Optimizing Blood Utilization Using Real-Time Clinical Decision Support

HIMSS Davies Award Case Study

UCLA Health
Information Technology

ISS | OHIA | DGIT

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Presenters

Agenda

- Overview of Patient Blood Management
- Red Blood Cell (RBC) Utilization Project
  - UCLA Data
    - Appropriate transfusions
    - 2 unit RBC orders
  - Strategy and Design
  - How Health IT was Utilized
- Value Derived

UCLA Health by the Numbers

4 hospitals

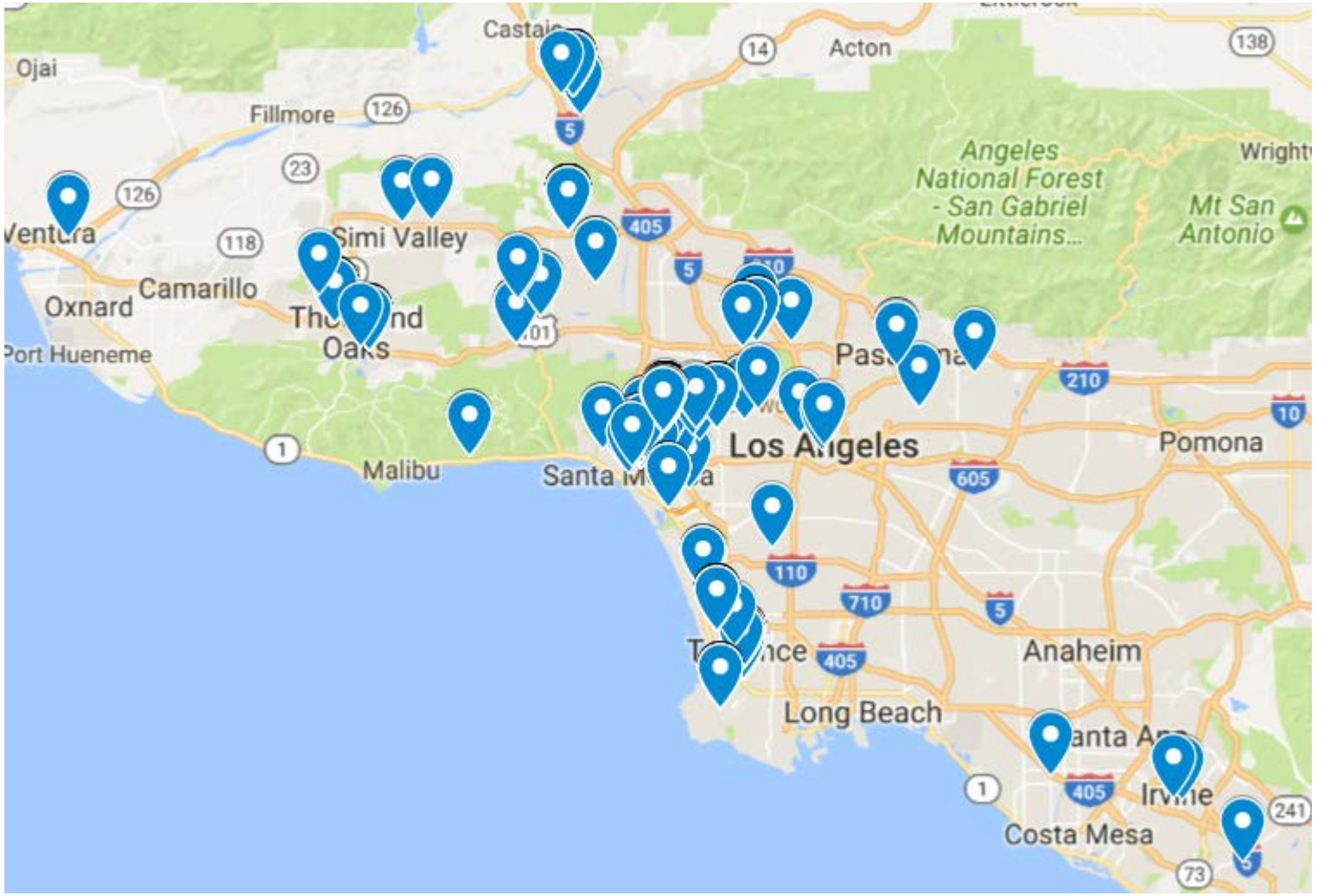
795 inpatient beds

60,000 hospital encounters

250+ outpatient practices

30+ specialties

1.9 million ambulatory visits per year
- 310,000 primary care population
  - 59% patients in plan where UCLA shares some risk
- 208,000 specialty care population



Mission, Vision, Goal

Our **mission** is to deliver leading-edge patient care, research, and education.

Our **vision** is to heal humankind, one patient at a time, by improving health, alleviating suffering and delivering acts of kindness.

Our **goal** is to provide the best patient experience with every patient, every encounter, every time.

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HIMSS ANALYTICS STAGE 7 INPATIENT & OUTPATIENT

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Overview of Patient Blood Management

Patient Blood Management

A patient-centered, evidence-based multidisciplinary approach to utilizing a rare and limited resource, blood.

- Optimize the use of blood and blood components
- Involves assistance and coordination from multiple medical disciplines
- Goals:
  - Anemia Management
  - Minimization of iatrogenic blood loss
  - Elimination of preoperative autologous donated blood
  - Use of autologous blood recovery and biologic therapy
  - Reduction of unnecessary transfusions through the use of restrictive transfusion triggers and 1-unit orders
  - Education of healthcare workers and auditing of transfusion practice

Patient Blood Management

Recognized by the WHO, TJC, AABB, AMA, other national/international societies

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.

American Society of Anesthesiologists

American Society of Anesthesiologists®

Five Things Physicians and Patients Should Question

American Society of Hematology

Five Things Physicians and Patients Should Question

Society of Hospital Medicine – **Adult Hospital Medicine**

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Five Things Physicians and Patients Should Question

Magnitude of the Problem

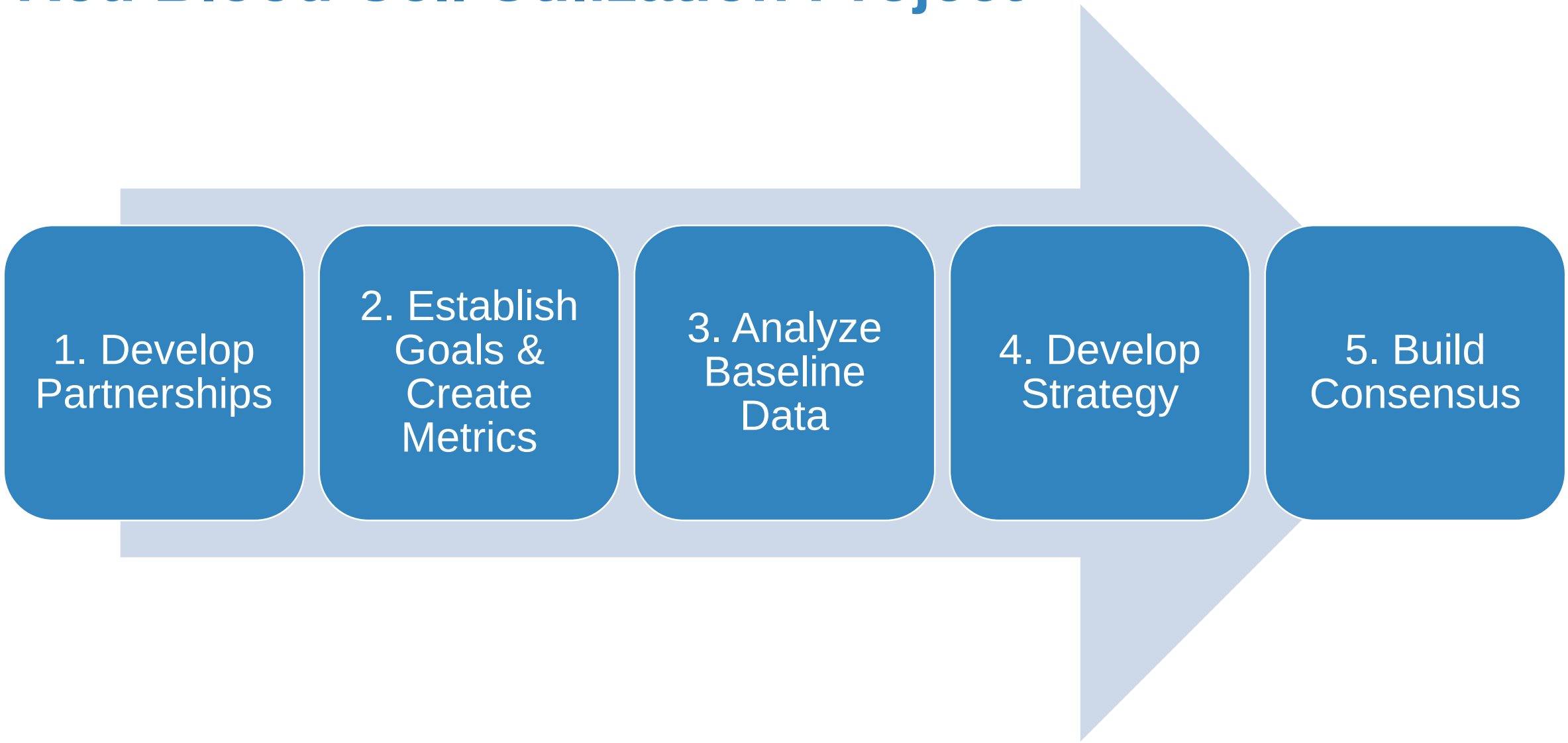
- Blood transfusion is the most common procedure performed during hospitalizations (occurs in 11% of all hospital admissions with a procedure)[1]
- Up to 59% of RBC orders are inappropriate[2]

- UCLA Health Pre-Intervention State
  - ~30,000 units of RBC units transfused annually
  - 2 units routinely ordered for transfusion without an interval Hgb check
  - Two sources for orders – order sets and order panels
  - Interns and residents do most of the blood ordering
  - Orders based on hemoglobin (Hgb) level or provider's ordering habits

1. Most Frequent Procedures Performed in US Hospitals, 2010 Healthcare Cost and Utilization Project (HCUP). February 2013. Agency for Healthcare Research and Quality
2. Shander et al. Appropriateness of Allogeneic Red Blood Cell Transfusion: The International Consensus Conference on Transfusion Outcomes. Transfusion Medicine Reviews. 25(3), 2011: 232-246.

RBC Utilization Project

Red Blood Cell Utilization Project



1. Develop Partnerships

- Approached by Hospitalists
- Multidisciplinary Team
  - Hospitalists
  - Transfusion Medicine Physicians/Transfusion Safety Officer
  - Nursing
  - IT

2. Establish Goals & Create Metrics

Goals

- Standardize transfusion practice
- Avoid transfusion at Hgb ≥ 8 g/dL in stable patients
- Reduce routine 2 unit RBC orders

Metric 1: % Orders with Appropriate Indications

- "Appropriate indication" for 1st unit
  - Patient does not have coronary disease AND most recent prior Hgb < 7 g/d

    - OR -
  - Patient has coronary disease AND most recent prior Hgb < 8 g/dL
- "Appropriate indication" for 2nd unit (when 2 units ordered)
  - Patient does not have coronary disease AND most recent prior Hgb < 6 g/dL

    - OR -
  - Patient has coronary disease AND most recent prior Hgb < 7 g/dL

Metric 2: % Orders for 2 units RBCs

- Aim for orders for 1 RBC unit with post-Hgb assessment; minimize orders where the 2nd unit is considered "inappropriate"

3. Analyze Baseline Data

Baseline Data Period (March 2013 – June 2014)

- Identify ‘transfusion orders’ as non-future, non-standing, non-cancelled orders for ‘Transfuse RBC’
- Include the number of units requested and the indication noted in the order
- Identify authorizing provider associated with the order, and the location and service of the patient at the time of order

Inclusion/Exclusion

- Population limited to adults (age > 18)
- Excluded those with > 2 g drop Hgb in prior 48 hours
- Excluded transfuse orders initiated in the OR

Unit of analysis is individual unit of RBCs

3. Analyzing Baseline Data

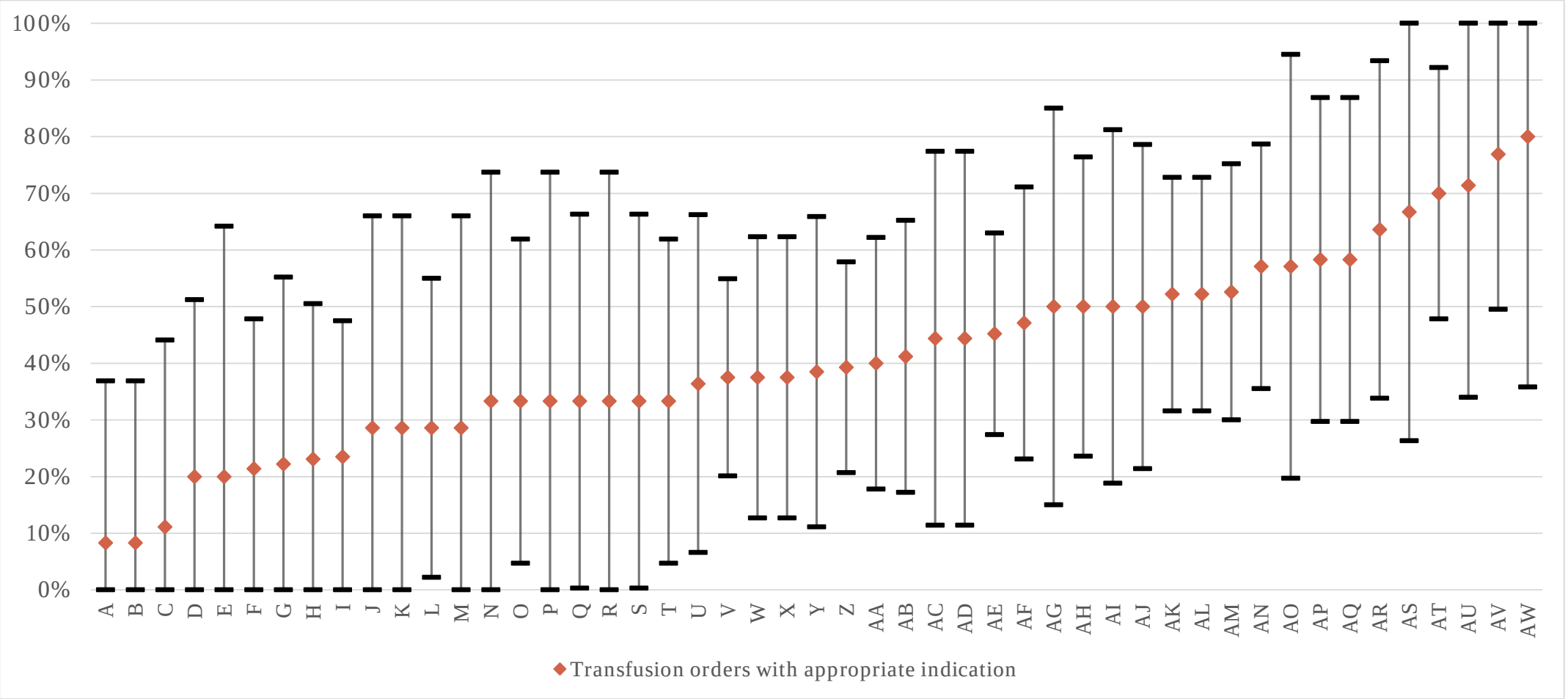
Hospitalist RBC Utilization Project: Pre-Intervention

SMUCLA Data

Measure Description	Orders
Total Transfuse RBC orders	6,166
“Inappropriate”	4,533 (73%)
• Hgb >8g/dL at the time of order	1,860 (30%)

3. Analyzing Baseline Data

- Wide Variation in Appropriate Transfusions by Hospitalist



4. Develop Strategy

- Capitalize on the Multidisciplinary Team and enlist hospital administration and quality department to create awareness
- Utilize IT intervention with Computerized Provider Order Entry alerts triggered based on patient Hgb and physician order
- Multi-intervention plan
    - Develop transfusion order sets embedded with evidence-based ordering
    - Continue Clinical Education Program
    - Provide initial feedback to Physicians and Departments

How Health IT Was Utilized

4. Develop Strategy

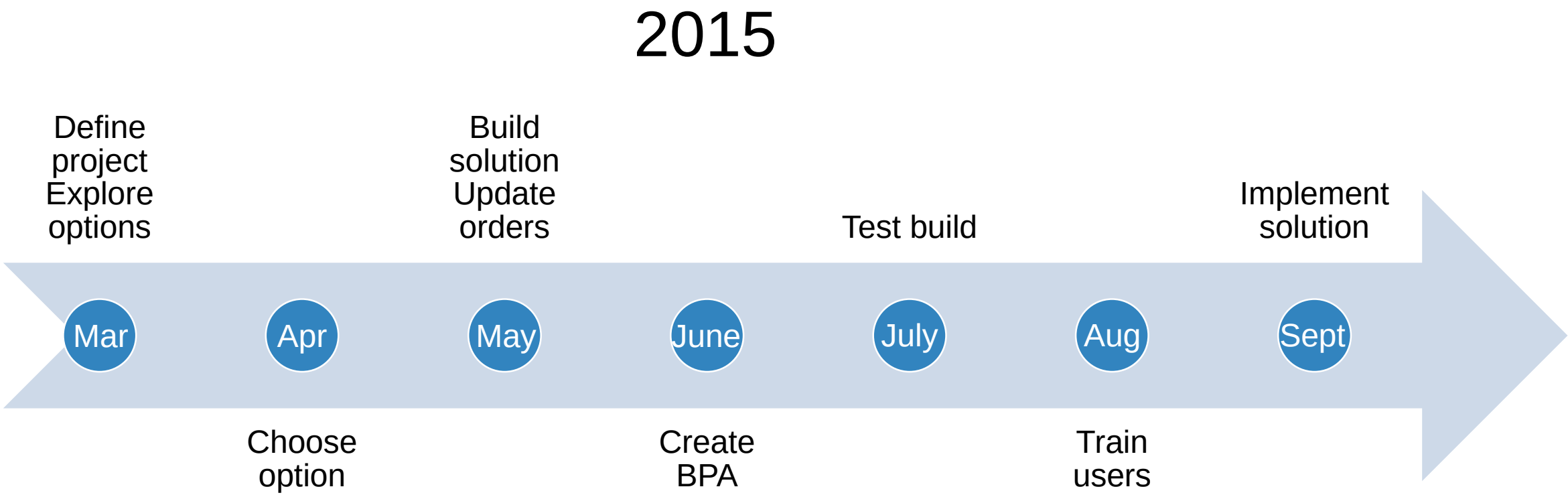
Options for Embedded Decision Support

1. Display Hgb result in the order with informational guideline text or a web link
   - Pros: Quicker and easier to build, little training required
   - Cons: Passive alert, provider-dependent for compliance with guidelines
2. Best Practice Advisory (BPA) for RBCs ordered outside of recommended guideline in blood panels and order sets
   - Pros: Active alert, can quantify reasons for ordering, little training required
   - Cons: Requires more time to build, alert fatigue
3. Order set that is dynamic based on the patient's hgb level
   - Pros: Dynamic alert, cleaner, more elegant, can use rules to determine when alerts appear
   - Cons: Complex build, ordering can only be done from order sets, more extensive training required

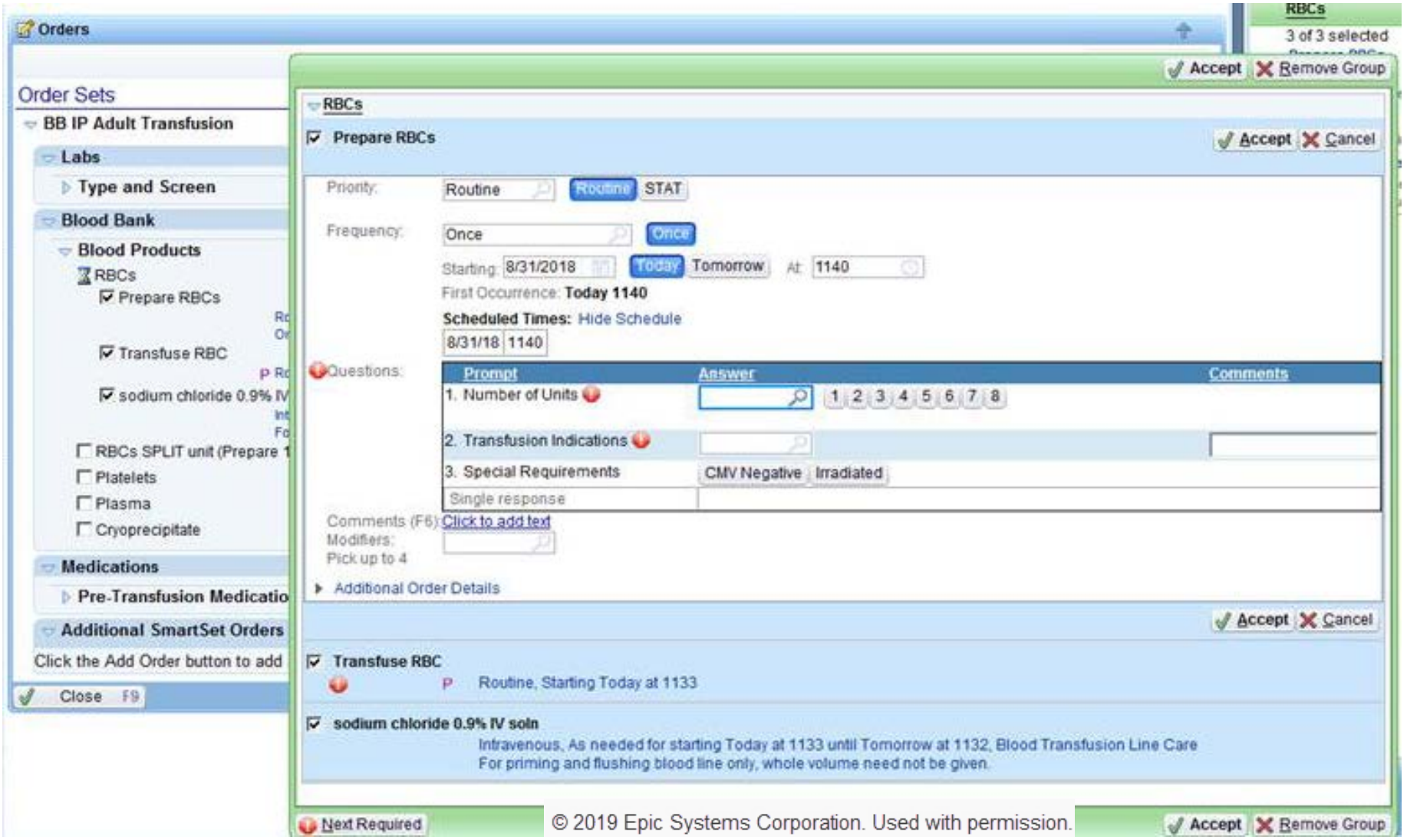
5. Build Consensus

- Subject Matter Experts
- Physician Informaticists
- New Project Request (NPR) Review Committee
- Clinical Optimization Review Council (CORC)
- Inpatient Advisory Group

Build Timeline



Pre-Intervention RBC Order



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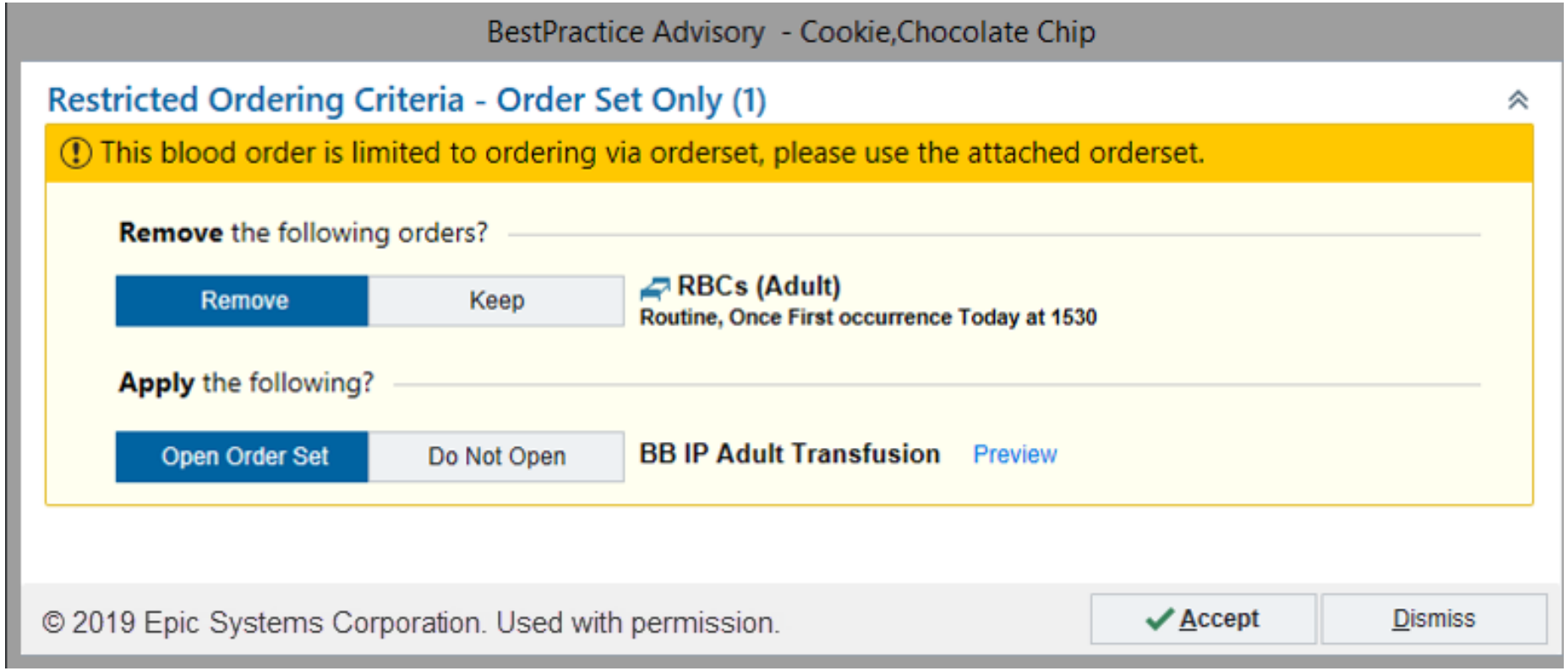
How Health IT Was Utilized

- Create a BPA to take providers from the RBC order panel to the Blood Bank order set
- Embed real-time clinical decision support into the ordering process
  - Display the patient's most recent hemoglobin result in the RBC order
  - Add a defaulted hemoglobin lab order if no result in past 48 hours
  - Display the transfusion guidelines based on the patient's most recent hemoglobin result
  - Default the RBC order to 1 unit if the hemoglobin is 7 – 10 g/dL
  - Add an order to draw a hemoglobin level 15 minutes after the transfusion of the first unit of RBCs is completed

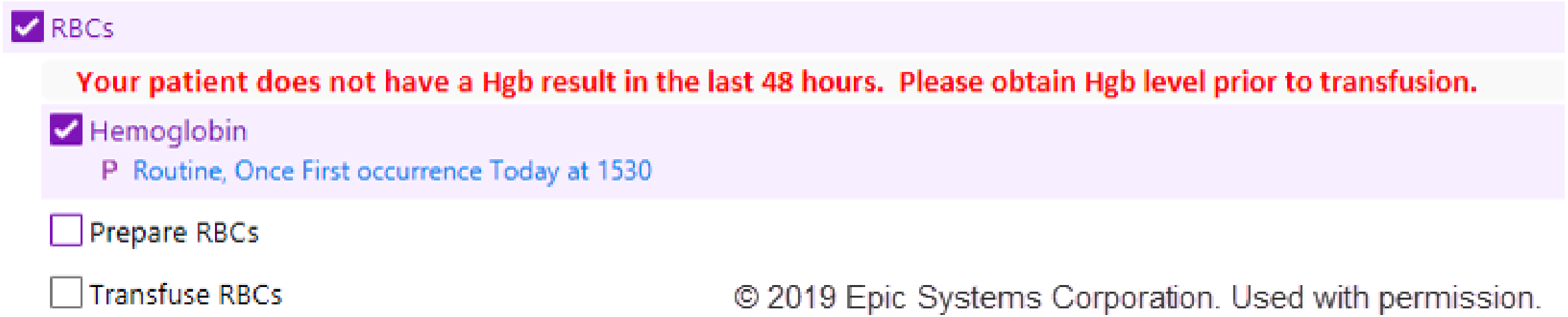
RBC Ordering Workflow

- Provider enters order for RBCs
- Redirect BPA fires and sends user to the Blood Bank order set



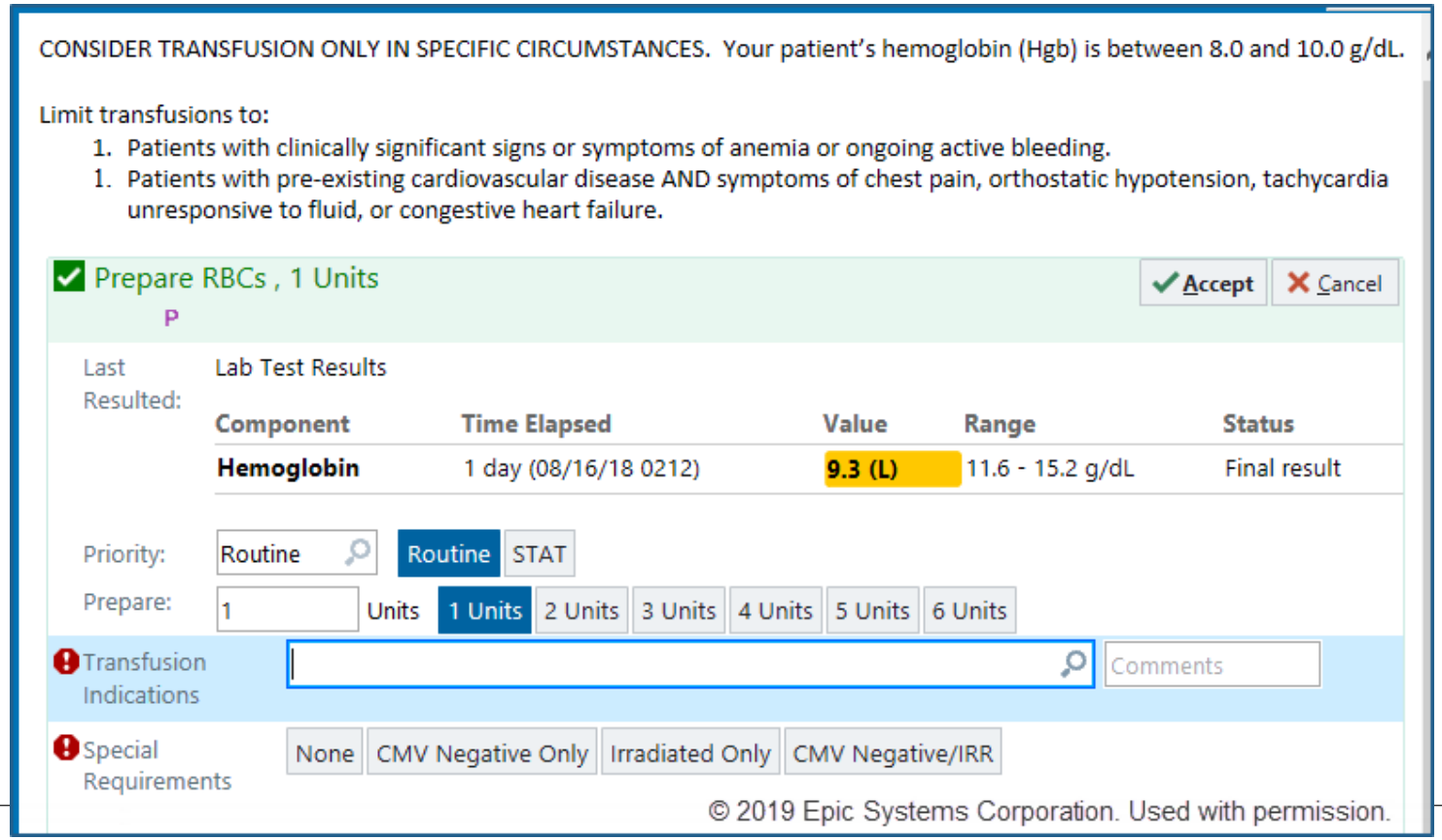
RBC Ordering Workflow

- Hemoglobin order defaults if there is no result in the last 48 hours



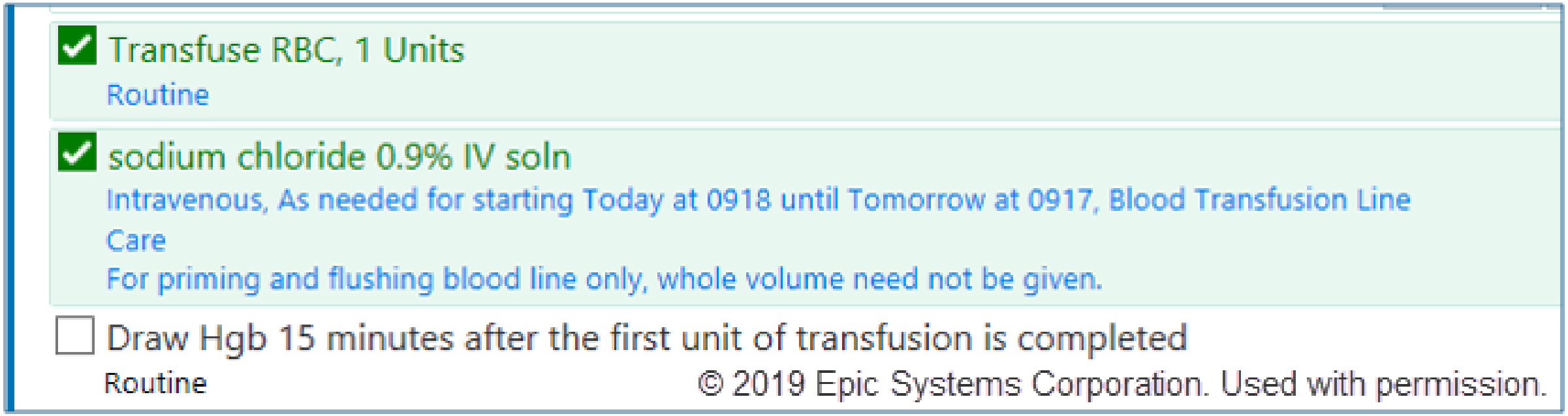
RBC Ordering Workflow

- Prepare RBC order displays the patient's most recent hemoglobin in the last 48 hours and guideline verbiage based on the hemoglobin value
- Prepare RBC order defaults to 1 unit if the hemoglobin is 7 – 10 g/dL



RBC Ordering Workflow

- Order to draw Hgb 15 minutes after the first unit of transfusion is completed



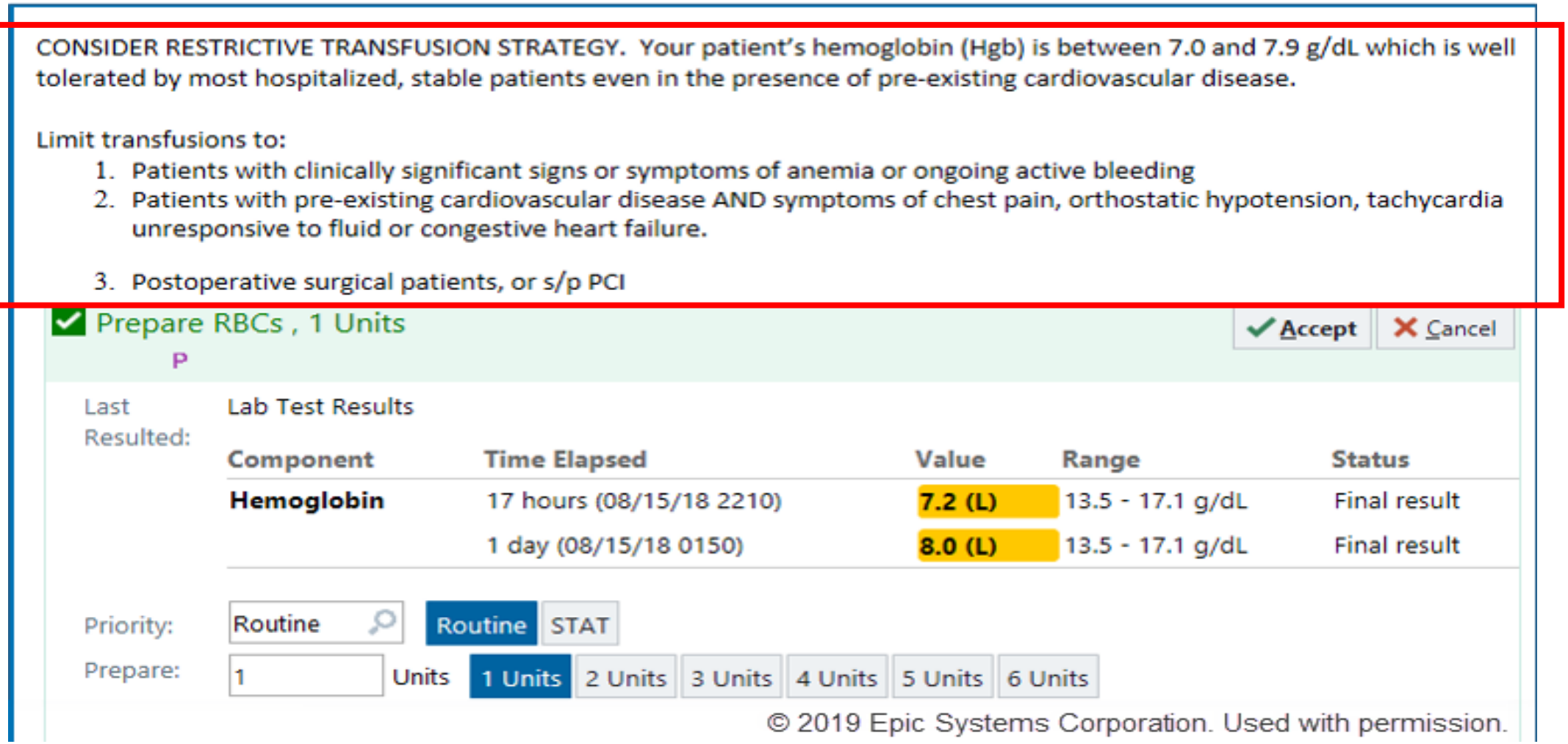
- Provider signs order

Verbiage for Hgb between 7.0 and 7.9 g/dL

CONSIDER RESTRICTIVE TRANSFUSION STRATEGY. Your patient's hemoglobin (Hgb) is between 7.0 and 7.9 g/dL which is well tolerated by most hospitalized, stable patients even in the presence of pre-existing cardiovascular disease.

Limit transfusions to:

1. Patients with clinically significant signs or symptoms of anemia or ongoing active bleeding
2. Patients with pre-existing cardiovascular disease AND symptoms of chest pain, orthostatic hypotension, tachycardia unresponsive to fluid or congestive heart failure.
3. Postoperative surgical patients, or s/p PCI



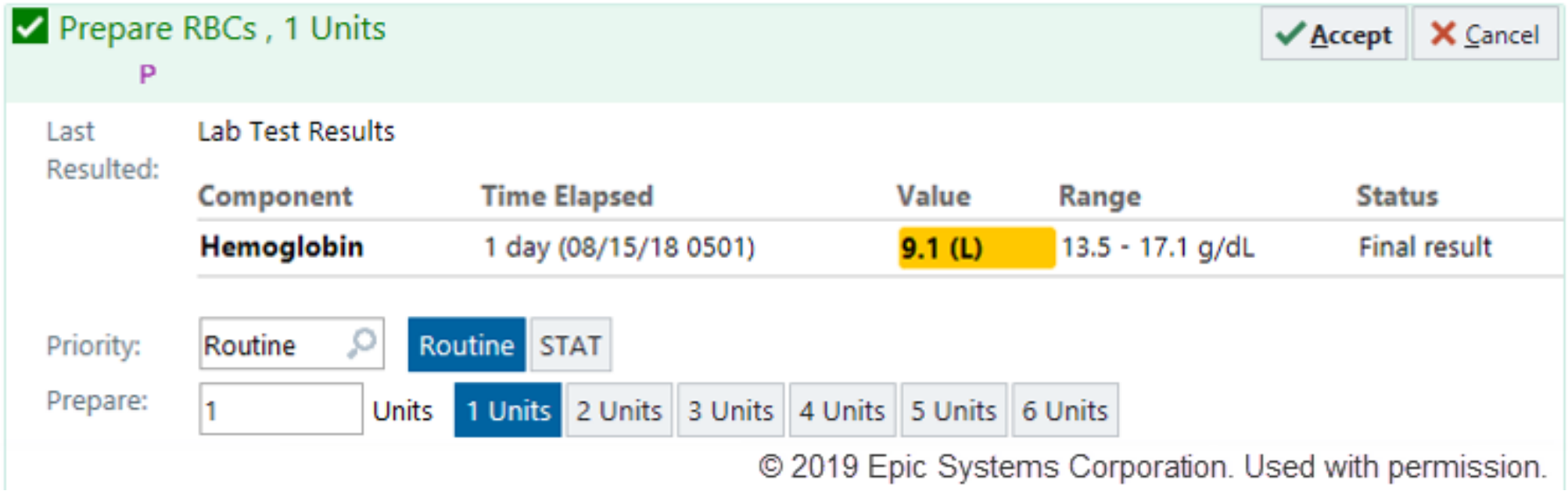
- Order defaults to 1 unit

Verbiage for Hgb between 8.0 and 10.0 g/dL

CONSIDER TRANSFUSION ONLY IN SPECIFIC CIRCUMSTANCES. Your patient's hemoglobin (Hgb) is between 8.0 and 10.0 g/dL.

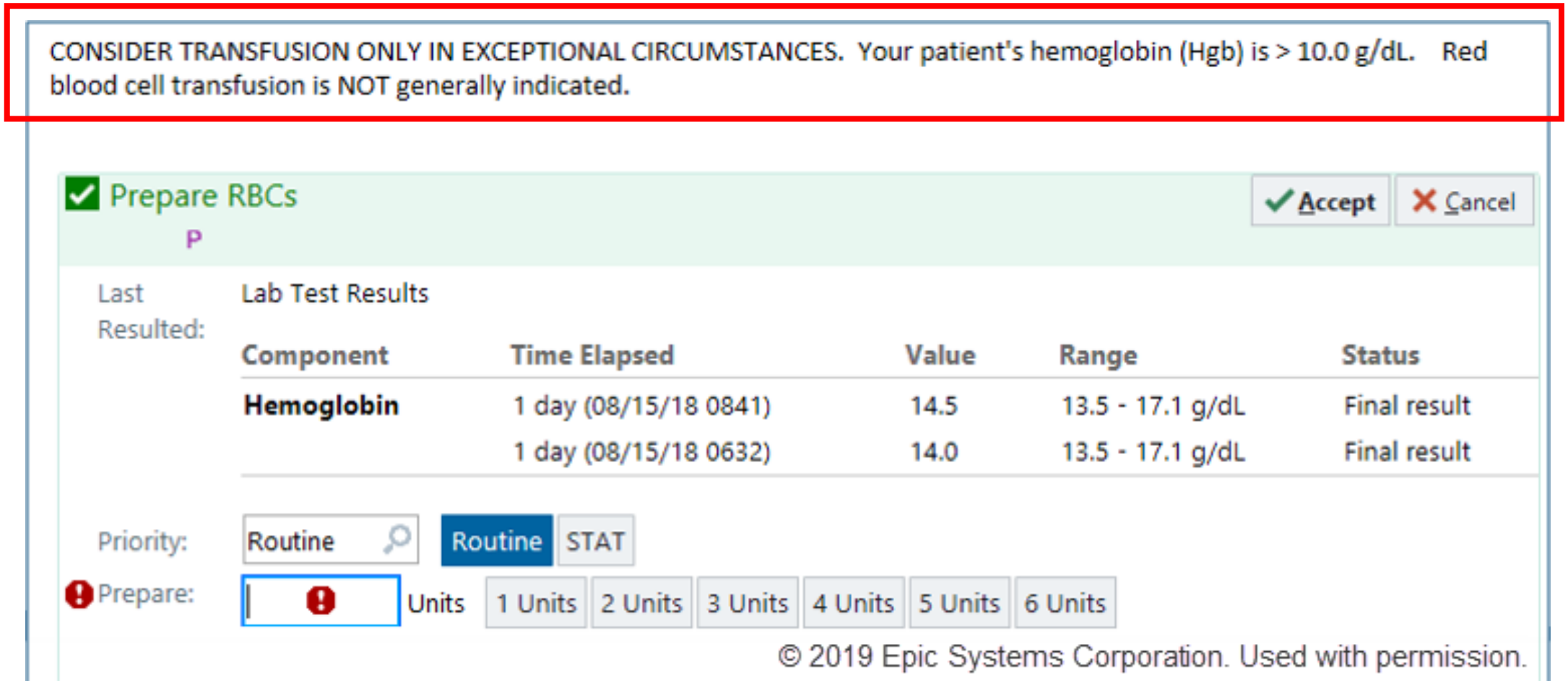
Limit transfusions to:

1. Patients with clinically significant signs or symptoms of anemia or ongoing active bleeding.
1. Patients with pre-existing cardiovascular disease AND symptoms of chest pain, orthostatic hypotension, tachycardia unresponsive to fluid, or congestive heart failure.



- Order defaults to 1 unit

Verbiage for Hgb > 10.0 g/dL



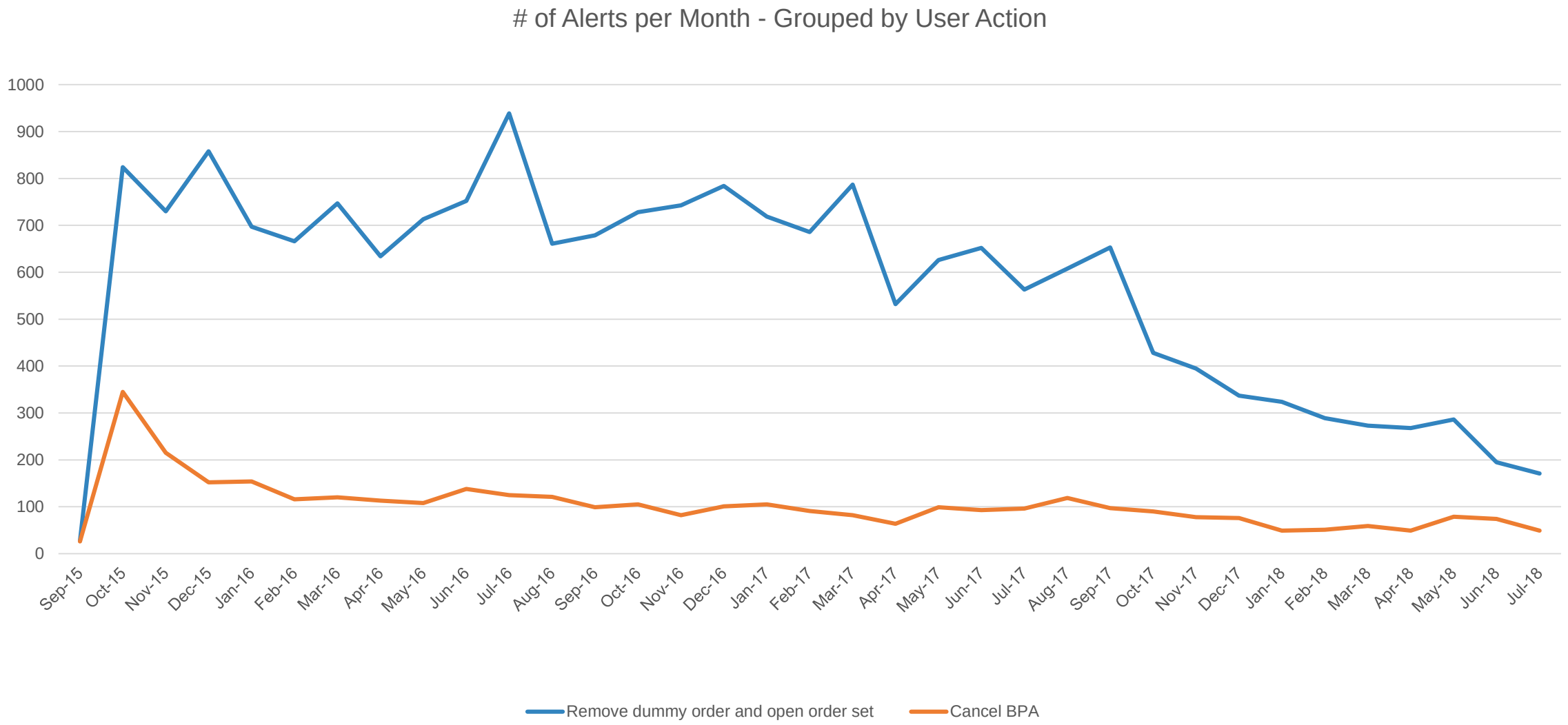
- MD must enter the desired number of units

Training and Implementation

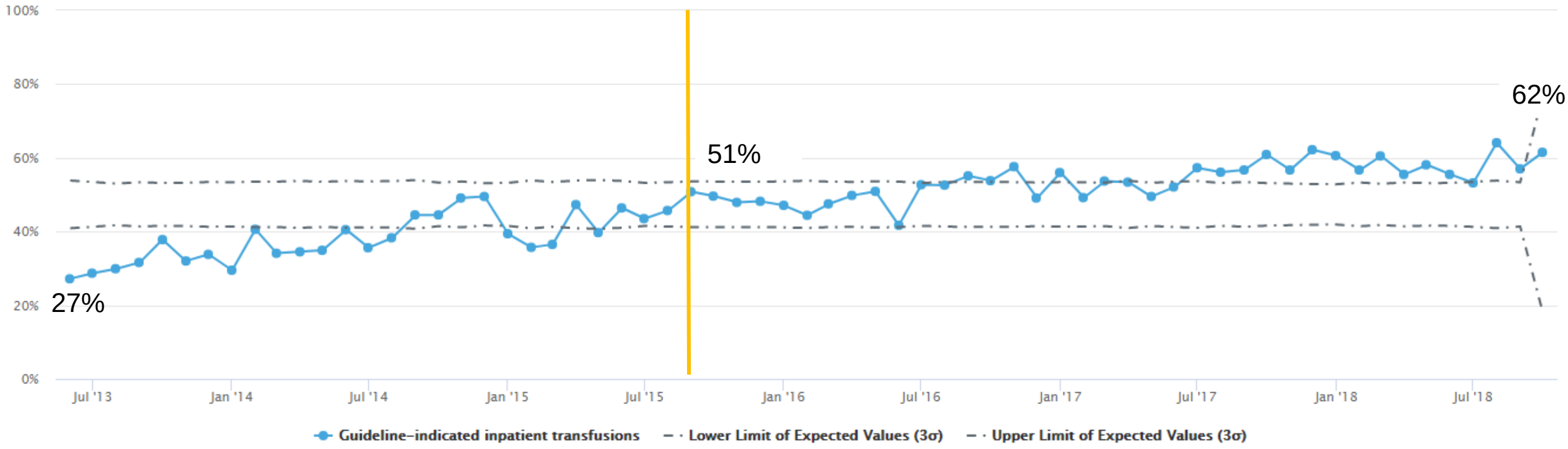
- eLearning for providers and nurses
- Presentations at medical committees and department meetings
- Roaming trainers
- SuperUser support

Value Derived

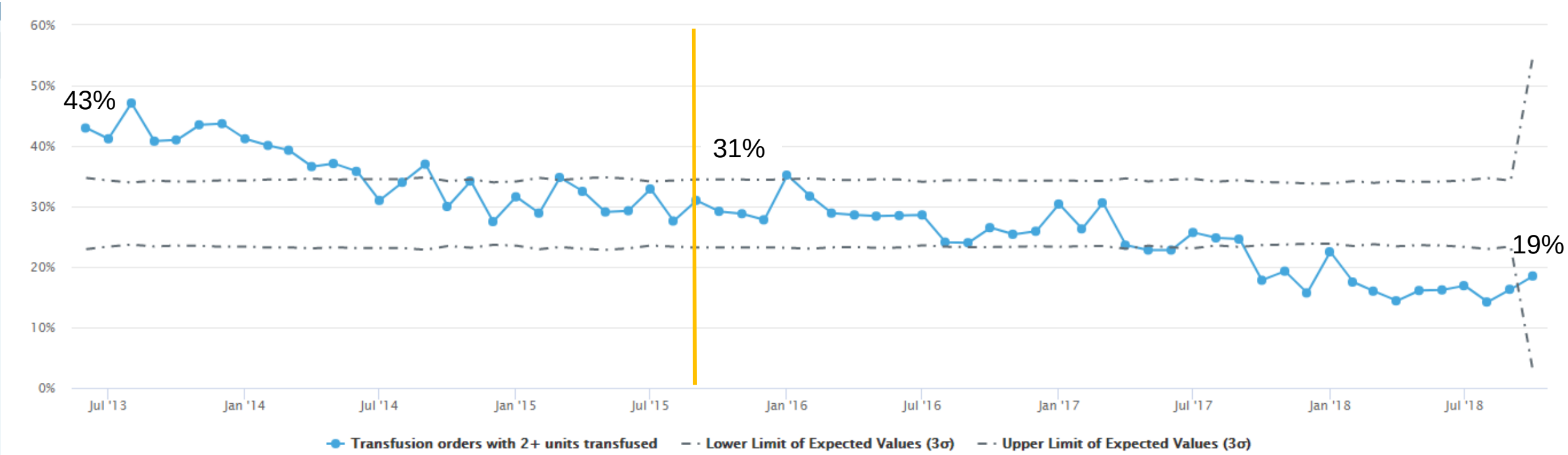
Redirect BPA Firing



Metric 1: Guideline-Indicated Inpatient Transfusions



Metric 2: Transfusion Orders with 2+ Units Transfused



Value Derived Summary

- Metric 1: Increase in number of guideline-indicated transfusions
  - Baseline: 27% (June 2013)
  - Education and awareness increased appropriateness prior to IT intervention
  - IT intervention provided additional and sustained increase in appropriateness (~54%) (September 2015 – October 2018)
- Metric 2: Decrease in the number of 2 unit transfusions
  - Baseline: 43% (June 2013)
  - Education and awareness increased appropriateness prior to IT intervention
  - IT intervention provided additional and sustained increase in appropriateness (~24%) (September 2015 – October 2018)

Value Derived Summary

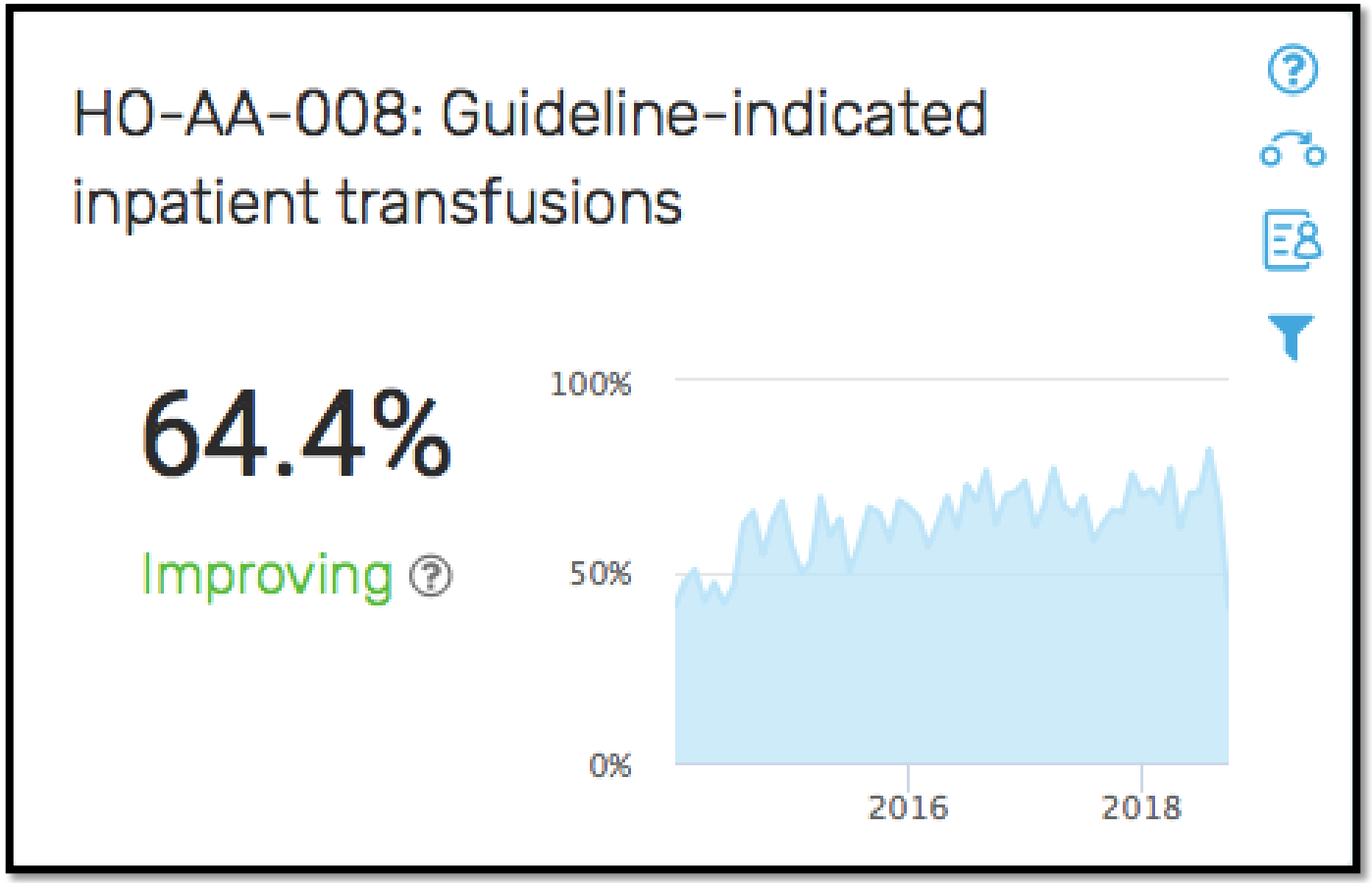
Transfusions	FY15	FY16	FY17	FY18
RBC - Total	30886	30713	30331	30325
RBC Utilization Project	18643	18162	16961	17829
% of Total RBC transfusions	60%	59%	56%	59%
Type & Screen Specimens	60830	67290	69385	71043
T&S:RBC	0.31	0.27	0.24	0.25

Next Steps

- Provide timely, data-driven feedback and targeted education
    - Reporting to individual providers, departments, quality committees
    - Continue to identify outliers
    - Targeted educational initiatives

Hospitalist Quality Initiative: RBC Utilization

- Quality Dashboard Measure: % compliance with guideline driven transfusions
- Individual identified dashboard data (monthly)
  - Physicians have access to the dashboard to view, filter and better understand their individual data



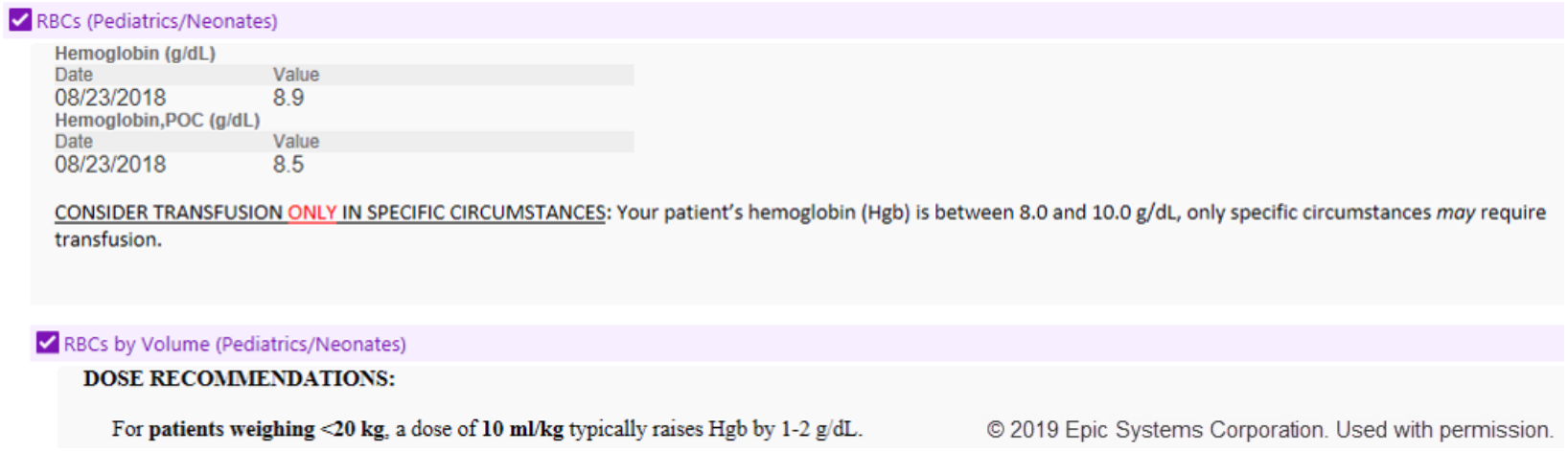
Hospitalist Quality Initiative: RBC Utilization

Monthly Meetings

- “Highlight a Hospitalist“
  - Highlight top performers in a given measure
- Provide forum to have an open dialogue about that physician's successes and challenges in hitting the quality goal
  - Generates discussion
  - Fosters a culture of teamwork to improve performance
  - Data sharing is not punitive

Next Steps

- Clinical decision support added to neonatal and pediatric RBC orders
  - Guideline verbiage appears based on Hgb level
  - Order by unit or volume appears based on patient's weight



RBCs (Pediatrics/Neonates)

Hemoglobin (g/dL)

Date	Value
08/23/2018	8.9

Hemoglobin,POC (g/dL)

Date	Value
08/23/2018	8.5

CONSIDER TRANSFUSION ONLY IN SPECIFIC CIRCUMSTANCES: Your patient's hemoglobin (Hgb) is between 8.0 and 10.0 g/dL, only specific circumstances *may* require transfusion.

RBCs by Volume (Pediatrics/Neonates)

DOSE RECOMMENDATIONS:

For **patients weighing <20 kg**, a dose of **10 ml/kg** typically raises Hgb by 1-2 g/dL.

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Lessons Learned

- Important to involve all major stakeholders
- Clinical testing is crucial
- Train as close as possible to the go-live

Thank you!