Too Much of a Good Thing:

Using Health IT to Promote Appropriate Use of Blood Products

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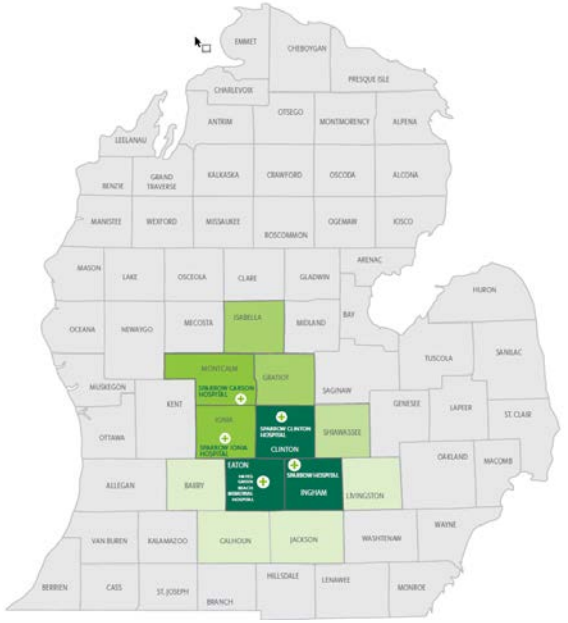
PATIENT
CAREGIVER
VISION
MISSION
VALUES
PILLARS OF EXCELLENCE
THE SPARROW WAY

About Sparrow Health System

- Sparrow Hospital - Lansing
  - 733 beds
  - 30,000 inpatient discharges
  - Surgery: 8,162 IP, 12,776 OP
  - 4,200+ births, Level 3 RNICU
  - 117,000+ annual ED visits
  - 960+ Providers, 6500+ Caregivers, 2300+ Volunteers
- Sparrow Specialty Hospital (LTACH)
- Sparrow Clinton, Ionia and Carson Hospitals
- Ambulatory clinics and services



Sparrow Offices

- Ambulatory clinics – 60 locations, 400+ Providers
- Outpatient visits – 590,000 visits/year
- Variety of specialties and services
  - Behavioral Health
  - Cardiology, CVT Surgery
  - Diabetes/Endocrinology
  - Family Medicine
  - FastCare Retail Clinics
  - Gastroenterology
  - Geriatrics / Senior Health
  - Infusion Centers
  - Internal Medicine
  - Nephrology
  - Neurology
  - Oncology
  - OB/Gyn
  - Orthopedics
  - Pain Management
  - Pediatrics
  - Perinatal
  - Surgery
  - Urgent Care
  - Weight Management
  - Wound and Hyperbaric

Local Problem: Too Much of a Good Thing

- Overuse of RBC and platelet transfusions
  - Blood products are scarce, finite, expensive
  - Patients do no better, and may do worse, if transfused prematurely or unnecessarily
  - Transfusions can have serious risks
  - Wide variation exists
  - Unnecessary transfusions are pure waste
    - 35% of RBCs; 40% - 60% of platelets
  - Limited reduction (17% RBCs; 5% platelets) without EMR

Our Local Problem is a National One: Regulatory Agencies Agree

- 2011: The Joint Commission (TJC)
  - Top priority
- 2013: American Health Association
  - Non-beneficial care
- 2013: American Medical Association, TJC, Center for Medicare/Medicaid Services
  - Transfusions are overused

Local Problem

- Anticipating Sparrow's Dec 2012 IP and ED EMR go-live, the Transfusion Committee and Transfusion Safety RN began working with the EMR team to look at IT-enabled strategies to improve compliance with evidence-based guidelines for blood product use, focusing on RBC and platelet transfusions.
- 2012 baseline: 9,680 units of RBCs; 2,455 units of platelets
- Sparrow set goals to
  - Reduce RBC units transfused by 25%
  - Reduce platelet units transfused by 15%

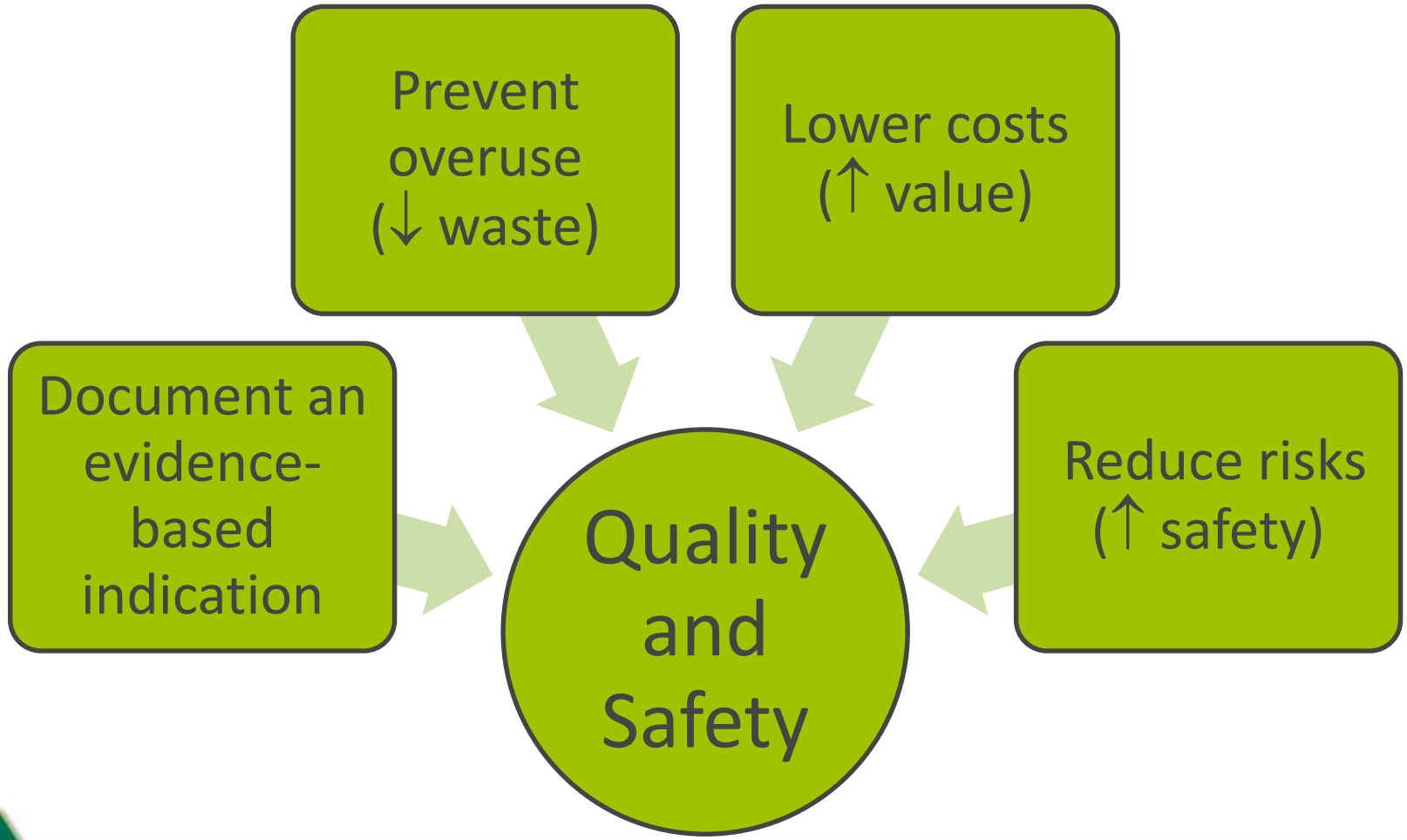
Framework to Address the Local Problem

- Patient Blood Management (PBM)
  - Multidisciplinary approach
  - Evidence-based transfusion
  - Promote single unit transfusions
  - For actively bleeding patients
    - Need fast, reliable method to order

Project Hypothesis

- Is implementation of a workflow-integrated, evidence-based transfusion order set, with removal of all other blood product ordering options, associated with:
  - Sustainable decreases in RBC and platelet transfusions?
  - Financial savings?

Design and Implementation Goals



Design and Implementation: Getting Insights from Other Organizations

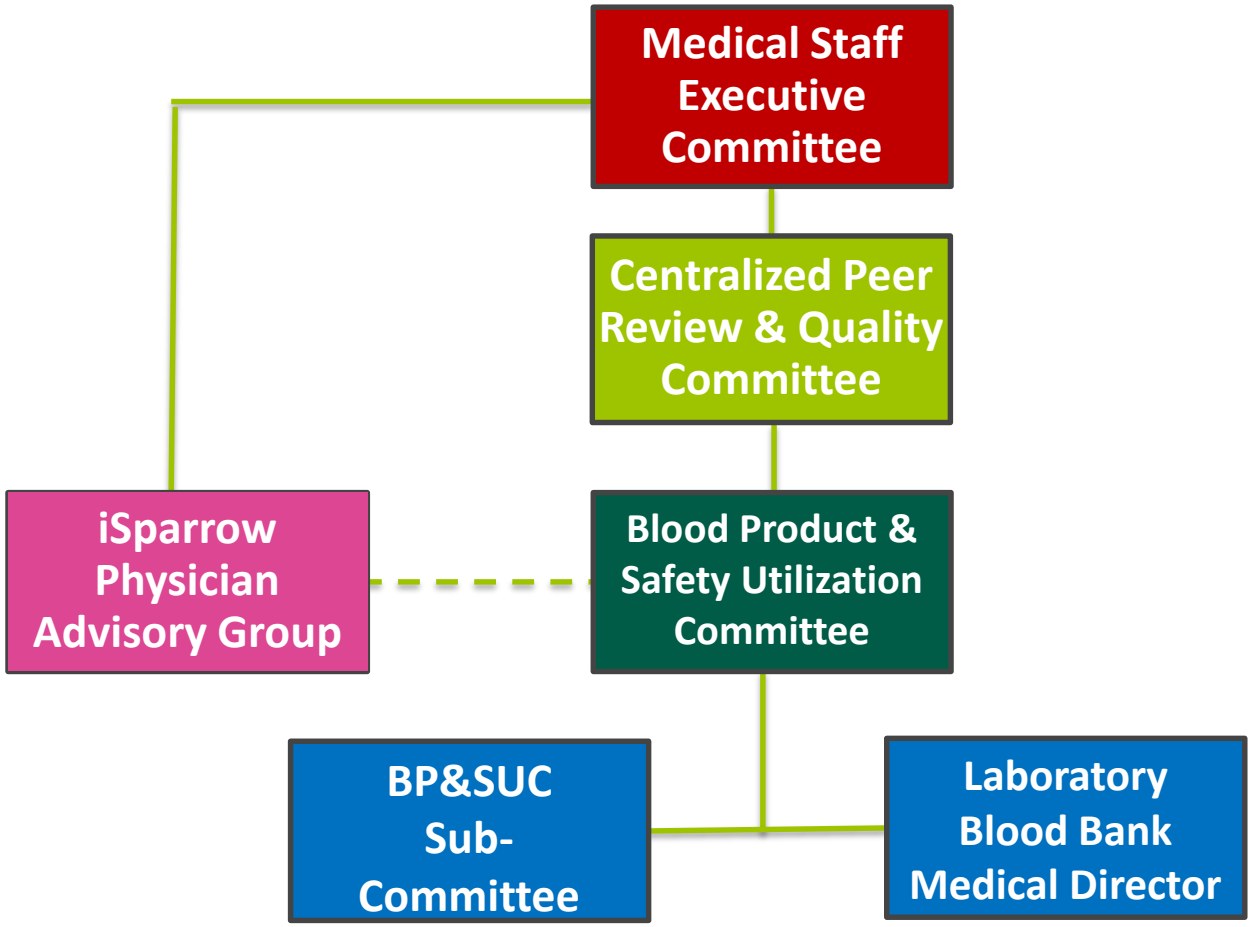
- Transfusion Safety Nurse contacted other hospitals using same EMR for tips
  - William Beaumont Hospital
  - University of Michigan
  - Ohio State University
  - Bronson Hospital

Design and Implementation

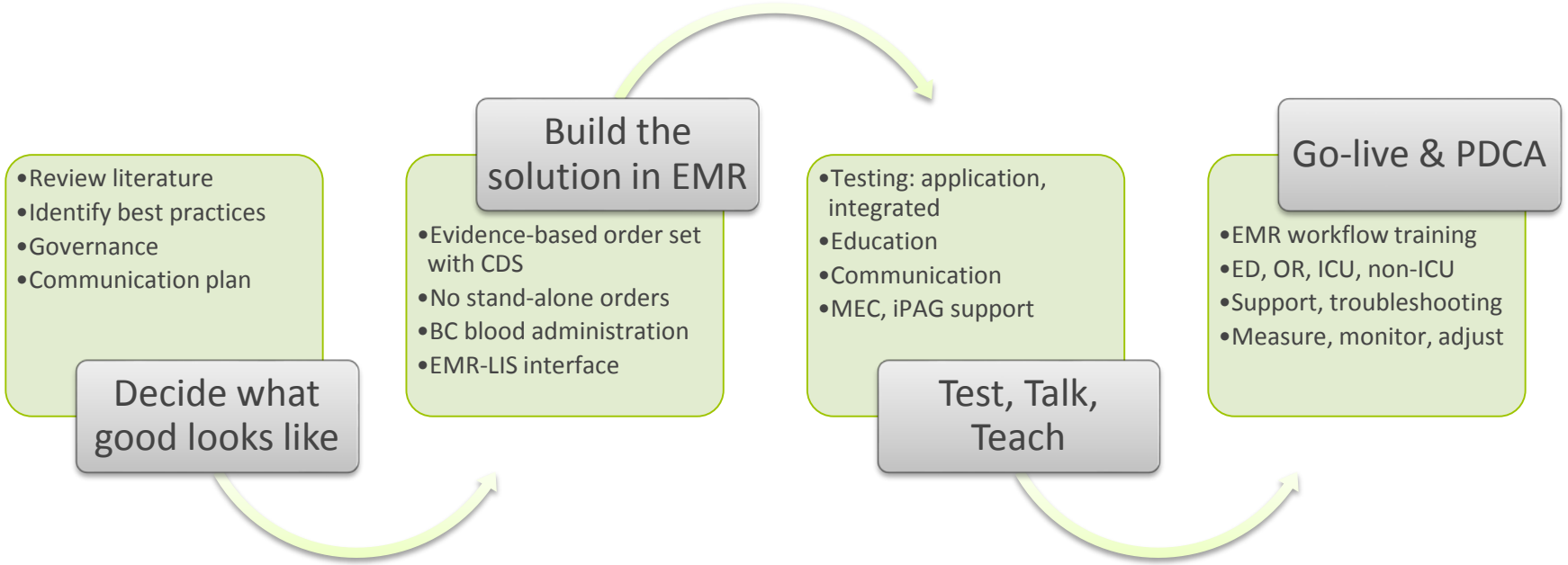
- The **knowledge tools** we decided to use
  - American Red Cross transfusion practice guidelines[1]
  - TJC PBM measures[2]
- The **IT tool** we decided to use: **Epic**, because it is…
  - Key to our Sparrow Way goals and care transformation
  - Where orders are entered and acted on
  - Where decision support appears: Evidence-based order set, knowledge resources, embedded ordering guidelines

1. *American Red Cross Transfusion Practice Guidelines, 2017*
2. *The Joint Commission Patient Blood Management Measures, 2011*

Blood Management Governance



Design and Implementation: Four Main Steps



Timeline

6 months

Plan

- SMEs
- Meetings
- Content
- Consensus

6 months

Build & Test

- Narratives
- Knowledge links
- Lab tests
- Consents
- Orders (adult)

6 months

Train

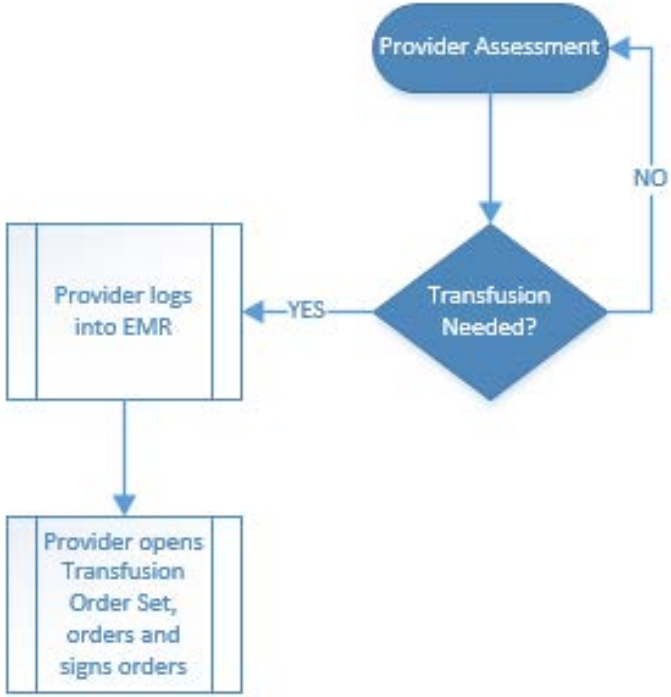
- Scheduling
- Superuser training
- User training
- Getting to everyone

Go-live 2013 Q2

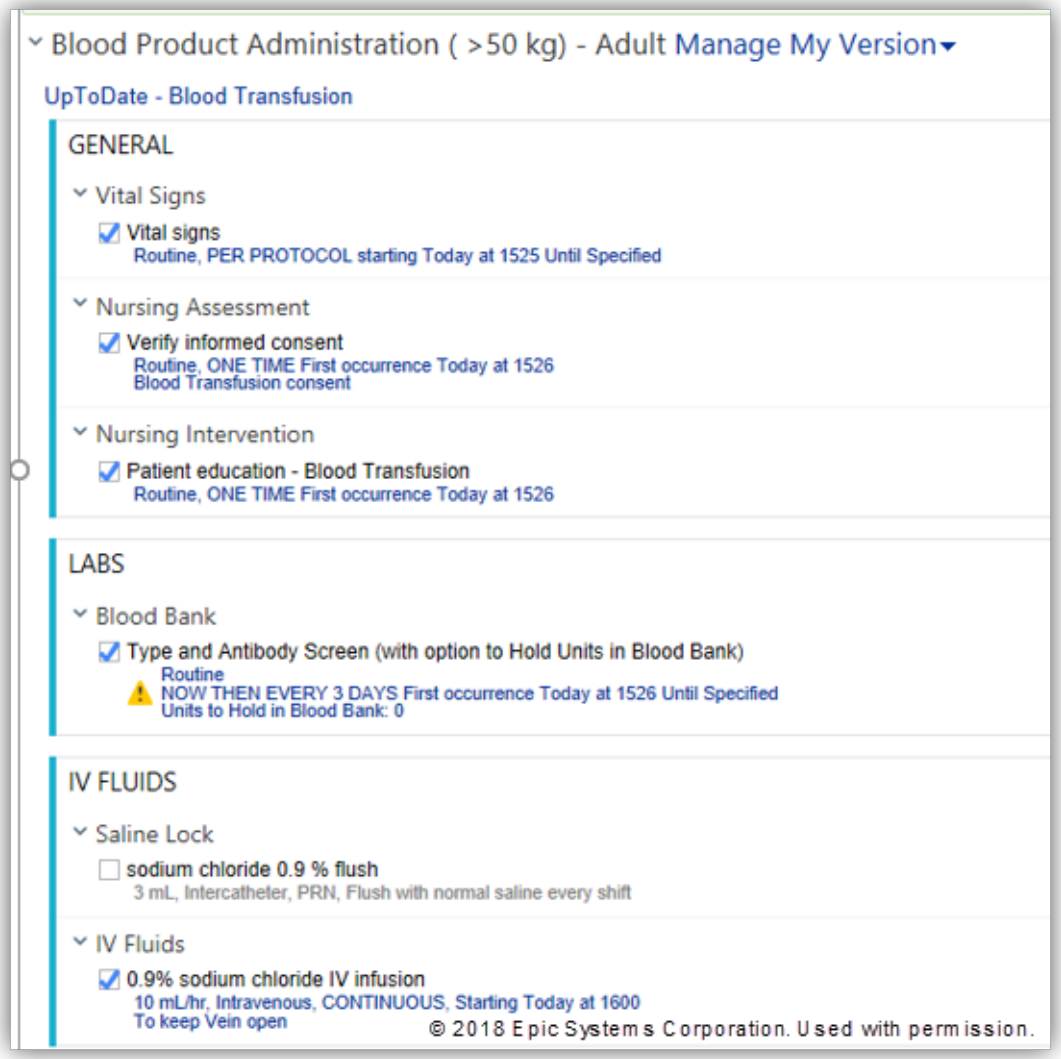
- Unit level support
- Elbow support
- Stabilization
- Optimization

How Health IT Was Used: Workflow

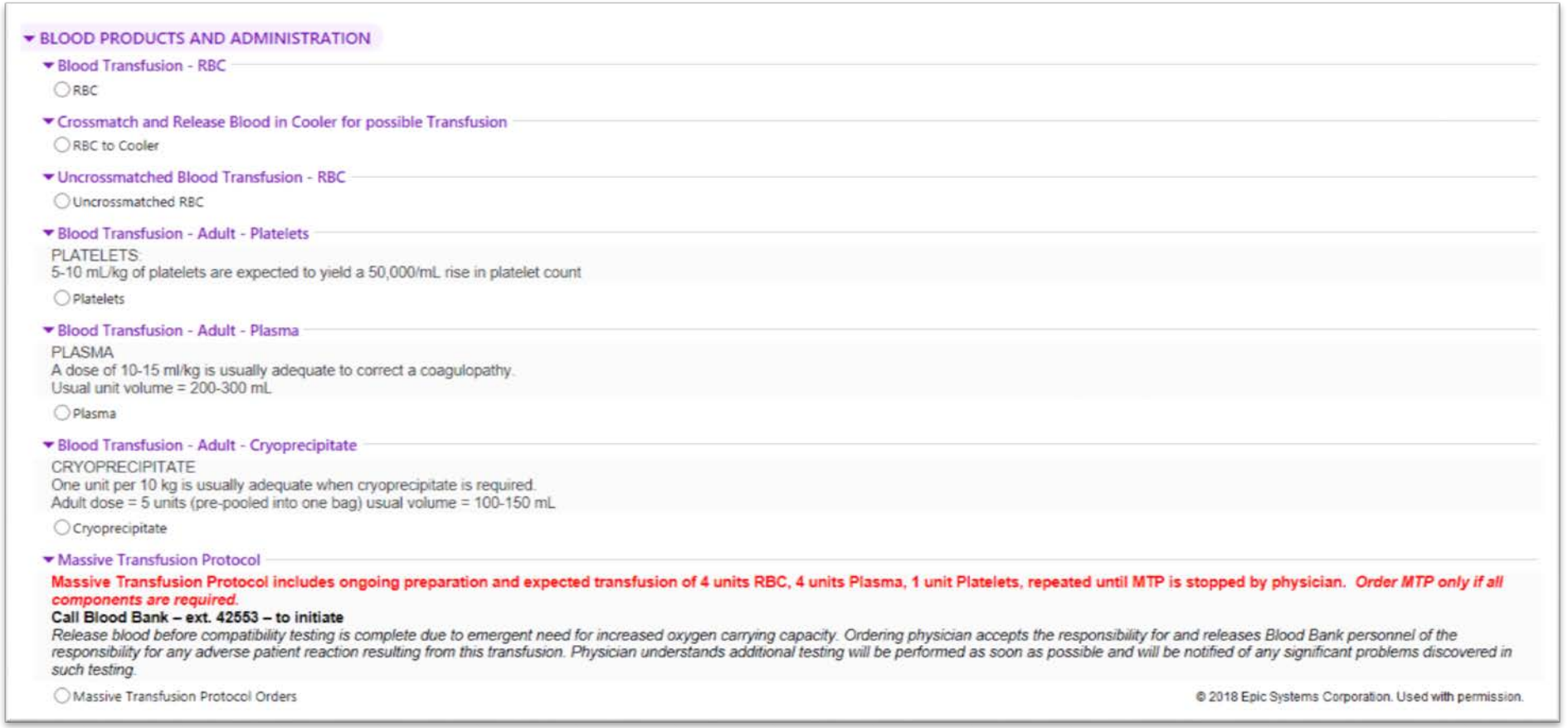
- Provider determines transfusion is needed
- Logs into EMR
- Opens Transfusion Order Set
- Accepts defaults (or modifies)
  - Type and antibody screen
  - Informed consent
  - Other laboratory testing
  - Order to prepare product
  - Order to transfuse product



How Health IT Was Used



How Health IT Was Used



▼ BLOOD PRODUCTS AND ADMINISTRATION

▼ Blood Transfusion - RBC

○ RBC

▼ Crossmatch and Release Blood in Cooler for possible Transfusion

○ RBC to Cooler

▼ Uncrossmatched Blood Transfusion - RBC

○ Uncrossmatched RBC

▼ Blood Transfusion - Adult - Platelets

PLATELETS:
5-10 mL/kg of platelets are expected to yield a 50,000/mL rise in platelet count

○ Platelets

▼ Blood Transfusion - Adult - Plasma

PLASMA
A dose of 10-15 ml/kg is usually adequate to correct a coagulopathy.
Usual unit volume = 200-300 mL

○ Plasma

▼ Blood Transfusion - Adult - Cryoprecipitate

CRYOPRECIPITATE
One unit per 10 kg is usually adequate when cryoprecipitate is required.
Adult dose = 5 units (pre-pooled into one bag) usual volume = 100-150 mL

○ Cryoprecipitate

▼ Massive Transfusion Protocol

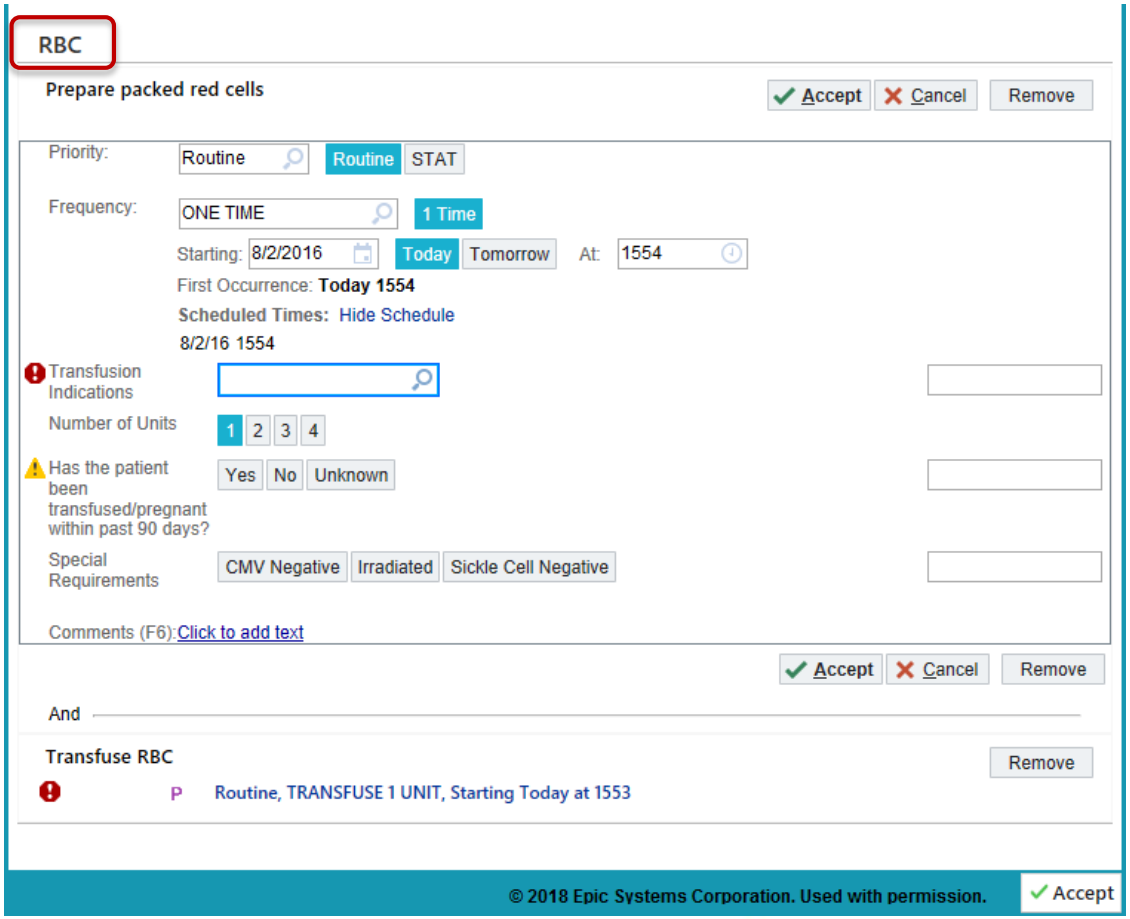
Massive Transfusion Protocol includes ongoing preparation and expected transfusion of 4 units RBC, 4 units Plasma, 1 unit Platelets, repeated until MTP is stopped by physician. ***Order MTP only if all components are required.***
Call Blood Bank – ext. 42553 – to initiate
Release blood before compatibility testing is complete due to emergent need for increased oxygen carrying capacity. Ordering physician accepts the responsibility for and releases Blood Bank personnel of the responsibility for any adverse patient reaction resulting from this transfusion. Physician understands additional testing will be performed as soon as possible and will be notified of any significant problems discovered in such testing.

○ Massive Transfusion Protocol Orders

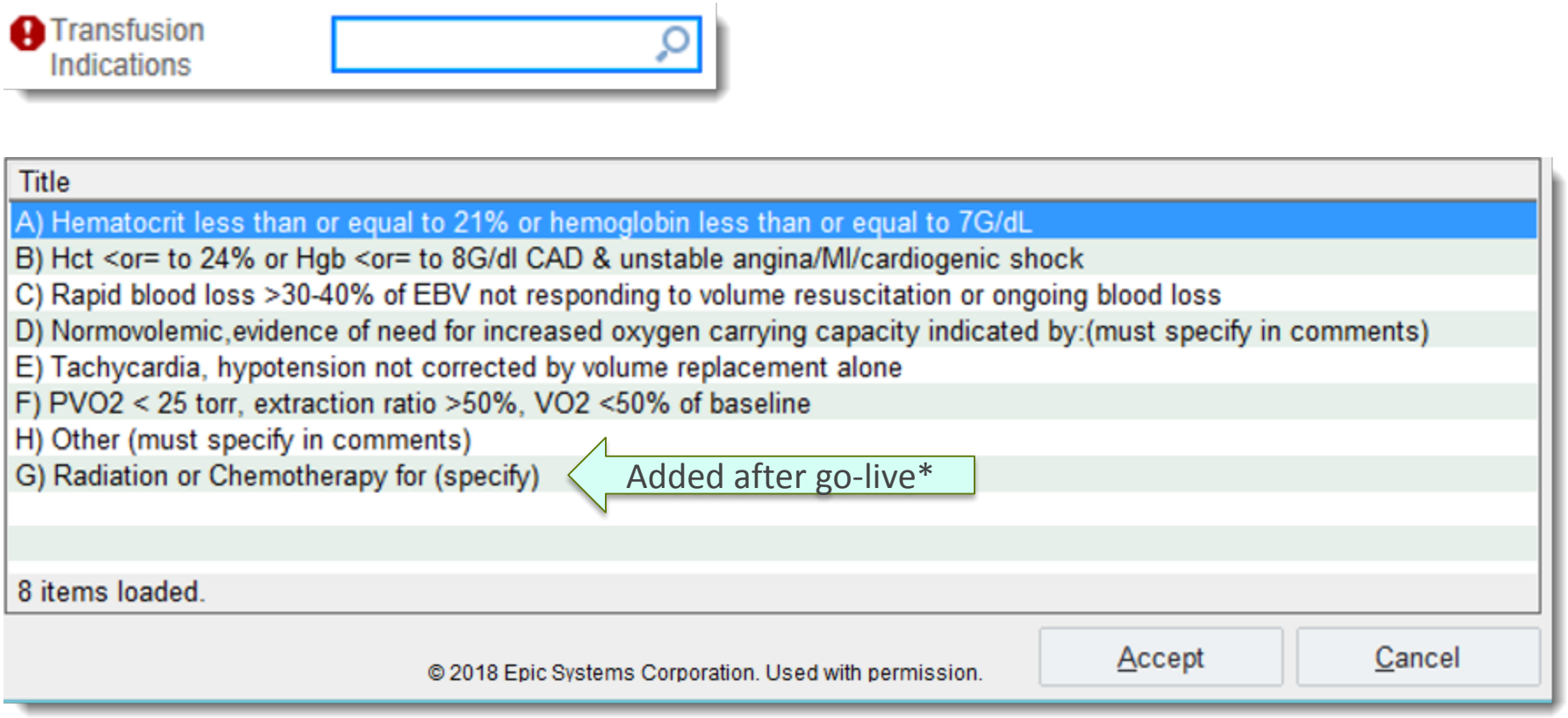
How Health IT Was Used: Order to Prepare RBCs

- Blood bank order
  - Required indication

  - Defaults to ONE (1) unit

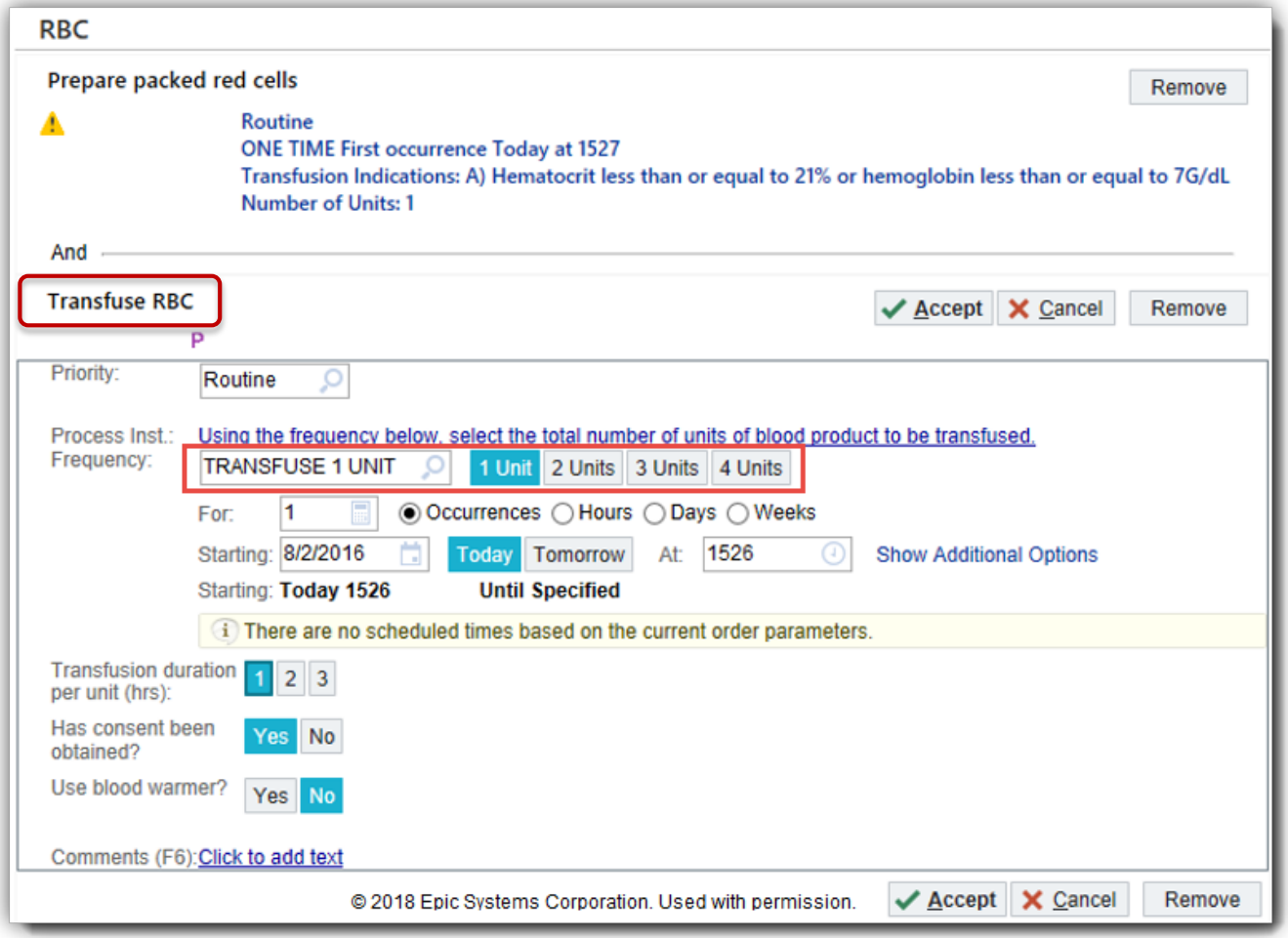


Selecting an Evidence-Based Indication



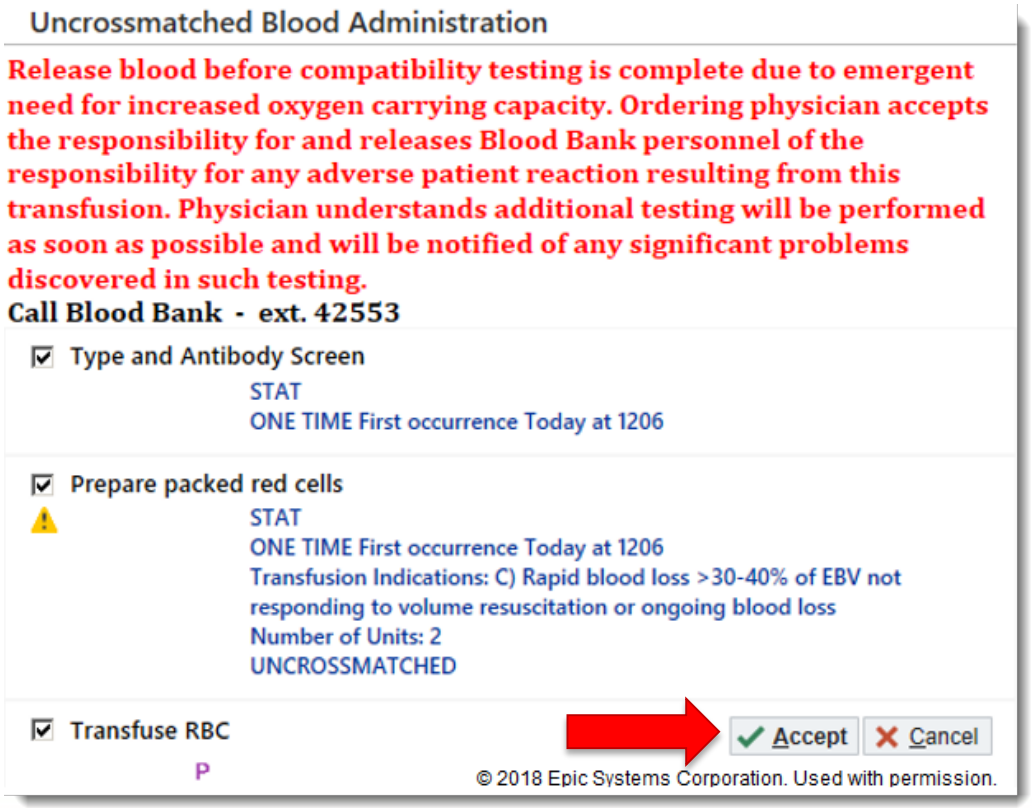
* Ongoing learning loop in place

How Health IT Was Used: Order to Transfuse RBCs



But What if There's No Time? One-Click Order for STAT Transfusions

» Fast, efficient way to find and order uncrossmatched blood when seconds count



One-Click Order for MASSIVE Transfusions

» Fast, efficient way to find and order multiple blood products at one time for exsanguinating patients

Massive Transfusion Protocol

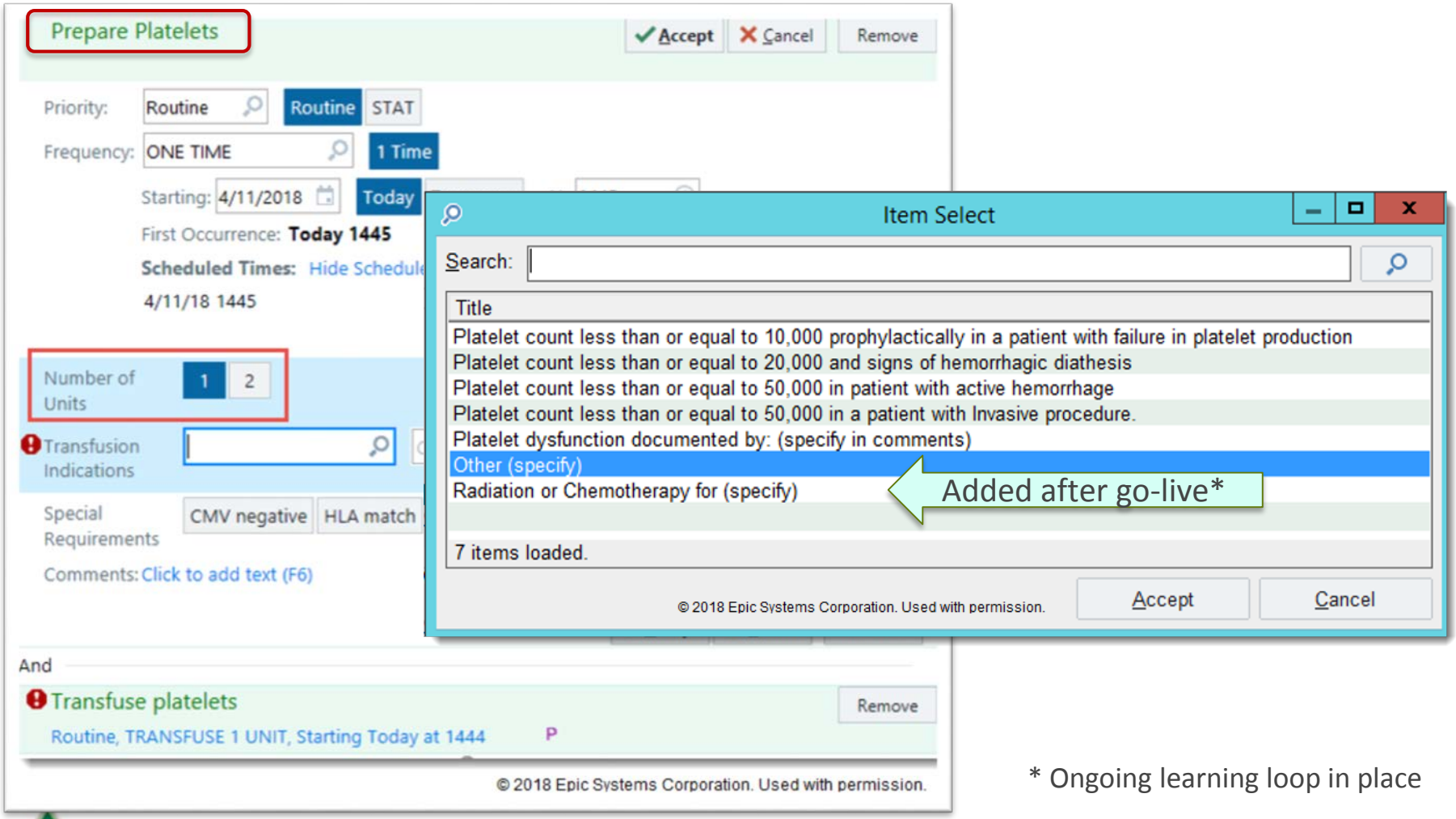
Massive Transfusion Protocol Orders

Massive Transfusion Protocol includes ongoing preparation and expected transfusion of 4 units RBC, 4 units Plasma, 1 unit Platelets, repeated until MTP is stopped by physician. ***Order MTP only if all components are required.***

Call Blood Bank - ext. 42553 - to initiate.

Massive Transfusion - CALL Blood Bank
STAT
ONE TIME First occurrence Today at 1548
And
Prothrombin time
STAT, NOW THEN EVERY 1 HOUR First occurrence Today at 1548 Last occurrence Today at 1748 for 3 occurrences
And
APTT-Act partial thromboplastin time
STAT, NOW THEN EVERY 1 HOUR First occurrence Today at 1548 Last occurrence Today at 1748 for 3 occurrences
And
Fibrinogen
STAT, NOW THEN EVERY 1 HOUR First occurrence Today at 1548 Last occurrence Today at 1748 for 3 occurrences
And
Hemoglobin
STAT, NOW THEN EVERY 1 HOUR First occurrence Today at 1548 Last occurrence Today at 1748 for 3 occurrences
And
Platelet count
STAT, NOW THEN EVERY 1 HOUR First occurrence Today at 1548 Last occurrence Today at 1748 for 3 occurrences
And
D-dimer,
Timed, IN 1 HOUR First occurrence Today at 1648

How Health IT Was Used: Order to Prepare Platelets



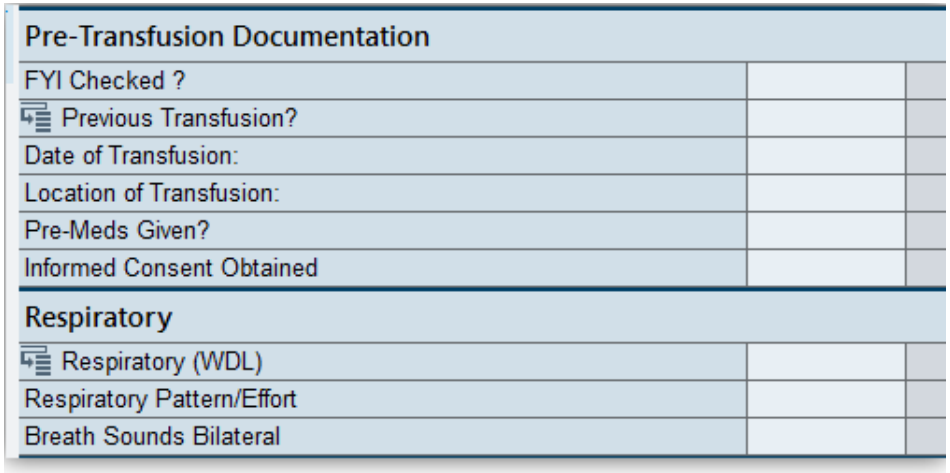
* Ongoing learning loop in place

How Health IT Was Used: Blood Administration & Documentation

- Bar code blood product administration
- Transfusion documentation
- Transfusion reaction documentation
  - All in one place – Blood Administration Flowsheet
    - Vital signs, start time, end time, volume
    - Two-person sign-off (for safety)
  - Documentation instructions help from blood bank

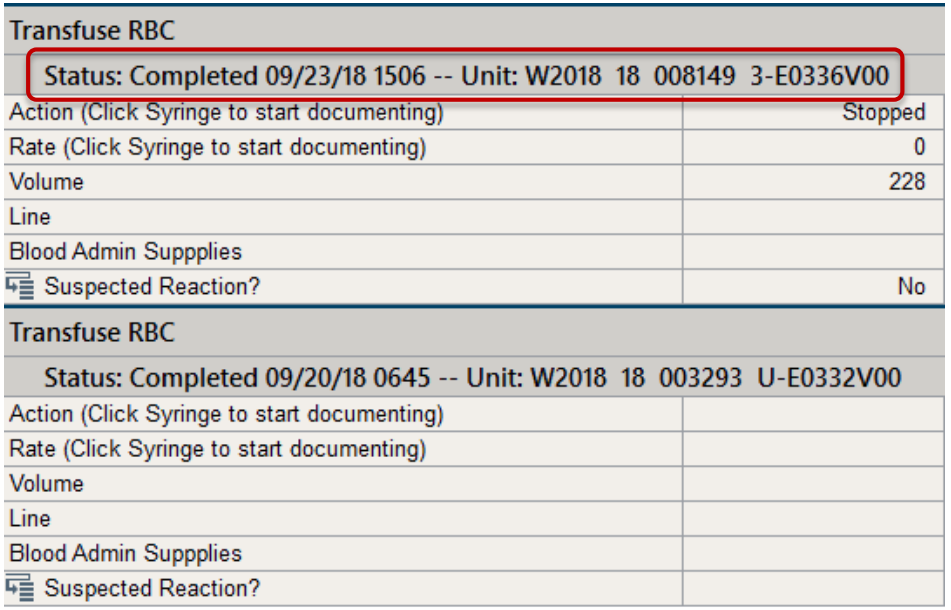
How Health IT Was Used Nursing Documentation

Pre-Transfusion



Pre-Transfusion Documentation		
FYI Checked ?		
Previous Transfusion?		
Date of Transfusion:		
Location of Transfusion:		
Pre-Meds Given?		
Informed Consent Obtained		
Respiratory		
Respiratory (WDL)		
Respiratory Pattern/Effort		
Breath Sounds Bilateral		

Transfusion

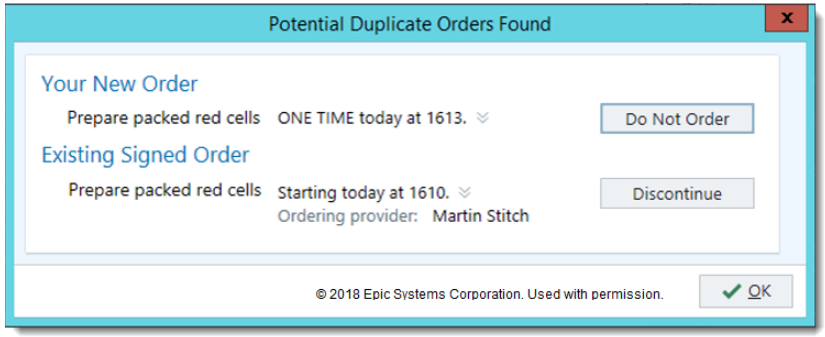


Transfuse RBC	
Status: Completed 09/23/18 1506 -- Unit: W2018 18 008149 3-E0336V00	
Action (Click Syringe to start documenting)	Stopped
Rate (Click Syringe to start documenting)	0
Volume	228
Line	
Blood Admin Suppplies	
Suspected Reaction?	No
Transfuse RBC	
Status: Completed 09/20/18 0645 -- Unit: W2018 18 003293 U-E0332V00	
Action (Click Syringe to start documenting)	
Rate (Click Syringe to start documenting)	
Volume	
Line	
Blood Admin Suppplies	
Suspected Reaction?	

How Health IT Was Used: Post Go-Live Enhancements

- 2013 Q2: Transfusion order reports for monitoring, feedback, improvement
- 2013 Q4: Added Pediatric and Neonatal order sets
- 2014 Q4: Blood on hold/cooler
- 2015 Q4: BPA RE: duplicate order
- 2016 Q3: Display of lab results
- 2018 Q3: Populated special needs from Epic to Blood Bank

PATIENT NAME	ORDER	ORDER DATE TIME	#UNITS ORDERED	#UNITS TRANSFUSED	PRE HGB
TIGER, DANIEL STRIPED	PREPARE RBC	6/22/2018 8:20:00 AM	1	1	6.2
X, THE OWL	PREPARE RBC	6/25/2018 6:15:00 AM	1	1	6.9
PUSSYCAT, HENRIETTA	PREPARE RBC	6/11/2018 6:17:00 AM	1	1	6.1
FAIRCHILDE, LADY ELAINE	PREPARE RBC	6/26/2018 6:04:00 AM	2	2	5.4



How Health IT Was Used: Transfusion Order Reports

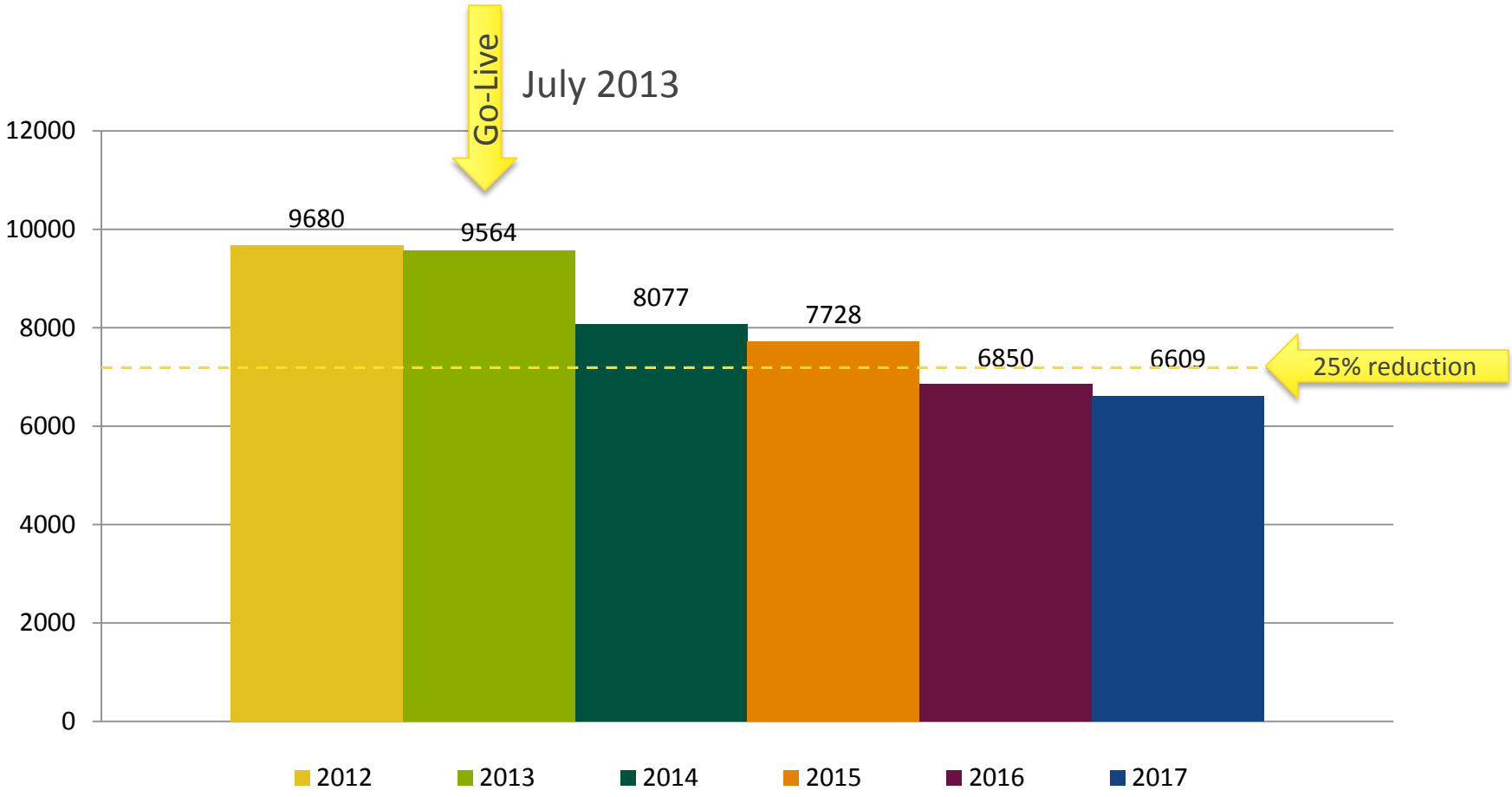
PATIENT NAME	ORDERING PHYSICIAN	ATTENDING PHYSICIAN	ORDER	ORDER DATE TIME	#UNITS ORDERED	#UNITS TRANSFUSED	PRE HGB	HGB TIME
TIGER, DANIEL STRIPED	DREW, CHARLES	SEUSS, THEODOR	PREPARE RBC	6/22/2018 8:20:00 AM	1	1	6.2	0659
X, THE OWL	LISTER, JOSEPH	LECTER, HANNIBAL	PREPARE RBC	6/25/2018 6:15:00 AM	1	1	6.9	0435
PUSSYCAT, HENRIETTA	BLACKWELL, ELIZABETH	LUTWIDGE, CHARLES	PREPARE RBC	6/11/2018 6:17:00 AM	1	1	6.1	0541
FAIRCHILDE, LADY ELAINE	FLEMING, ALEXANDER	WATSON, JOHN	PREPARE RBC	6/26/2018 6:04:00 AM	2	2	5.4	0529
McFEELY, MISTER	APGAR, VIRGINIA	JEKYLL, HENRY	PREPARE PLASMA	6/26/2018 8:17:00 PM	2	1	NA	
ABERLIN, LADY	PASTEUR, LOUIS	ZHIVAGO, YURIC	PREPARE PLATELET	6/27/2018 6:51:00 PM	1	1	NA	
BROCKETT, CHEF	BANTING, FREDERICK	STAPLETON, JACK	PREPARE RBC	6/29/2018 2:44:00 AM	1	1	6.8	0153

Report published daily, delivered to Transfusion Safety Nurse via email

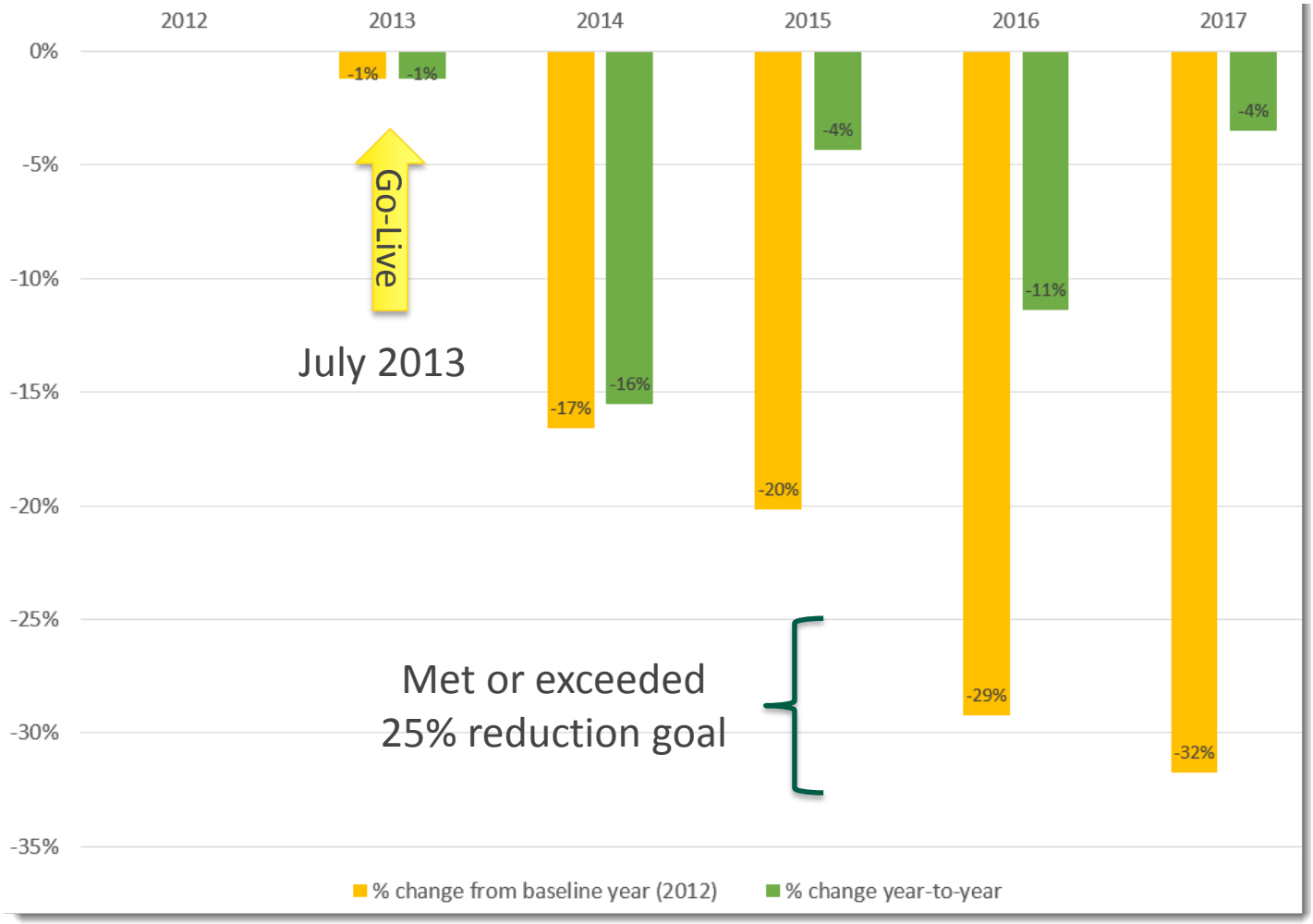
How Transfusion Reports Were Used to Help Us Keep Improving

- Data analytics: Key elements used to target education
  - Pre/post transfusion test results
  - Indications for transfusion
  - One vs. two unit orders: Nursing intervention
  - Ordering/attending physician
  - Specialty groups
  - Patients by department

Value Derived: Decreased RBC Utilization: Goal = 25% Reduction (≤7260 units/year)



Value Derived: Percentage ↓ in RBCs Transfused
(From Baseline and Year-to-Year)



Value Derived:
RBC Price Savings and Cost Avoidance

	RBC units transfused	# Fewer units than 2012	Price savings @ $210/unit*	Costs avoided @ $3,000/unit*
2012	9680			
2013	9564	116	$ 24,360	$ 348,000
2014	8077	1603	$ 336,630	$ 4,809,000
2015	7728	1952	$ 409,920	$ 5,856,000
2016	6850	2830	$ 594,300	$ 8,490,000
2017	6609	3071	$ 644,910	$ 9,213,000
TOTALS	**38828**	**9572**	**$ 2,010,120**	**$ 28,716,000**

* Shander A et al. Blood 2008; 112:3045
* Shander A et al. Transfusion 2010; 50:753

Saved costs of administration:
$6.9M – $11.3M

Estimated RBC Transfusion Reactions Prevented* 9,572 Fewer Units

For every 10,000 fewer RBC units transfused, we prevent:

» **1** Transfusion-related acute lung injury (TRALI)

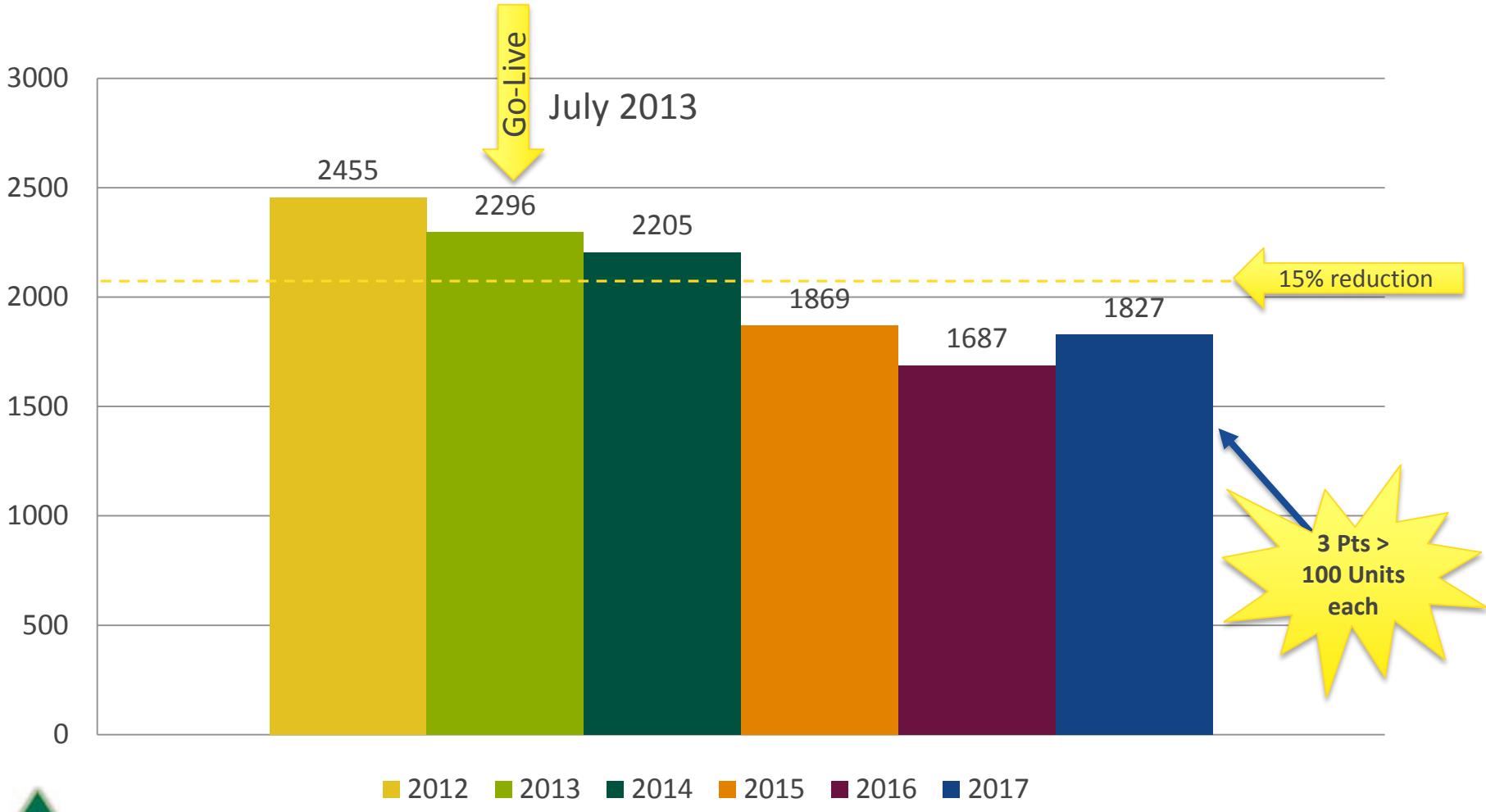
» **100** Transfusion-associated circulatory overloads (TACO)

» **100-300** Urticaria reactions

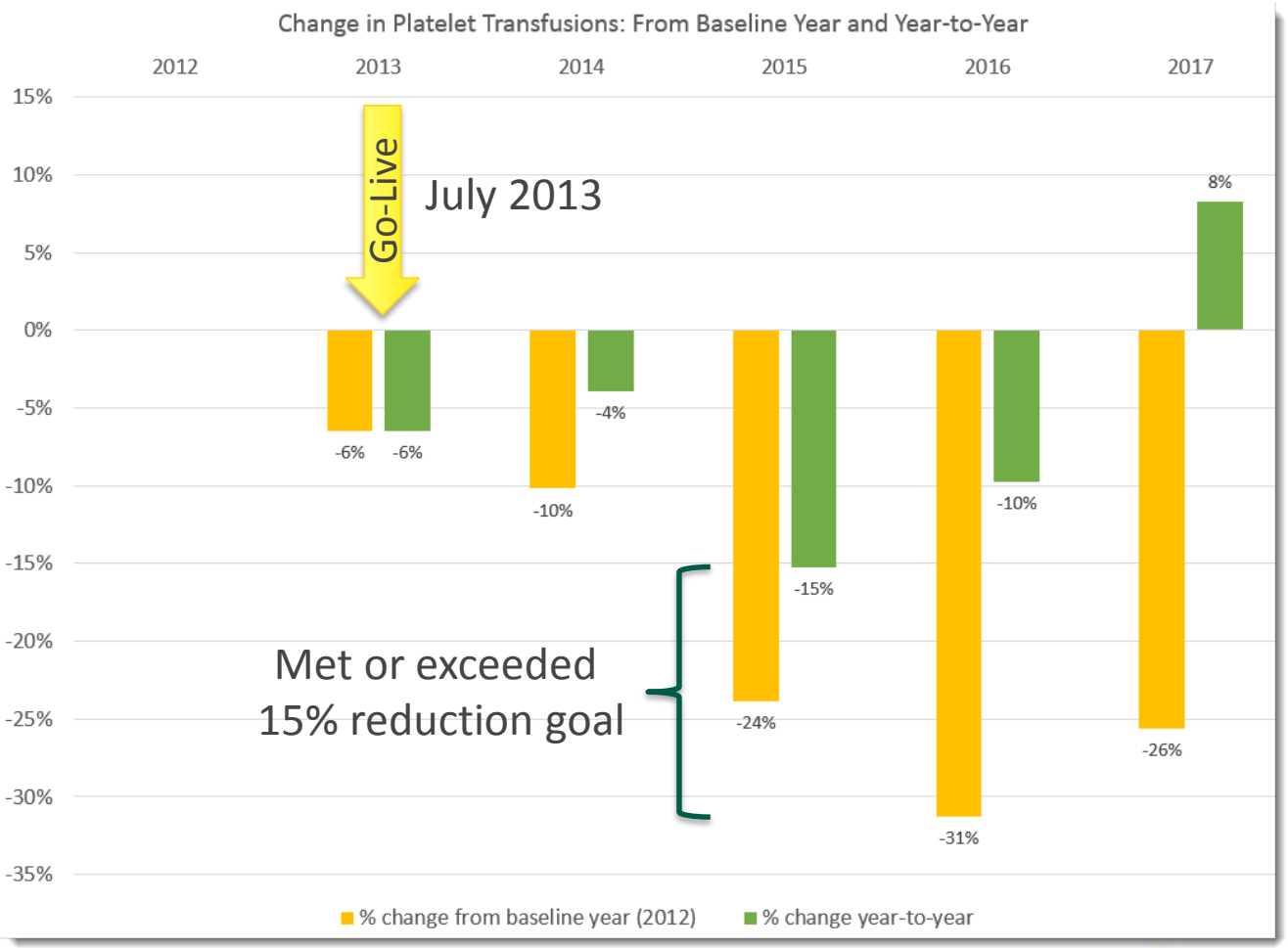
* Carson JL et al., Ann Intern Med 2012; 157:49.

Value Derived: Decreased PLT Utilization

Goal = 15% Reduction (≤2087 units/year)



Value Derived:
% Change in Platelet Units Transfused
(From Baseline and Year-to-Year)



Value Derived:
Platelet Price Savings and Cost Avoidance

	Platelet units transfused	# Fewer units than 2012	Price savings @ $565/unit	Costs avoided @ $3,000/unit*
2012	2455			
2013	2296	159	$ 89,835	$ 477,000
2014	2205	250	$ 141,250	$ 750,000
2015	1869	586	$ 331,090	$ 1,758,000
2016	1687	768	$ 433,920	$ 2,304,000
2017	1827	628	$ 354,820	$ 1,884,000
TOTALS	**9884**	**2391**	**$ 1,350,915**	**$ 7,173,000**

* Shander A et al. Blood 2008; 112:3045
* Shander A et al. Transfusion 2010; 50:753

Saved costs of administration:
$1.7M – $2.8M

Estimated Platelet Transfusion Reactions Prevented: 2,391 Fewer Units

- Fewer data for platelet transfusion reactions
- Overall incidence estimates[1]
  - 2 per 1000 for whole blood-derived platelets
  - 6 per 1000 for apheresis platelets
- TRALI, TACO, alloimmunization, Ta-GVHD, fever, bacteremia, urticaria, primary hypotensive reactions
  - Fever ≈ 24 prevented
  - Urticaria ≈ 24-72 prevented

[1] Daurat A et al., Transfusion. 2016;56:1295.

Capital and Operational Expenses

- Capital expenses = $ 0
- Operational expenses (5-year) ≈ $257,000
  - Basically = the cost of having a PBM program

Activity		Cost
Dedicated transfusion safety nurse	$	192,000
Blood bank physician	$	48,000
Committee time	$	14,400
Communication	$	1,000
EMR analyst time; 60 total hours	$	1,560
TOTAL	**$**	**256,690**

Our Lessons Learned

- Enforce use of transfusion order sets
- Dedicated Transfusion Safety Nurse as only role
- Ongoing targeted education via data reports
  - Consistent, frequent message to all
- Transfusion Committee physician champion
- Dedicated physician for Blood Management (before, during implementation)
- Listen and respond to feedback throughout

Thank You!