



MedStar Health

It's how we **treat people.**

Using an Electronic Blood Transfusion Record System to Improve Clinician Workflow and Prevent Blood Transfusion Errors

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Objectives

To share technological interventions put in place towards:

- Streamlining the blood transfusion process
- Preventing blood transfusion mismatches at point of care

To demonstrate the impact of the interventions put in place

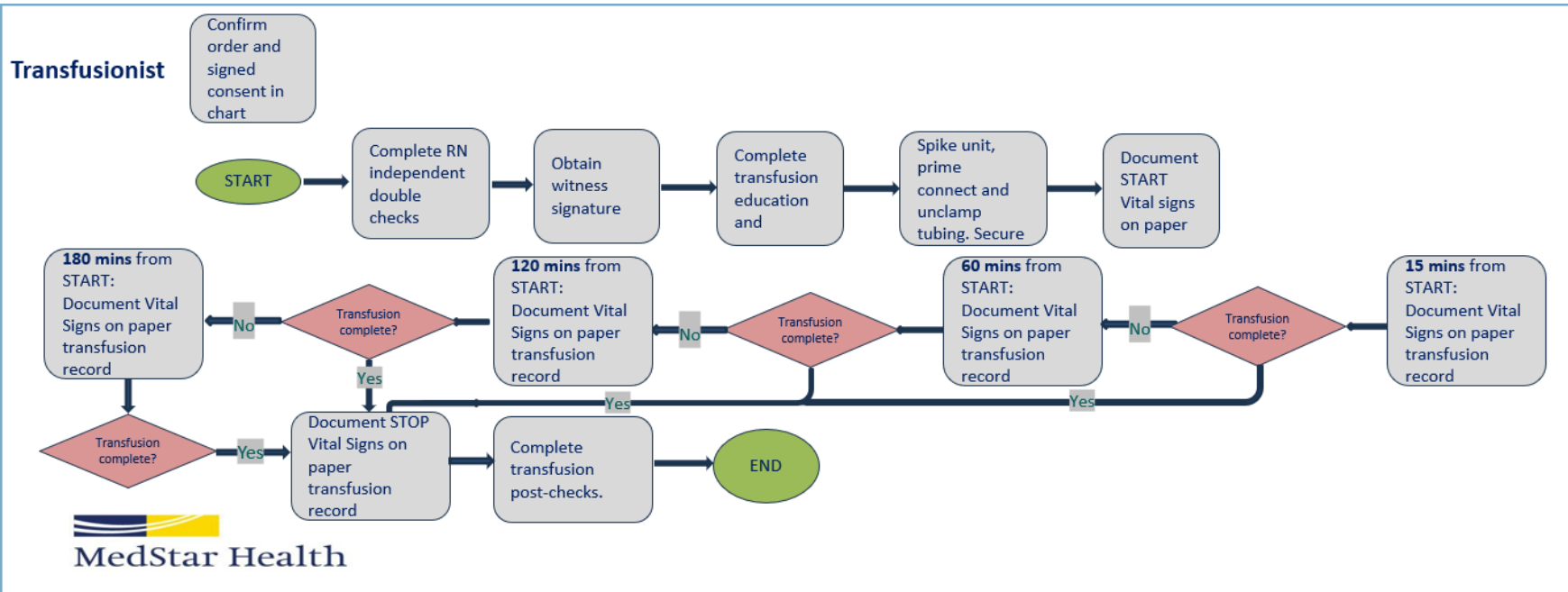
Introduction

- ❑ Positive patient identification (PPID) is a crucial part of preventing patient misidentification and mismatch with prescribed care.
- ❑ Blood transfusion-related errors through research have been identified as occurring primarily because of external factors outside of the transfusionists control (Brown & Brown, 2023).
- ❑ External factors may include:
 - Product mismatch/mislabeling
 - Complicated workflows
 - Outdated, absence of, or sub-optimal technologies
 - Knowledge gaps in safe blood transfusion processes
- ❑ Most of these factors are however avoidable.
- ❑ Processes that involve visualization and verbal verification of patient and the product to be transfused, are subject to human error (Boyd et al., 2019).
 - 1:19,000 red blood cell units make their way into the wrong patients every year
 - 1: 76,000 transfusions attempted has ended in an acute hemolytic reaction
 - 1: 1.8 million RBC unit transfusions lead to patient death caused by a hemolytic reaction
- ❑ It is important to report transfusion-related errors and transfusion reactions- and maintain transparency with reporting. They can be the key to discovering previously unknown deficiencies in workflow, system in use, or even knowledge gaps. This in turn helps the experts better target and implement safer patient care measures (Nitsche, Drebler, & Henschler, 2023).

Pre-Implementation: Paper Process

- ❑ Transfusion activity was entirely captured on paper
- ❑ Limited data reporting. Not transferrable
- ❑ Audits and error reporting were completely manual processes making them tedious and not entirely transparent
- ❑ Transfusionists relied entirely on human factors to ensure
 - Right patient
 - Right product
 - Appropriate transfusion monitoring

MedStar Health (MSH) as a system identified a need for migration towards electronic documentation to streamline workflows, improve transfusion safety, and ease of data reporting



Blood Component Transfusion Record
Reserved Space for Millennium Printer

Step 1 - TRANSFUSION CERTIFICATION We, the Transfusionist and Witness, certify by our signatures that:

- The patient's name and identifying numbers are identical on the hospital ID band, this record and as stated by the patient (when possible).
- The patient's name, identifying numbers, blood type and component number are identical on the blood component label, the white label and this record.
- If applicable, the crossmatch interpretation was verified. If applicable, the blood component meets the patient's special transfusion needs stated in the order.
- The date/time of issue and the blood component expiration date/time were reviewed. Date/Time of issue stamped on form or document here:

Transfusionist's Signature _____ Transfusionist's Name (print) _____ Date _____ Time _____

Witness's Signature _____ Witness's Name (print) _____ Date _____ Time _____

Step 2 - PATIENT EDUCATION/CONSENT: Patient verbalized understanding of signs and symptoms of a transfusion reaction and was instructed to notify the nurse if any occur. Patient agrees to transfusion.

Yes _____ No: EDUCATION PROVIDED (If No, provide reason: _____)

Yes _____ No: CONSENT ON CHART (If No, provide reason: _____)

Step 3 - TRANSFUSION MONITORING

- Transfusion should be started as soon as possible and must be completed within 4 hours of issue. Return any unused components to the Transfusion Service immediately.
- Prime Y-type blood tubing (with filter) using ONLY 0.9% sodium chloride solution. No medications may be added.
- Access: Peripheral Venous Line Central Venous Line PICC Line Mediport Other _____
- Record Vital Signs Below OR Check here if recorded on Chart Record or Anesthesia Record Check if blood warmer used
- START AND STOP TIME MUST BE RECORDED ON EVERY FORM - ALL SHADED FIELDS MUST BE COMPLETED**

	Date	Time	Temp	Pulse	Blood Pressure	Signature
Start						
From Start:						
15 min						
60 min						
120 min						
180 min						
STOP						

Temperature is required at every interval. Pulse and blood pressure are required at start, 15 minutes after start and at stop time. Pulse and blood pressure are ONLY required at other intervals IF the patient experiences a temperature elevation equal to or greater than 1°C/2°F from baseline above 38°C/100.4°F or exhibits any signs or symptoms of a transfusion reaction.

AMOUNT TRANSFUSED ALL or mL (Approximate)

Step 4 - IF SIGNS OR SYMPTOMS SUGGESTING A TRANSFUSION REACTION ARE DETECTED - COMPLETE THIS SECTION:
Stop the transfusion and, using a new IV set, keep the line open with a slow 0.5% sodium chloride IV infusion at 30 mL/hour.

Record patient's signs and symptoms - Check all that apply

- Fever (1°C/2°F or higher from baseline above 38°C/100.4°F)
- Chills
- Hives - Itching
- Red or dark urine
- Chest pain
- Back Pain
- Hypoxemia
- Shortness of breath
- Change in B/P
- Change in pulse

Notify the physician immediately. REPORTED TO DR. _____ By _____ Date _____ Time _____

Intervention (Use Progress Notes/Orders as necessary): _____

Check the patient's hospital ID band and this record to verify the patient's name and medical record number match identically.
 Match Do not match (check one)

Check the blood component label and this record to verify the patient's name, medical record number, and unit number match identically.
 Match Do not match (check one)

Nurse/Physician completing this section: Signature _____ Name (print) _____ Date _____ Time _____

IF A TRANSFUSION REACTION IS SUSPECTED, NOTIFY THE TRANSFUSION SERVICE IMMEDIATELY AND SEE REVERSE.

Chart Copy
DC-F2000

Electronic Transfusion Process: Planning & Training

Oracle and MedStar Health resources collaborated through project planning, analysis, design, testing, and implementation phases of the project.

Project goal

An electronic transfusion technology to streamline transfusionist workflow and maximize safety of the patient during the transfusion process.

Project Team

- Project Manager
- Nursing and Provider Informatics
- IT Specialists
- Analysts
- Cyber Information Security teams
- Subject Matter Experts (SMEs)
- Nursing Education and
- Clinical Specialists

Training

Training occurred over a 4-week period prior to go-live.

At MWHC, users were admitted through self enrollment for training

- Virtual and live training sessions offered
- Total number of Nurses targeted for training: approx. 2900
- Total number of Nurses enrolled: 2,503
- Total number of Nurses trained: 2,392



Implementation

On **April 18, 2023**, MedStar Health (MSH), a multifacility organization which employs over 9,000 Nurses launched the Oracle Cerner Bridge Medical application across 10 inpatient facilities.

- Bridge Medical was launched as an electronic transfusion record system which when in use, requires that core safety measures are taken before initiating the transfusion.
- Barcode scanning for positive patient identification (PPID) and product identification and matching
- Integrates with the EMR
- Transfusion orders and transfusion-related lab results review within the application
- In app reporting capabilities
- Desktop and mobile versions
- Emergency Departments (Eds), Inpatient, Peri-Operative, and Procedural areas were in scope for the implementation

Intra-Operative areas and Outpatient clinics except Infusion Centers were out of scope for the implementation

- Go-Live support provided over a 2-week period
- In person/over the elbow support was provided during that time
- JobAides were provided to end-users for reference purposes during and post implementation
- Remote and over the elbow support continues as needed



Post Implementation: Current State, Electronic

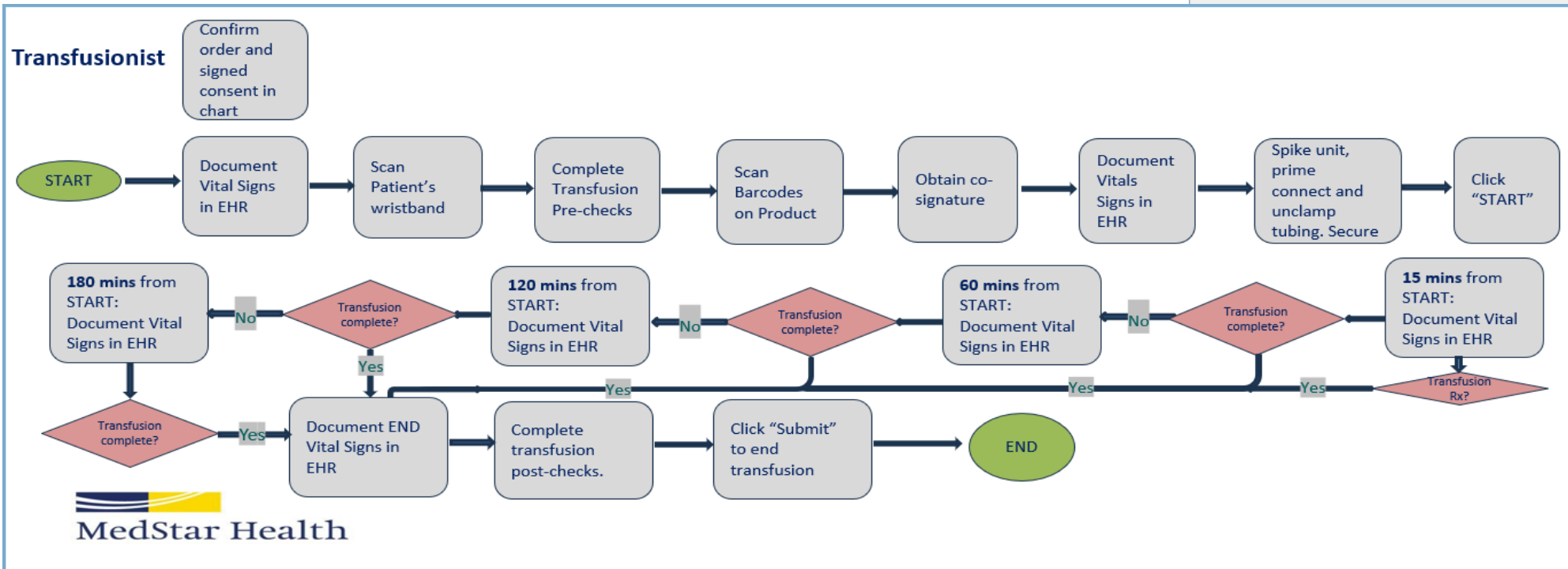
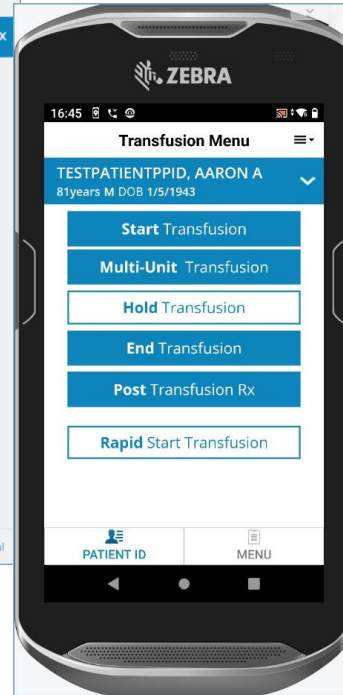
Using the electronic transfusion workflow in Bridge, transfusionists can perform PPID by barcode scanning to confirm that:

- ❑ The right patient is being transfused
- ❑ The right product is being administered
- ❑ The product is crossmatched for the right patient.

These alone make for a safer and efficient transfusion process.

Additionally,

- ❑ Data reporting is more transparent
- ❑ Documentation seamlessly transfers to the EHR
- ❑ Transfusion monitoring is more effortless



Sample Transfusion Record in Bridge & EMR

Transfusion Details

General Reactions Checks Holds

Times

Date/Time started: 5/15/2024 01:04 EDT
 Started by: Anumudu, Chinyere A
 Date/Time ended: 5/15/2024 04:58 EDT
 Ended by: Anumudu, Chinyere A

Blood Product

Blood product: RBC CPDA1 450
 Donation Type: P
 Division: 00
 Unit number: W000000000000
 Center code: W0000
 Unit expiration: 7/31/2024 01:04 EDT

Cosignature

Cosigned by: n/a

Patient Comments

Blood Types

Patient blood type: O NEG
 Donor blood type: O NEG
 Reason for substitution: n/a

Results

Held: No
 Volume transfused: 300mL
 End transfusion reactions: No
 Post transfusion reaction:
 Date/Time recorded:
 Recorded by:

Secondary Identifier

n/a

End Transfusion Comments

MSH practices PPID via barcode scanning for vital signs obtainment and recording.

These are available with mobile vital signs monitors as well as the stationary cardiac monitors.

Immunology Cardiology Anesthesia Results Pharmacogenomics Delivery Record Lactation

ons Table Group List

February 05, 2024 15:20 EST - February 08, 2024 15:20 EST (Clinical Range)

	02/07/2024 15:25 EST	02/07/2024 14:51 EST	02/07/2024 13:51 EST	02/07/2024 12:51 EST	02/07/2024 12:06 EST	02/07/2024 11:51 EST	02/07/2024 11:50 EST
BRIDGE Blood Transfusions	END W000000000000					START W000000000000	START
Unit Number	END W000000000000					START W000000000000	START
Transfusion Started						02/07/2024 11:51	
Transfusion Ended	02/07/2024 15:25						
Blood Product	RBC CPDA1 450 Irr Lr					RBC CPDA1 450 Irr Lr	
Division	00					00	
Blood Product Expiration						05/30/2024 23:59	
Donor Blood Type						O NEG	
Donation Type	Volunteer homologous (allogeneic) donor					Volunteer homologous (allogeneic) donor	
Pre-Transfusion Checks						Volunteer homologous (allogeneic) donor	
End-Transfusion Checks	Vital Signs Recorded (in MedConnect)					Transfusion order reviewed, informed conse	
Transfusionist	Anumudu, C					Anumudu, Chinyere A	
Transfusion Reaction Occurred	No	END Transfusion V.S.	180mins after START	120mins after START	60mins after START	15mins after START	Pre-Transfusion V.S.
<input type="checkbox"/> Packed Red Blood Cells Volume	300						
<input type="checkbox"/> SpO2	97	97	94	94	91 CRITICAL !!!		88 CRITICAL !!!
Vital Signs							
<input type="checkbox"/> Temperature Oral	37.5	37.5	37.1	37.3	37		37.3
<input type="checkbox"/> Peripheral Pulse Rate	102 H	108 H	112 H	115 H	120 H		118 H
<input type="checkbox"/> Respiratory Rate	20	20	20	22 H	25 H		25 H
<input type="checkbox"/> Systolic BP, Automated	118	115	105	100	90		89 L
<input type="checkbox"/> Diastolic BP, Automated	72	70	72	60	65		65
<input type="checkbox"/> MAP, Automated	87	85	83	73	70		73
<input type="checkbox"/> BP Extremity, Automated	Right upper	Right upper	Right upper	Right upper	Right upper		Right upper

Vital Signs are completed entirely in the EHR, outside of Bridge.

All other transfusion activity documentation occurs in Bridge or the paper form during system downtimes

Transfusion data captured in Bridge flows into the EHR

Process Optimization

After the launch, a Taskforce was formed. The taskforce consists of Nursing Informaticists and IT Analysts

- The aim of the task force is to evaluate adoption of the new process and utilization of the product.
- Additionally, to identify short-term shortcomings and address them promptly.
- Finally, task force seeks to identify opportunities for process and product optimization and implement them.

Since launch, this taskforce has implemented:

1. Smart Zone alerts: passive, non-disruptive, but requires a user's intervention to resolve.
 - These alerts are geared towards reminding the Nurse to document transfusion vital signs at the time they are due.
 - The rules around them were built in alignment with the MSH Blood Transfusion Policy
 - Once all required vital signs are documented within MSH Blood Transfusion Policy required time frames, the alerts are resolved.
2. More comprehensive discern reports including:
 - Bridge Transfusion Record Report: includes comprehensive transfusion data.
 - Transfusion Vital Signs Report: pulls in policy required vitals signs documented during the transfusion if within the required timeframe
 - These reports can be run from the reporting portal in the EHR system or auto-delivered to specified recipients

The taskforce continues to meet in efforts to ensure that the system continues to meet the safety requirements and care needs of the patients it serves. Also, that it maintains in an optimal state. SAFETY is #1 priority.

Alerts

[END TRANSFUSION – Document the required vital signs \(TEMP, HR, BP, RR\) then document the end of the transfusion in Bridge.](#)

Alerts

[TRANSFUSION VITAL SIGNS – Document the required vital signs \(TEMP, HR, BP, RR\) 170-190 minutes after the start of the transfusion.](#)

Alerts

[TRANSFUSION VITAL SIGNS – Document the required vital signs \(TEMP, HR, BP, RR\) 110-130 minutes after the start of the transfusion.](#)

Alerts

[TRANSFUSION VITAL SIGNS – Document the required vital signs \(TEMP, HR, BP, RR\) 50-70 minutes after the start of the transfusion.](#)

Alerts

[TRANSFUSION VITAL SIGNS – Document the required vital signs \(TEMP, HR, BP, RR\) 15-25 minutes after the start of the transfusion.](#)

Meaningful Data

MSH, within the period of 01.01.24 – 06.30.24 has administered a total of **23, 487** units of blood products.

However, focusing on MWHC alone...

Bridge Utilization

From 01.01.24 – 06.30.24:

- ❑ There were a total of 7, 478 transfusions in areas where Bridge is in scope
- ❑ 6, 970 of those were completed in Bridge Medical
- ❑ 508 were transfused on paper

Transfusion Reaction Reported

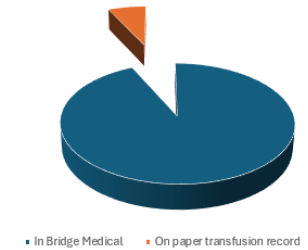
- ❑ From 01.01.2022 – 06.30.2022, while still entirely utilizing the paper transfusion record, MWHC reported a total of 31 transfusion reactions
- ❑ In comparison, from 01.01.2024 – 06.30.2024 (post implementation), MWHC has reported a total of 26 transfusion reactions while using Bridge

Bridge Transfusion Errors

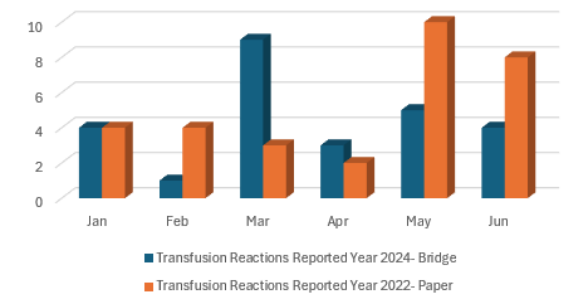
Also, at MWHC, from 01.01.24 – 06.30.24

- ❑ There have been 414 transfusion errors identified by scanning the product or cross match label barcodes in Bridge.

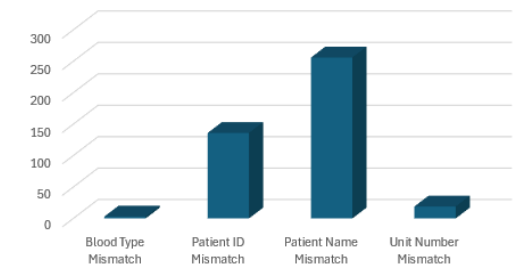
MWHC Total Transfusions = 7, 478



Transfusion Reactions Reported



Bridge Transfusion Errors Captured = 414



References

Brown, C. & Brown, M (2023). Blood and blood products transfusion errors: what can we do to improve patient safety? *British Journal of Nursing*, 32(7).
<https://doi.org/10.12968/bjon.2023.32.7.326>

Boyd, J., Franklin, S., Hensley, N. B., Koch, C. G., Mershon, B.H., Moore, D., Pronovost, P. J., Sheridan, K., Steele, A., & Stierer, T. L. (2019). Wrong patient blood transfusion error: Leveraging technology to overcome human error in intraoperative blood component administration. *The Joint Commission Journal on Quality and Patient Safety*, 45(3), 190-198.
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Nitsche, E., Drebler, J., & Henschler, R. (2023). Systematic workup of transfusion reactions reveals passive co-reporting of handling errors. *Journal of Blood Medicine*, 2023(14), 435-443.
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