Med Ctr	5.5% (17)	17.8% (55)	38.8% (120)	19.1% (59)	13.3% (41)	5.5% (17)
Avera McKennan Hospital	7.8% (396)	30.6% (1558)	42.6% (2171)	8.9% (456)	8.0% (407)	2.1% (108)
Avera Queen of Peace Hospital	3.5% (27)	8.1% (62)	29.2% (224)	44.5% (341)	12.9% (99)	1.8% (14)
Avera Sacred Heart Hospital	8.7% (65)	26.1% (195)	38.6% (289)	14.0% (105)	6.3% (47)	6.3% (47)
Avera St. Anthony's Hospital	14.9% (14)	31.9% (30)	43.6% (41)	7.4% (7)	2.1% (2)	
Avera St. Luke's	3.2% (35)	16.3% (179)	41.4% (456)	18.7% (206)	11.4% (125)	9.1% (100)
Avera St. Mary's Hospital	11.3% (44)	15.7% (61)	36.1% (140)	18.0% (70)	6.7% (26)	12.1% (47)
Avera St.Benedict Health Ctr	6.6% (5)	10.5% (8)	48.7% (37)	27.6% (21)	5.3% (4)	1.3% (1)
Avera Weskota Memorial Med Ctr		55.6% (10)	11.1% (2)	22.2% (4)	11.1% (2)	
Bowdle Healthcare Center	9.5% (2)	47.6% (10)	9.5% (2)	19.0% (4)	9.5% (2)	4.8% (1)
Dells Area Hospital Avera		43.8% (7)	56.2% (9)			
Floyd Valley Hospital	8.0% (10)	19.2% (24)	51.2% (64)	8.0% (10)	8.8% (11)	4.8% (6)
Freeman Regional Health Svcs.	10.5% (2)	21.1% (4)	31.6% (6)	10.5% (2)	15.8% (3)	10.5% (2)
Hegg Memorial Health Ctr Avera	17.6% (6)	5.9% (2)	55.9% (19)	11.8% (4)	8.8% (3)	
Hendricks Community Hospital		18.5% (5)	48.1% (13)	14.8% (4)	11.1% (3)	7.4% (2)
Lakes Regional Healthcare	12.3% (26)	11.8% (25)	27.0% (57)	28.4% (60)	15.6% (33)	4.7% (10)
Milbank Area Hospital Avera	2.4% (2)	22.4% (19)	38.8% (33)	20.0% (17)	15.3% (13)	1.2% (1)
Osceola Community Hospital	22.4% (11)	8.2% (4)	30.6% (15)	22.4% (11)	14.3% (7)	2.0% (1)
Pipestone County Medical Ctr	9.2% (7)	10.5% (8)	15.8% (12)	32.9% (25)	28.9% (22)	2.6% (2)
Platte Health Center Avera	13.6% (3)	27.3% (6)	18.2% (4)	27.3% (6)	13.6% (3)	
Redfield Community Memorial	13.6% (6)	13.6% (6)	36.4% (16)	36.4% (16)		

Patient Blood Management
Tracking the Data

Avera Clinical Intelligence



Take home points

- 7 is the new 8
  - A more restrictive threshold for transfusion (hemoglobin of 7 in stable patients, hemoglobin of 8 in patients with co-morbidities) leads to better patient outcomes overall
- 1 is the new 2
  - Transfuse 1 unit at a time, instead of 2, and check a repeat hemoglobin and reassess the patient. Often the patient will not need a 2nd unit.
- Transfuse to symptoms
  - SOB, tachycardia, orthostatic hypotension, etc.
  - Document the symptoms prompting the transfusion