2023 ONTARIO BEDSIDE AUDIT OF BLOOD ADMINISTRATION REPORT

ORBCoN

Ontario Regional Blood Coordinating Network

Inspiring and facilitating best transfusion practices in Ontario.

LEGAL DISCLAIMER

The publisher, author(s)/general editor(s) and every person involved in the creation of this publication, whether directly or indirectly, shall not be liable for any loss, injury, claim, liability or damage of any kind resulting from the use of or reliance on any information or material contained in this publication. This publication is intended for information purposes only, without any warranties of any kind. Without limitation, the publication is not intended or designed to constitute or replace medical advice or to be used for diagnosis. If specific information on personal health matters is sought, advice from a physician or other appropriate health professional should be obtained. Any decision involving patient care should be based on the judgement of the attending physician according to the needs and condition of each individual patient. The publisher, author(s)/general editor(s) and every person involved in the creation of this publication disclaim all liability in respect of the results of any actions taken in reliance upon information contained in this publication and for any errors or omissions in the publication. They expressly disclaim liability to any user/reader of the publication.

Table of Contents

Executive Summary

The Ontario Ministry of Health's Blood Coordinating Program, established in 2005, aims to implement a provincial blood utilization strategy including monitoring and making recommendations for initiatives related to blood components and products. As part of this effort, the Ontario Regional Blood Coordinating Network (ORBCoN) was created in 2006 to improve blood management across the province.

Blood transfusion, a common treatment in Ontario hospitals, carries inherent patient risks. Rigorous adherence to established standards and best practices is imperative. To enhance transfusion safety, a provincial audit of blood administration practice at the bedside was conducted in 2023. The audit aimed to evaluate compliance with current transfusion medicine standards and promote continuous quality improvement.

In 2023, 72 (45%) of hospitals with transfusion services participated in the audit, performing a total of 309 audits. While hospital participation increased slightly compared to the previous audit in 2018, the number of audits conducted decreased by 32%. The 2023 audit tool was updated to align with the most recent standards and best practices, incorporating comprehensive metrics to assess compliance.

Findings from the 2023 audit in comparison to the 2018 audit reflect minor changes:

- Compliance Improvement: Overall compliance improved in areas such as pre-transfusion and transfusion checks (4% increase) and procedure checks (3% increase).
- Areas of Concern: There was a decrease in compliance for patient identification checks (3% decline) and component checks (1% decline) which pose a potential risk to patient safety.
- Ward/Area Variability: Compliance varied across different wards/areas, with some improvement and others a decrease.

The audit results underscore the need for ongoing education and process evaluation for improvements to support safe transfusion practices. Hospitals are encouraged to use the updated audit tool for monitoring and quality improvement, supporting patient safety and aligning accreditation requirements.

This report details the findings of the 2023 bedside audit, providing suggested resources for hospitals to address gaps in compliance and enhance transfusion safety across Ontario.

Introduction

The Ontario Ministry of Health established the Blood Coordinating Program in 2005. One of the mandates is to lead the implementation of a provincial blood utilization strategy and make recommendations for initiatives related to blood components and products. The Ontario Regional Blood Coordinating Network (ORBCoN) was formed by the program in 2006 to provide an organized and integrated approach to blood management.

Blood transfusion is a frequently ordered treatment; across Ontario hospitals, every day in FY 2021/22, approximately 950 red blood cell units were transfused[1]. As with all treatments, transfusion of blood is associated with patient risks[2]. At this time, risk mitigation centers on ensuring the indication for transfusion is clear, avoiding over transfusion as well as under transfusion[2,3]. Equally significant for risk mitigation and patient safety is adherence to evidence-based, best practice blood administration policies and procedures[2]. Audit, assessment of practice and the subsequent compliance metrics, is a key patient safety indicator and provides an opportunity for ongoing learning to enhance transfusion safety. This audit tool is based on Health Canada and Transfusion Medicine (TM) Standards which provide the rationale for policies and procedures[4,5,6].

The goal of this audit was to evaluate practice and gather data from at least 50% of hospitals across Ontario, comparing metrics from previous audits to monitor compliance with current standards and critical steps in the blood administration process. This includes pre-transfusion checks by the transfusionist, pre-transfusion checks by the transfusion service (TS), patient identification, component and procedure checks, and post-transfusion checks. A secondary goal was to introduce the updated audit tool to hospitals and encourage its ongoing use as a quality improvement initiative, as well as to facilitate meeting hospital accreditation requirements.

This report summarizes the methodology and results of the 2023 audit of blood administration practices at the bedside in Ontario hospitals.

Methodology

Audit Tool Development

From 2011 to 2021, ORBCoN administered a tailored web-based platform, e-Tools, to hospital facilities. This platform served as a data input mechanism for various auditing projects, facilitating streamlined report generation to monitor adherence to TM Standards. A cyber-breach resulted in a system outage, impacting the functionality of the e-Tools platform including the Bedside Audit. In response, a new audit tool was developed utilizing the secure Research Electronic Data Capture Program (REDCap) web application and paper-based form (Appendix A) integrating historical bedside audit data, an in-depth analytical report template, and a comprehensive user guide.

In alignment with the latest directives from Health Canada and TM Standards, a thorough gap analysis was conducted to ensure the audit tool would capture key metrics to assess compliance. Subsequently, two pilot trials were performed, and data access groups were assigned to enable multi-site access. The refined audit tool, based on stakeholder feedback and current standards, supports the provincial blood utilization strategy. This tool is utilized in conducting comprehensive audits to gauge blood administration best practice and compliance across the province's hospitals, provides invaluable patient safety metrics, and fosters a culture of continuous learning enhancing transfusion safety.

Audit Distribution

All hospitals with a licensed TS in Ontario were invited to participate in a voluntary audit of blood administration at the bedside between January 30th and April 30th, 2023.

Participating hospitals were asked to perform a minimum number of audits during the audit period based on their facility's size. Small hospitals (<100 beds) were asked to perform two audits, community hospitals (>100 beds) were asked to perform five audits and large/university affiliated teaching hospitals were asked to perform ten audits. The goal was a minimum of 50% participation from hospitals in Ontario.

Results

In 2023, a total of 72 (45%) of the 159 Ontario hospitals with a TS participated and performed 309 audits. This represents a decrease in hospital participation by 24% with a 32% decrease in the number of audits compared to the 2018 audit.

In some sections, the 2023 bedside audit defined compliance as a composite of parameters that must all be met (refer to User Guide, Report Template). The opportunity to assess each parameter individually is also provided to support targeted follow up. This compliance definition reflects current TM Standards and is distinct from the 2011 and 2018 audit versions.

For the purpose of comparison, the results as obtained during the three audits are detailed in tables below.

1. Transfusion Demographics

Auditors were asked to identify if the order was for a routine, urgent or STAT transfusion, figure 1 illustrates the breakdown of the transfusion priority.

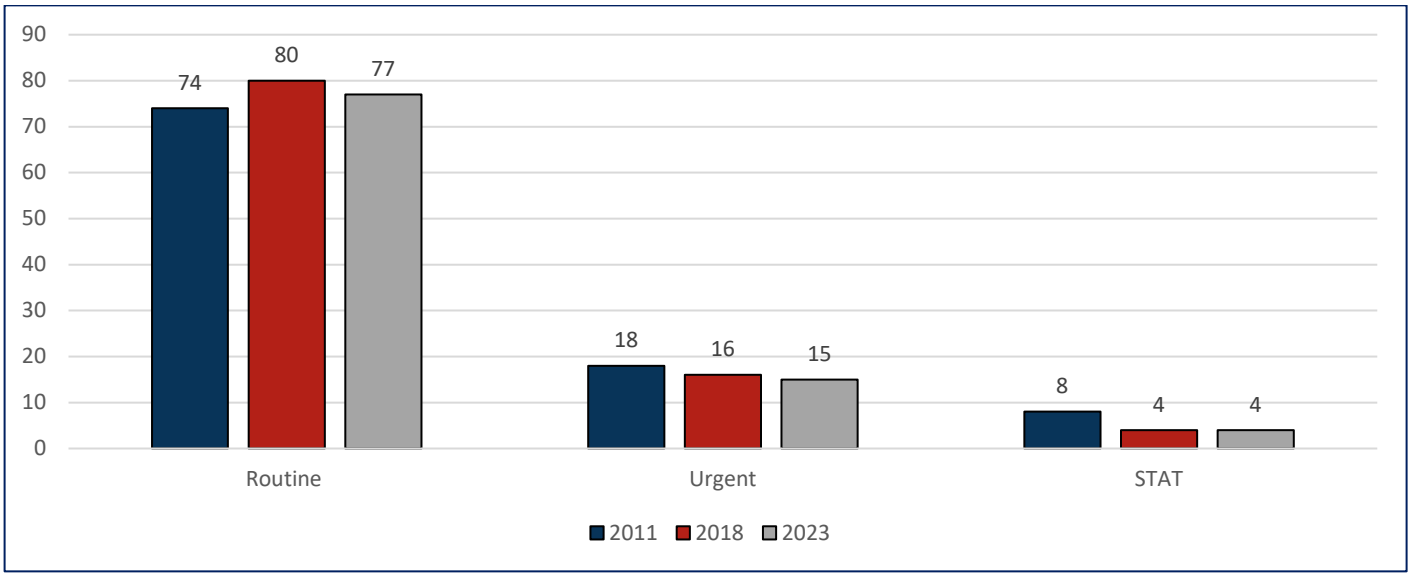

Figure 1: Transfusion Priority (%) 2011, 2018 and 2023

All blood component types were audited except for Cryoprecipitate in the 2023 audit. See Figure 2 below.

Figure 2: Type of blood component audited by % (n) in 2023

Many wards/areas of the hospitals were audited. The breakdown of ward/area (transfusion location) is shown in Table 1. Only the wards/areas that have more than 10 audits in any audit period are included in the results.

Table 1: Percentage of audits performed by ward/area. (n = number of audits performed)

	2011	2018	2023
Ward/Area	Percent of audits *(n)*	Percent of audits *(n)*	Percent of audits *(n)*
Medical / Surgical (Med/Surg)	33 *(118)*	35 *(161)*	39 *(122)*
Outpatient Clinic (Outpatient)	26 *(95)*	25 *(114)*	28 *(87)*
Emergency Department (ED)	16 *(57)*	20 *(91)*	14 *(42)*
Intensive Care Unit (ICU)	15 *(53)*	12 *(55)*	12 *(36)*
Neonatal / Paediatric (Neonate/Peds)	4 *(16)*	3 *(12)*	4 *(12)*
Chronic Care / Rehabilitation (Chronic Care)	3 *(10)*	2 *(10)*	2 *(5)*

2. Overall Compliance

The overall compliance by audit section is shown in Table 2 below. These results reflect the audit form / tool revisions that were implemented for the 2023 audit.

Table 2: Overall compliance for each section of the bedside audit

Section	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Order Confirmation Checks/Pre-Transfusion & Transfusion Checks	80	92	96*
Patient Identification Checks	93	97	94
Component Checks	87	95	94
Procedure Checks	90	91	94
Post Transfusion Checks			89

**This represents the average compliance combined for three audit sections, for the purpose of comparison to previous audit results. **

2023 Audit Changes

- In the 2023 audit tool, the previous "order confirmation checks" encompassed three audit sections. These sections, "Pre-Transfusion Checks Transfusionist", "Pre-Transfusion Checks Transfusion Service" and "Transfusion" had overall compliances rates of 96%, 99%, and 93% respectively.
- Two of these sections, "Pre-Transfusion Checks Transfusionist" and "Transfusion" were expanded to include additional parameters as well as composite parameters which are reviewed in table 4 and 5.

3. Overall Compliance by Ward/Area

Overall compliance varied between wards/areas across the 3 audit periods as shown in figure 3.

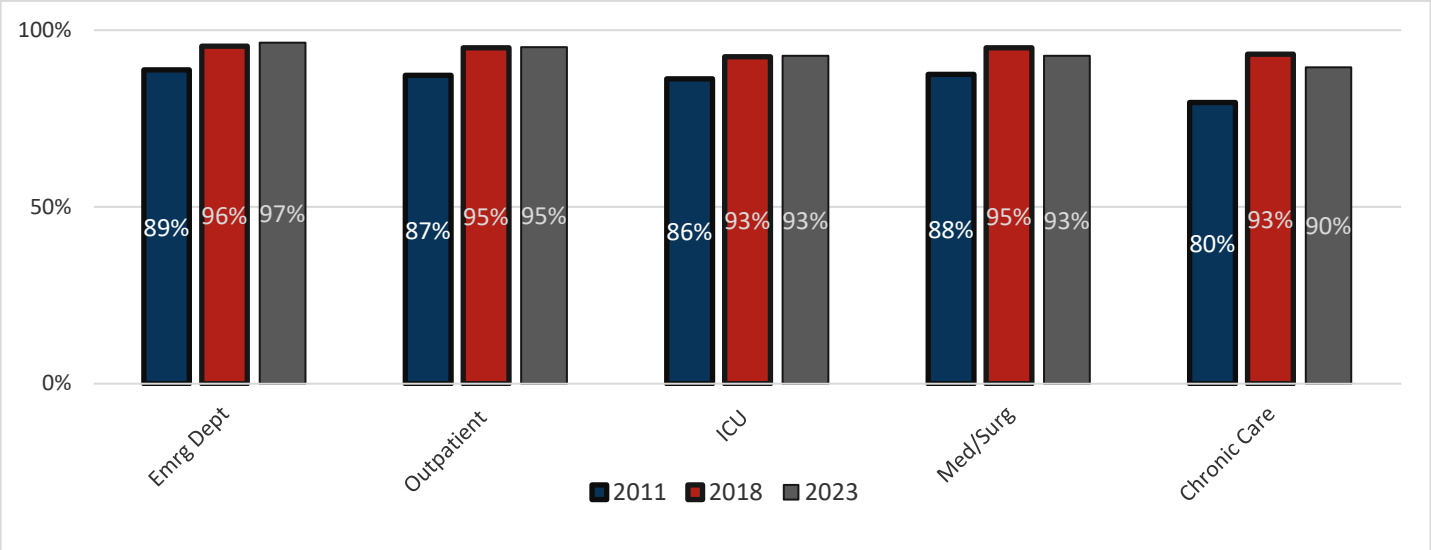

Figure 3: Overall Compliance by Ward/Area 2011, 2018 and 2023 audits.

4. Pre-Transfusion and Transfusion Checks

With the revision of the audit tool, the previous "order confirmation checks" section was expanded to incorporate the most recent TM Standards. Pre-Transfusion Checks – Transfusionist, confirms the prescriber's order and the required order elements, verifies informed consent was obtained, and determines patent IV access is established prior to the component arriving in the clinical area. Pre-Transfusion Checks – Transfusion Services (TS) focuses on verification of the patient's and unit's identification prior to issue to the clinical area as well as documentation of issue time from TS. Transfusion Checks validate the component received from TS matches the prescriber's order and that the subsequent checks are completed in the presence of the patient, at the bedside. The provincial compliance for each parameter is shown in Tables 3, 4 and 5.

Table 3: Pre-Transfusion Checks - Transfusionist Compliance (%)

Pre-Transfusion Checks - Transfusionist	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Was the authorized prescriber's order documented?	100	100	100
Did the order include the component type?	97	99	99
Did the order include the rate/duration of the transfusion or stated facility specific standard operating procedure?	44	72	91
Was informed consent documented?	87	96	95
Was the IV established and patent prior to the component arriving at the clinical area?	94	97	94

2023 Audit Changes:

- For the 2023 audit, an additional question was included in Pre-Transfusion Checks – Transfusionist, (table 3) regarding the volume/quantity/dose was specified in the order. Of the 309 audits, 91% confirmed that the volume, quantity, or dose was documented. Current TM Standards mandate that the blood order includes component type, volume/quantity/dose and rate of transfusion. In the 2023 audit, compliance for the composite of the three order parameters was 90%.
- As well, the question about whether the IV was established and patent before the component arrived at the ward/area was moved from the Procedure Checks section (used in the 2011 and 2018 audits) to the Pre-Transfusion Checks – Transfusionist section.

Table 4: Pre-Transfusion Checks – Transfusion Services Compliance (%)

Pre-Transfusion Checks - Transfusion Services (TS)	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Were the Transfusion Medicine (TM) patient identifiers on the order/pick-up slip verified to match those on the TS label/tag on the component?	93	96	99

2023 Audit Changes:

- In the 2011 and 2018 audits, this question (Table 4) was included in the patient identification check. However, for the 2023 audit, to align with current TM Standards, this patient and unit identification check at the time of issue was highlighted as Pre-Transfusion Checks – Transfusion Services.

Table 5: Transfusion Compliance (%)

Transfusion	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Was the component type received from TS verified to match the authorized prescriber's order?	70	92	97
Were all checks done in the presence of the patient, at the bedside?	92	98	88

5. Patient Identification Checks

This section confirms that the TM patient identifiers are identical on the patient's armband, the prescriber's order on the patient's paper/electronic medical record and the transfusion service (TS) label/tag attached to the blood component. This ensures the unit issued from TS will be transfused to the intended recipient. The results for the Patient Identification Checks section of the audit are shown in Table 6.

2023 Audit Change:

- In the 2011 and 2018 audits, these questions were included in the order confirmation check and the patient identification check. However, in keeping with best practice the 2023 audit emphasizes checks be performed in the presence of the patient, at the bedside.

Table 6: Patient Identification Checks Compliance (%)

Patient Identification Checks	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Were the TM patient identifiers verified to be identical on each of the following: • Patient's arm band • Authorized prescriber's order • TS label/tag	85	95	90*

**For 2023 compliance, the composite of these three parameters must be met. **

2023 Audit Changes:

- An additional question regarding documentation of the Patient Identification Checks in the paper or electronic medical record was included. Of the 309 audits, 99% indicated that the Patient Identification Checks were documented.

6. Component Checks

This audit section assesses compliance with TM Standards of bedside blood component verification before transfusion. This process includes verification of ABO/Rh group compatibility of the patient and the component by cross-referencing the component's Canadian Blood Services (CBS) supplier label with the patient's Group & Screen test results as well as the component's TS label/tag. The component's donor unit number must also be verified as identical on the CBS supplier label and the TS label/tag. Additionally, verification of the blood component's expiry date was performed to ensure the component was in date. Results are detailed in Table 7.

Table 7: Component Checks Compliance (%)

Component Checks	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Were the ABO /Rh(D) blood groups (as applicable to the component being transfused) of the patient and the component verified to be identical or compatible: • Patient ABO/Rh(D) test results (Group & Screen test) • Canadian Blood Services (CBS) label • TS label/tag	96	98	92*
Was the donor unit number verified as identical on the: • CBS label • TS label/tag	96	98	94**
Was the expiry date on the blood component verified to be acceptable?	70	90	95

**For 2023 compliance, the composite of these 3 parameters must be met. **

***For 2023 compliance, the composite of these 2 parameters must be met. ***

2023 Audit Update:

- Additional questions were added within this section. The first question is when an ABO/Rh non-identical unit was issued, was compatibility validated by the transfusionist through demonstrating knowledge of non-identical compatibility scenarios or by consulting a compatibility chart. Of the 309 audits, 47 were identified as ABO/Rh non-identical component transfusions, and 98% of these 47 audits indicated that compatibility was validated.
- The second additional question asked if the date and time of issue from TS was checked by the transfusionist to determine the maximum timeframe for completing the transfusion; 89% (276 of 309 audits) were compliant.
- The third additional question asked if the Component Checks were documented on the paper or electronic medical record. Ninety-nine percent (99%) of the audits conducted included this documentation.

7. Procedure Checks

This section of the audit focused on procedures for administration of blood components as per TM Standards. Compliance with the procedure parameters included in all three audit periods are presented in Table 8 below.

Table 8: Procedure Checks Compliance (%)

Procedure Checks	2011 Compliance (%)	2018 Compliance (%)	2023 Compliance (%)
Was patient advised of symptoms to watch for and report during or following transfusion?	74	78	81
Was the transfusion start time documented?	100	100	100

2023 Audit Changes:

- New questions were added to this section. The first 2 questions pertained to the use of blood administration tubing with 170–260-micron filter (100% compliance) and IV fluid 0.9% sodium chloride (99% compliance).
- A best practice question was introduced regarding the initial transfusion rate. Specifically, whether the transfusion commenced slowly, at rate 50mL/hr. for adults or 1mL/kg/hr. to a maximum of 50mL/hr. for neonates/pediatrics, during the first 15 minutes of the transfusion. Among 283 audits (for 26 audits, the transfusionist indicated this practice was not applicable for the patient situation i.e., an urgent transfusion), 92% reported compliance with the slow initial transfusion rate protocol.

Vital sign parameters recorded during the transfusion are shown in Figure 4.

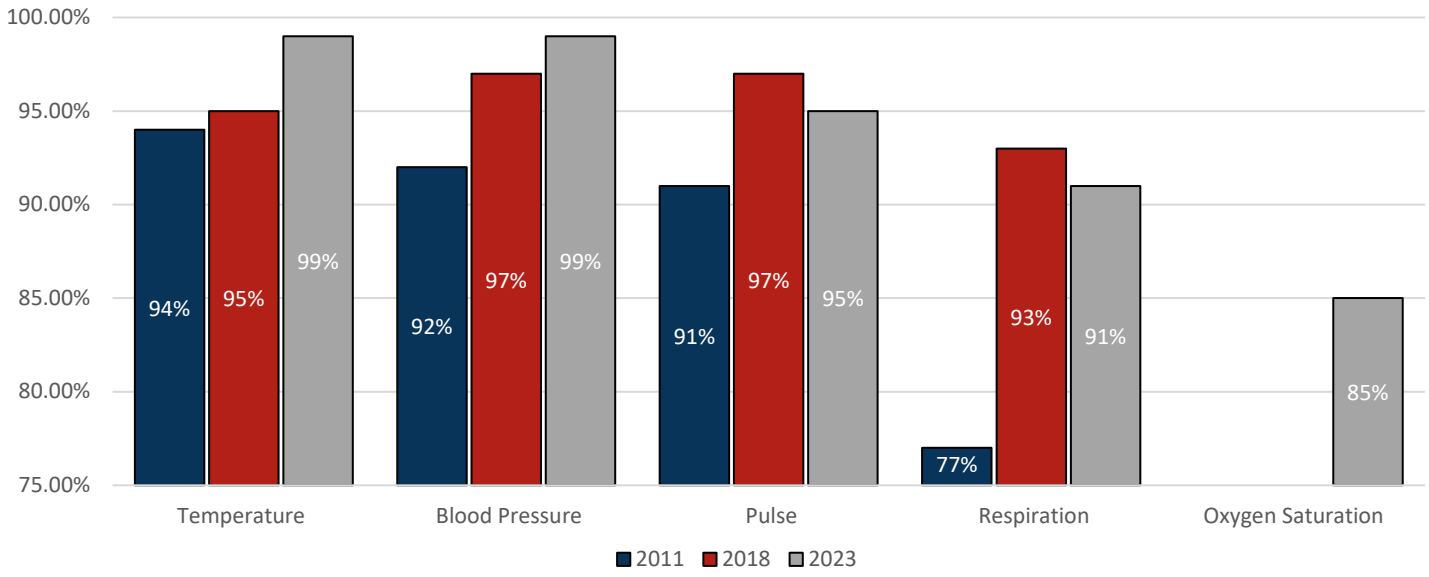

Figure 3: Vital sign parameters assessed (% compliance).

2023 Audit Changes:

- Based on best practice and aligning with the previous audits where other vital signs assessed included oxygen (O_2) saturation, this parameter was required in the vital signs checks.
- For 2023 compliance, the composite of 5 vital sign parameters (temperature, blood pressure, pulse, respiration, O_2 saturation) was required; this was achieved in 82% of audits.

Patients were advised of symptoms to watch for and report during or following their transfusion only in 81% (206 of 253 audits; not applicable for patient status in 56 audits) of audited transfusions in 2023. Figure 5 below details the compliance with this parameter across wards/areas.

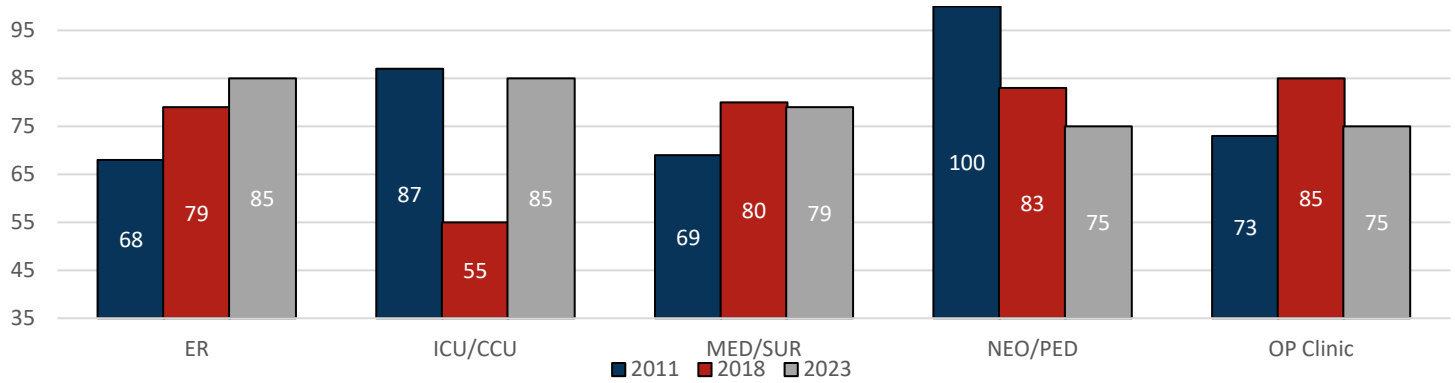

Figure 4: Advised Patient of Signs and Symptoms Compliance (%) per ward/area (transfusion location)

2023 Audit Changes:

- A question introduced in the 2023 audit was whether the transfusionist was aware of the steps to manage a transfusion reaction. In ninety seven percent of audits, the transfusionist was aware of the requirements to manage a transfusion reaction.

8. Post-Transfusion

The 2023 audit included a specific section that addressed compliance with requirements at the end of a transfusion. Table 9 below illustrates the results.

Table 9: Post-Transfusion Compliance (%)

Post-Transfusion	2023 Compliance (%)
Was the transfusion end time documented?	92
Was the transfusion completed within the 4 hours from time of issue to TS?	98
Where vital signs checked on completion of the transfusion?	94
Did the TS label/tag remain attached to the component until completion of transfusion?	99
Does the paper/electronic medical record documentation provide identity of the transfusionist?	99
Does the paper/electronic medical record documentation include: • Volume transfused • Vital signs • Patient assessments (if applicable)	*

** For 2023 compliance, the composite of these 3 parameters must be met. However, given data limitations, calculation is not possible, refer to Discussion p.16 for further information.*

When post-transfusion documentation elements were evaluated individually, 89% of the audits included documentation for the volume transfused, 96% for the vital signs and 59% included a patient assessment (if applicable).

Transfusion Time

Post-transfusion included assessment of the component transfusion patient safety metric, maximum 4-hour transfusion time (as mandated per TM Standards). Transfusion time refers to the time frame of issue from TS/removal from the temperature-controlled environment to transfusion completion. The 2023 audit parameters included issue time, transfusion start time, and transfusion completed time. All 309 audits (100%) documented the issue and start times, while 92% (269 of 291; 18 audits end time was not assessed) documented the end time.

The data indicate that 3.3% (9 of 269) of transfusions exceeded the 4-hour maximum transfusion time, ranging from 6 to 46 minutes beyond 4 hours. Figure 6 shows the distribution of time from component issue to transfusion completion, with an average transfusion time of 2 hours 30 minutes, the shortest being 38 minutes, and the longest being 4 hours 46 minutes.

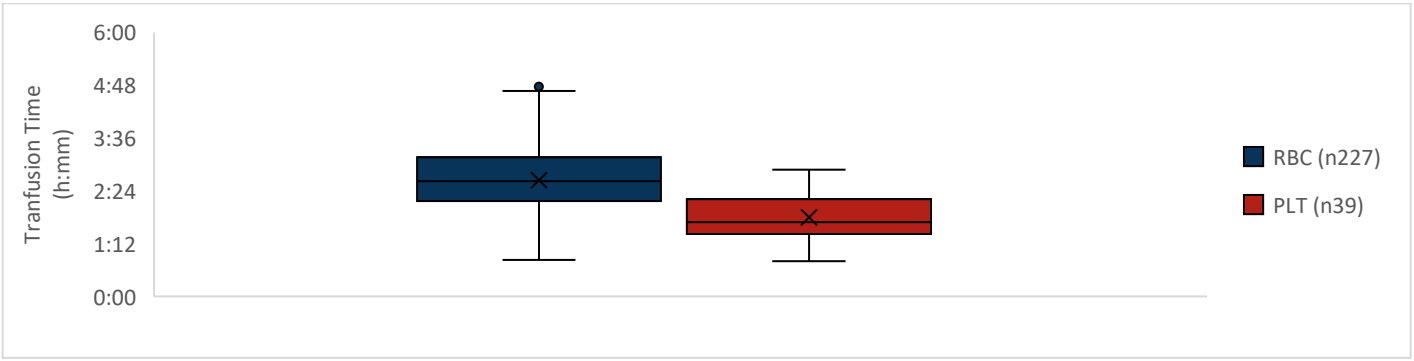

Figure 5: Transfusion Time (TS issue to end transfusion) for RBC and PLT transfusions

Discussion

Although 45% of Ontario hospitals with a TS participated in the 2023 provincial audit, there was a 32% decrease in the total number of audits performed. Participation was voluntary. Transfusion demographics across the three audit periods remained consistent (Figure 1, Table 1). In 2023, a greater number of smaller sites (45) participated compared to community (33) and teaching (12) hospital sites. According to previous provincial audit protocols, smaller sites, community hospitals and teaching hospitals were requested to complete 2, 5, and 10 audits, respectively. The shift in number of participating sites by size may account for the overall reduction in number of audits performed in 2023.

Comparison of Overall Compliance with Previous Benchmarks

For the 2018 and 2023 audit results, overall compliance (Table 1) varied somewhat, with increased compliance for audit sections Pre-Transfusion and Transfusion Checks (+4%) and Procedure Checks (+3%) and decreased compliance for Patient Identification Checks (-3%) and Component Checks (-1%) sections. The decrease in compliance for Patient Identification Checks is concerning as this could lead to a serious patient safety risk (transfusion of an incompatible component).

On comparison of overall compliance for specific wards/areas (Figure 3) for 2018 and 2023 audit data, neonatal/pediatric saw a 2% increase, and emergency experienced a 1% increase. Intensive care unit (93%) and

outpatient clinic (95%) maintained consistent compliance, while there was decreased compliance for medical/surgical (-2%), and chronic care/rehabilitation (-4%). Comparison across wards/areas is limited by sample size. Audits in medical/surgical and outpatient clinics encompassed 35% (2018) and 39% (2023) and 25% (2018) and 28% (2023) respectively.

Analysis of 2023 Audit Compliance

The audit tool was revised in 2023 to align with the current TM Standards and best practices, providing a rigorous assessment of blood administration safety. Although 100% compliance is theoretically feasible and would aid in minimizing potential health/life threatening events for patients, in clinical practice this is seldom achieved. In this report to evaluate compliance, a "traffic light" framework with arbitrary numerical values assigned was adopted as follows: 100% vibrant green (optimal), ≥ 95 to 99% pale green (acceptable for purposes of this report, suboptimal), 91 to 94% - amber (cautious observation), and ≤ 90% - red alert (requires investigation). Hospitals are reminded that this categorization of compliance rate was applied equally to all audit elements, however for certain requirements, e.g., patient identification checks, any non-compliance is associated with severe and immediate patient risk. Therefore, compliance below 100%, despite a green or amber designation, may warrant further investigation and follow-up, in accordance with policies and procedures.
Refer to Appendix B for detailed application of this traffic light framework for evaluating compliance to the 2023 bedside audit of blood administration results.

1. *Pre-Transfusion Checks – Transfusionist, Transfusion Service and Transfusion*

   Within the Pre-Transfusion Checks audit section, 100% of transfusions audited were ordered by an authorized prescriber. The documentation of informed consent compliance, 95%, is acceptable for purposes of this report but nonetheless suboptimal.
   Compliance for the composite of parameters required for the transfusion order (as per TM Standards) was 90%, indicating further inquiry is indicated. While order parameters are the responsibility of the prescriber, the patient safety implications mandate collective health care team accountability. Implementation of user-friendly standardized transfusion order sets as well as Computerized Prescriber Order Entry (CPOE) can provide enhanced patient safety through the integration of mandatory data fields[7,8]. For instance, transfusion rate (including patient assessment for Transfusion Associated Circulatory Overload [TACO]) can be tailored to the specific patient.

   The Pre-Transfusion Checks - Transfusion Service (TS) is focused on patient identification as the component is issued from TS. Compliance was acceptable and very close to optimal at 99%. This is a critical patient safety check as patient identification presented from the clinical ward/area is validated as identical to that on the component label (the intended recipient as per the prescriber's order and TS testing, preparation and issuing standard operating procedures).

   The Transfusion checks pertain to the clinical ward/area. The first metric, the component type received from the TS is verified to match the prescriber's order, while acceptable for the purpose of this report, compliance at 97% is suboptimal. However, the second metric all checks performed in the presence of the patient, at the bedside compliance is 88% raising a red alert, requiring investigation. This is a longstanding audit element (per TM Standards) where in 2023 compliance has declined (2011, 92%; 2018, 98%). The factors or barriers that impede bedside checks must be identified and mitigated. The challenges in nursing practice, complacency with knowledge deficits, workload, workflow, and interruptions may contribute to the red alerts[9]. To mitigate errors some hospitals have implemented a workflow practice, the purposeful pause "no

interruption, engaged in a critical activity". Analysis of medication administration procedures may also provide strategies transferable to blood administration[10,11,12].

2. *Patient Identification Checks*

The documentation of patient identification checks demonstrated acceptable, close to optimal compliance at 99%. The performance of these critical patient identification checks requires investigation as a red alert at 90% compliance. This metric incorporates checking for identical patient identifiers on a composite of 3 parameters: patient's arm band, prescriber's order, and TS label/tag. Notably, each individual parameter yielded 95% or greater compliance (refer to Appendix B, Patient Identification Checks section for detailed data). Transfusionist education is indicated as knowledge of the intricacy of this final patient identification check prior to transfusion is crucial. This knowledge must be translated into practice to support transfusion patient safety.

3. *Component Checks*

The documentation of checks, specifically component checks, demonstrated acceptable, close to optimal compliance at 99%. The application of these checks to confirm patient-component compatibility and unit identification is not as robust with 92% and 94% compliance respectively. These metrics both include checking a composite of parameters. On review of checking each individual parameter, the compliance was 95% or greater (refer to Appendix B, Component Checks section for detailed data). A possible knowledge gap should be explored, as transfusionists may be assuming checking of one parameter alone is appropriate. It is noteworthy for the non-ABO identical transfusions, compliance for confirmation of patient-component compatibility while acceptable for this report, compliance at 98% is suboptimal.

A pre-transfusion component check, confirming the date and time of issue from TS to determine the maximum timeframe for completing the transfusion, revealed a red alert at 89% compliance. The basis of this non-compliance must be determined; transfusionist education may be necessary. A possible explanation is that maximum transfusion time is erroneously calculated based on the start transfusion time rather than the component issue (from TS) time. Unlike IV medication administration time, which is calculated from medication infusion start time, transfusion administration time is calculated from the time of issue from TS.

4. *Procedure Checks*

Compliance for use of blood administration tubing with 170-260 micron filter and documentation of transfusion start time was optimal at 100% while use of 0.9% sodium chloride IV fluid was close to optimal compliance at 99%. While acceptable for the purpose of this report, suboptimal compliance was noted for vital signs checked within 30 minutes prior to transfusion (97%) and 15 minutes after start of the transfusion (95%) as well as the transfusionist's acknowledgement of transfusion reaction management (97%).

The compliance for the composite of the five vital signs parameters (temperature, blood pressure, pulse, respiration, oxygen saturation), at 82%, is a red alert necessitating investigation. This is of significant concern as assessment of vital sign parameters is not unique to transfusion and is a fundamental patient care activity. Re-education is warranted. On review of each vital sign parameter individually (refer to Appendix B, Procedure Checks section for detailed data), respiration and oxygen saturation compliance rates were lowest at 91% and 85% respectively. Transfusionist education regarding signs indicative of a possible respiratory transfusion reaction is highly recommended.

Compliance on advising the patient of signs and symptoms to watch for and report during or following the transfusion was also a red alert necessitating investigation at 81%. This 81% compliance rate does exclude the 56 audits where the patient situation was such that patient was unable to grasp this information (e.g., an

infant or sedated patient). Transfusionist education on the role of patient reporting in early detection of possible transfusion reactions should be implemented. Figure 5 illustrates compliance on advising the patient of signs and symptoms to watch for and report for several wards/areas, with lowest compliance, 75%, in the outpatient clinic ward/area. The outpatient setting may include chronic transfusion recipients, quite knowledgeable regarding self-care; nonetheless the patient is discharged home following completion of transfusion and should receive this precautionary information.

5. Post-Transfusion

For post-transfusion practices, compliance was close to optimal compliance at 99% for the TS label/tag remaining attached to the component until completion of the transfusion and for the paper/electronic medical record (EMR) documentation providing the identity of the transfusionist (both are mandated in TM Standards).

Compliance for the transfusionist documenting the transfusion end time (a TM Standards requirement and key information in transfusion reaction investigation) was 92% (269 of 291 audits). For the remaining 18 audits (5.8% of the total 309 audits) the auditor declined assessing transfusion end time documentation possibly related to auditor workload constraints. The unknown data could influence this metric positively or negatively.

Of the 269 audits where the transfusion end time was entered in the audit form, transfusion was completed within the maximum 4-hour transfusion time in 260 (97% compliance) audits. Since the end time was not documented by the transfusionist in 22 audits and the auditor did not assess the end time in another 18 audits, 12.9% of the data is unknown. Therefore, accuracy of percentage compliance for the maximum 4-hour transfusion completion time requirement is limited. For future audits, assessing this metric should be prioritized because transfusion end time must be documented to verify transfusion was administered safely.

Compliance for vital signs checked on completion of transfusion, 94%, should be considered with caution (a TM Standards requirement and critical information for investigation of transfusion reactions occurring post-transfusion).

The final audit question “Does the paper/electronic medical record (EMR) documentation include volume transfused, vital signs, patient assessments (if applicable)”, required a composite of these 3 parameters for compliance. Based on the data entered, it is concluded that this question was not clearly explained in the audit tool (audit paper form, REDCap data entry web application, User Guide). Accordingly, the composite of the 3 parameters cannot be analyzed. Compliance for each of the individual parameters provides some insights. Compliance for documentation of vital signs was found to be acceptable for the purpose of this report at 96%. Compliance for documentation of the volume transfused and patient assessment (if applicable) are red alerts at 89% and 59% respectively, requiring additional scrutiny. It is hypothesized that some auditors were not able to retrieve these parameters in the patient medical record. It was not practical for ORBCoN to engage in discussion with each individual auditor. In the January 2024 revised edition of the audit tool, it was clarified that if the auditor does not assess a parameter and the data entry does not include the option “AUDITOR DID NOT ASSESS”, then that field must remain blank.

Limitations

The data collected for this audit was provided by volunteer hospital participation. TS have and continue to experience significant staff shortages. Workload factors may have hindered full participation in a revised and unfamiliar audit tool.

Participating sites may have policies and procedures for blood administration that differ in some details, such as when component expiry dates are checked, how infusion times are documented, and how and when patients are notified of signs and symptoms to watch for during and after a transfusion. A detailed User Guide was provided with suggestions to manage these policy and procedure variations, and this may have led to additional auditor workload and time.

Future Considerations

ORBCoN

Hospitals have gained experience with the new audit tool forms, REDCap data entry and the data report template. Participation in subsequent provincial audits may be improved. Adopting a sentinel site model may provide more representative data. A sentinel site[13] is a community from which in-depth data are gathered and the resulting analysis is used to inform programs and policies affecting a larger geographic area.

Hospitals

The sample size for this audit was relatively small given the frequency of transfusion in Ontario. We suggest that auditing 1% to 5% of red cell transfusions annually may be more representative of clinical practice trends. Using the audit tool to focus on specific wards/areas may yield detailed information on practice.

Conclusions

The goal of achieving participation of at least 50% of Ontario hospitals was not met. However, the 2023 Bedside Audit demonstrated some improvement in bedside practice and compliance with current TM Standards for blood administration in comparison to the 2018 audit. However, there is an opportunity for ongoing learning and improved transfusion patient safety in the following areas:

- transfusion order requirements (component type, dose, infusion rate)
- completion of all checks at the bedside, in the presence of the patient
- the composite of parameters for patient identification, patient and component compatibility, and component identification
- verification of the maximum 4-hour transfusion time
- impact on identification of possible transfusion reactions related to the composite of vital sign parameters
- advising the patient of signs and symptoms to watch for and report
- end of transfusion documentation

A factor that may contribute to low compliance with some TM standards and best practices requirements is limited communication of audit outcomes with front line staff administering transfusion. ORBCoN will draft a template email communication for auditors to help nursing educators and leadership engage front-line staff. These communications outlining audit successes and opportunities for learning can generate staff discussion and learning. ORBCoN will also develop a template to track audit outcomes over time which can be used to identify recurring trends. ORBCoN's Bloody Easy Blood Administration resources (Handbook, eLearning, Information for Transfusionists PowerPoint, Transfusion Checklist Poster) support ongoing learning. The blood administration standard operating procedure, a template previously established by ORBCoN, will be revised to reflect current

TM Standards and best practices. The template will be re-branded as a Bloody Easy Blood Administration resource to enhance uptake. The ORBCoN Quality Improvement Plan transfusion order set template provides an additional resource.

Uptake of the rebuilt web-based audit tool has increased since its launch in January 2023. Hospital sites are using this tool to perform quality improvement audits to assess practice and comply with Accreditation Canada requirements.

ORBCoN will continue to collaborate with hospitals to improve the web-based audit tool to meet their needs and promote TM Standards and best practices for administration of blood components. The bedside audit toolkit is a resource available on the website at transfusionontario.org.

Acknowledgements

The Ontario Regional Blood Coordinating Network (ORBCoN) gratefully acknowledges funding support provided by the Ontario Ministry of Health. The views expressed in this Bedside Audit of Blood Administration report are those of the authors and of ORBCoN and do not necessarily reflect those of the Ontario Ministry of Health or the Government of Ontario.

References

1. Ontario Regional Blood Coordinating Network (ORBCoN). Blood Utilization Graphs [Internet]. Toronto (CA); ORBCoN: 2024 June [cited 2024 Aug 14]. Available from: https://transfusionontario.org/en/category/blood-utilization-audits/blood-utilization-graphs/
2. Callum J, Pinkerton P, Lin Y, Cope S, Karkouti K, Lieberman L, et al. Bloody Easy 5.1 Blood Transfusions, Blood Alternatives and Transfusion Reactions: A Guide to Transfusion Medicine [Internet]. 5th ed. Toronto: Ontario Regional Blood Coordinating Network; 2023; 40-1,8,14 [cited 2024 Oct 21]. Available from: https://transfusionontario.org/wp-content/uploads/2022/10/BloodyEasy5.1_English_Final_2023_Interactive-June-28.pdf.
3. Maramic I, IA Shulman IA. Approaches to Blood Utilization Auditing. In Technical Manual 19th Edition. Bethesda MD: AABB Press; 2017. p. 557 - 566.
4. National Standard of Canada Canadian Standards Association (CA). Blood and blood components. Toronto ON; 2020 Mar 24; cited 2024 Aug 14. 162 p. Report No.: CAN/CSA-902:20. Available from: https://community.csagroup.org/docs/DOC-126295 (Note: must create a user account for access)
5. Canadian Society for Transfusion Medicine (CA). Standards for hospital transfusion services. Markham ON; 2021 Dec; cited 2024 Aug 14. 110 p. Report No.: Version 5. Available from: http://www.transfusion.ca/Resources/Standards
6. Bloody Easy Blood Administration Version 3 Donna Berta, Clinical Project Coordinator -Nursing Ontario Regional Blood Coordinating Network Published by Ontario Regional Blood Coordinating Network [Internet]. Available from: https://transfusionontario.org/wp-content/uploads/2021/08/Bloody-Easy-Version-3-Interactive-English-Final-Page-Spreads.pdf
7. Olson J, Hollenbeak C, Donaldson K, Abendroth T, Castellani W. Default settings of computerized physician order entry system order sets drive ordering habits. Journal of Pathology Informatics. 2015;6(1):16–16.
8. Tseng E, Spradbrow J, Cao X, Callum J, Lin Y. An order set and checklist improve physician transfusion ordering practices to mitigate the risk of transfusion-associated circulatory overload. Transfusion medicine (Oxford, England). 2016;26(2):104–10.
9. Schroers G, Ross JG, Moriarty H. Nurses' Perceived Causes of Medication Administration Errors: A Qualitative Systematic Review. Joint Commission journal on quality and patient safety. 2021;47(1):38–53.
10. Mulac A, Mathiesen L, Taxis K, Gerd Granås A. Barcode medication administration technology use in hospital practice: a mixed-methods observational study of policy deviations. BMJ quality & safety. 2021;30(12):1021–30.
11. Hayes C, Jackson D, Davidson PM, Power T. Medication errors in hospitals: a literature review of disruptions to nursing practice during medication administration. Journal of clinical nursing. 2015;24(21–22):3063–76.
12. College of Nurses of Ontario (CNO). Standards & learning CNO documents practice standard medication [Internet]. Toronto (CA): College of Nurses of Ontario; 1996 Nov [revised 2023 Dec cited 2024 Aug 30]. 8p. Report No: 41007. Available from: https://www.cno.org/globalassets/docs/prac/41007_medication.pdf
13. Canada PHA of. Sentinel sites [Internet]. www.canada.ca. 2006. Available from: https://www.canada.ca/en/public-health/services/surveillance/foodnet-canada/sentinel-sites.html

Appendix A -BEDSIDE AUDIT OF BLOOD ADMINISTRATION FORM – COMPONENTS

ORBCoN
Ontario Regional Blood Coordinating Network

Demographics	**Hospital Name:**	
Record ID: *(REDCap generates)*	**Patient Code:** *(Created by Auditor, as per tracking log)*	**Transfusion Date:**
Transfusion Priority: ☐ Routine ☐ Urgent ☐ Stat	**Transfusion Location:** ☐ Chronic Care/Rehabilitation ☐ Emergency ☐ Intensive/Cardiac Care Unit ☐ Medical/Surgical Ward ☐ Neonatal/Pediatric	☐ Obstetrical Unit ☐ Operating Room ☐ Outpatient Clinic ☐ Post Anesthetic Care Unit ☐ Other *(specify)* _____

Blood Component:

☐ Red Blood Cells (RBC) ☐ Platelets ☐ Plasma ☐ Cryoprecipitate (Cryo)

Pre-Transfusion Checks - Transfusionist (References # 1)	
Was the authorized prescriber's order documented?	☐ YES ☐ NO
Did the order include: • Component type • Volume/quantity/dose • Rate/duration of transfusion or stated in facility specific standard operating procedure	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO
Was informed consent documented?	☐ YES ☐ NO
Was the IV established and * patent prior to the component arriving at the clinical area?	☐ YES ☐ NO
Pre-Transfusion Checks – Transfusion Service (TS) (References # 2)	
Were the * **Transfusion Medicine (TM) patient identifiers** on the order/pick-up slip verified to match those on the TS label/tag on the component?	☐ YES ☐ NO
Time component issued from TS:	___:___ hrs.
Transfusion (References # 3)	
Was the component type received from TS verified to match the authorized prescriber's order?	☐ YES ☐ NO
Were all the checks done in the presence of the patient, at the bedside?	☐ YES ☐ NO
Patient Identification Checks (References # 4)	
Were the * **TM patient identifiers** verified to be identical on the following: • Patient's arm band • Authorized prescriber's order • TS label/tag	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO
Were the patient identification checks documented in the paper/electronic medical record (EMR)?	☐ YES ☐ NO
Component Checks (References # 5a)	
Were the **ABO/Rh(D) blood groups** (as applicable to the component being transfused) **of the patient and the component** verified to be identical or compatible: • Patient ABO/Rh(D) test results (Group & Screen test) • Canadian Blood Services (CBS) label • TS label/tag If *not identical*, was compatibility validated (e.g., transfusionist's knowledge stated, compatibility chart consulted)?	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO ☐ N/A ☐ YES ☐ NO

APPENDIX A - BEDSIDE AUDIT OF BLOOD ADMINISTRATION FORM – COMPONENTS

ORBCoN
Ontario Regional Blood Coordinating Network

Was the **unit number** verified as identical on: • CBS label • TS label/tag	 ☐ YES ☐ NO ☐ YES ☐ NO
Was the **expiry** date on the blood component verified to be acceptable?	☐ YES ☐ NO
Were date and time of issue from TS checked to determine the **maximum timeframe** for completing the transfusion?	☐ YES ☐ NO
Were the component checks documented in the paper/electronic medical record (EMR)?	☐ YES ☐ NO
Procedure Checks (References # 6)	
Was the patient advised of signs & symptoms to watch for and report during or following the transfusion?	☐ YES ☐ NO ☐ N/A FOR PATIENT
Was blood administration tubing with 170-260 micron filter used?	☐ YES ☐ NO
Was IV fluid 0.9% sodium chloride used?	☐ YES ☐ NO
Was the transfusion start time documented?	☐ YES, START TIME ___:___hrs ☐ NO
Were vital signs checked within 30 minutes prior to transfusion?	☐ YES ☐ NO
Was the transfusion started at a slow rate (adults: 50 mL/hr; neonates/pediatrics: 1 mL/kg/hr, to maximum 50 mL/hr) for the first 15 minutes of transfusion?	☐ YES ☐ NO ☐ N/A PATIENT SITUATION
Were vital signs checked 15 minutes after start of the transfusion?	☐ YES ☐ NO
For vital signs checks, indicate if the vital sign parameter was assessed: • Temperature • Blood Pressure • Pulse • Respiration • Oxygen Saturation • Other *(specify)*	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO _____
Was the transfusionist aware of the steps to manage a transfusion reaction?	☐ YES ☐ NO
Post-Transfusion (References # 7)	
Was the transfusion end time documented?	☐ YES, END TIME: ___:___ hrs ☐ NO ☐ NOT ASSESSED
Was the transfusion completed within 4 hours from time of issue from TS?	☐ YES ☐ NO ☐ UNKNOWN
Were vital signs checked on completion of the transfusion?	☐ YES ☐ NO
Did the TS label/tag remain attached to the component until completion of transfusion?	☐ YES ☐ NO
Does paper/electronic medical record (EMR) documentation provide the identity of the transfusionist?	☐ YES ☐ NO
Does the paper/electronic medical record (EMR) documentation include: • Volume transfused • Vital signs • Patient assessments (if applicable)	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ N/A ☐ YES ☐ NO ☐ NOT ASSESSED
Summary	
Name of Auditor:	**REDCap Entered By:**
Comments:	
* **Patent:** correctly placed IV which permits IV solution to flow directly into the vein * **TM patient identifiers** include: 1. Patient surname & first name 2. Unique hospital identification number	

Appendix B: 2023 ONTARIO BEDSIDE AUDIT OF BLOOD ADMINISTRATION

Number of component transfusion audits: 309 (denominator for calculations*)

***NOTE:** If the raw data included blank response(s) or the response parameters included N/A FOR PATIENT, N/A PATIENT SITUATION, AUDITOR DID NOT ASSESS, the number of these responses is subtracted from the denominator for that calculation.

Compliance (%) Legend

100% (optimal)	95% - 99% (acceptable for purposes of this report, suboptimal)	91 - 94% (cautious observation)	≤ 90% red alert (requires investigation)

SECTION 1: PRE-TRANSFUSION CHECKS			
TRANSFUSIONIST	**Counts (n) provided where applicable**	**COMPLIANCE (n)**	**COMPLIANCE (%)**
Was the authorized prescriber's order documented?		309	**100%**
Did the prescriber order include: * Composite of the 3 parameters		279	*** 90%**
• Component type		309	**100%**
• Volume/quantity/dose		305	**99%**
• Rate/duration of transfusion or stated in facility specific standard operating procedure		280	**91%**
Was informed consent documented?		293	**95%**
Was the IV established and patent? prior to the component arriving at the clinical area?		292	**94%**
TRANSFUSION SERVICE (TS)			
Were the * Transfusion Medicine (TM) patient identifiers on the order/pick-up slip verified to match those on the TS label/tag on the component? ** 1. Patient surname & first name 2. Unique hospital identification number*		307	**99%**
Time component issued from TS documented:	309		
TRANSFUSION			
Was the component type received from TS verified to match the authorized prescriber's order?		300	**97%**
Were all the checks done at the bedside in the patient's presence?		273	**88%**

ORBCoN
Ontario Regional Blood Coordinating Network

Appendix B: 2023 ONTARIO BEDSIDE AUDIT OF BLOOD ADMINISTRATION

SECTION 2: PATIENT IDENTIFICATION CHECKS	Counts (n) provided where applicable	COMPLIANCE (n)	COMPLIANCE (%)
Were the TM patient identifiers verified to be identical on the following: * **Composite of the 3 parameters** • Patient's armband • Authorized prescriber's order • TS label / tag		278	* 90%
Count – Patient's arm band	298		
Count – Authorized prescriber's order	295		
Count – TS label/tag	300		
Were the patient identification checks documented in the paper/electronic medical record (EMR)?		306	99%
SECTION 3: COMPONENT CHECKS		COMPLIANCE (n)	COMPLIANCE (%)
Were the ABO / Rh(D) blood groups (as applicable to the component being transfused) of the patient and the component verified to be identical or compatible? * **Composite of the 3 parameters** • Patient ABO/Rh(D) test results (Group & Screen test) • Canadian Blood Services (CBS) label • TS label/tag		285	* 92%
Count – Patient ABO/Rh(D) test results (Group & Screen test)	296		
Count – Canadian Blood Services (CBS) label	302		
Count – TS label/tag	301		
If the ABO / Rh(D) blood groups (as applicable to the component being transfused) of the patient and the component were not identical, was compatibility validated?		46	98%
Count – Not Applicable	262		
Count – Yes	46		
Count – No	1		

ORBCoN
Ontario Regional Blood Coordinating Network

Appendix B: 2023 ONTARIO BEDSIDE AUDIT OF BLOOD ADMINISTRATION

Was the unit number verified as identical on: * Composite of the 2 parameters • CBS label • TS label / tag		291	* 94%
Count – CBS label	302		
Count – TS label/tag	297		
Was the **expiry** date on the blood component verified to be acceptable?		295	95%
Were date and time of issue from TS checked to determine the maximum timeframe for completing the transfusion?		276	89%
Were the component checks documented in the paper/electronic medical record (EMR)?		305	99%

SECTION 4: PROCEDURE CHECKS	Counts (n) provided where applicable	COMPLIANCE (n)	COMPLIANCE (%)
Was the patient advised of signs & symptoms to watch for and report during or following the transfusion?		206	81%
Was blood administration tubing with 170-260 micron filter used?		308	100%
Was IV fluid 0.9% sodium chloride used?		306	99%
Was the transfusion start time documented?		309	100%
Were vital signs checked within 30 minutes prior to transfusion?		301	97%
Was the transfusion started at a slow rate (adults: 50 mL/hr; neonates/pediatrics: 1 mL/kg/hr, to maximum 50 mL/hr) for the first 15 minutes of transfusion?		261	92%
Were vital signs checked 15 minutes after start of the transfusion?		294	95%
For vital signs checks, indicate if the vital sign parameter was assessed: *** Composite of the 5 parameters** Temperature; Blood Pressure; Pulse; Respiration; Oxygen saturation		253	* 82%
Count – Temperature	305		99%
Count – Blood Pressure	305		99%
Count – Pulse	295		95%
Count – Respiration	282		91%

ORBCoN
Ontario Regional Blood Coordinating Network

Appendix B: 2023 ONTARIO BEDSIDE AUDIT OF BLOOD ADMINISTRATION

Count – Oxygen Saturation	263		85%
Count – Other (please specify)	12		
Was the transfusionist aware of the steps to manage a transfusion reaction?		300	97%

SECTION 5: POST-TRANSFUSION	Counts (n) provided if applicable	COMPLIANCE (n)	COMPLIANCE (%)
Was the transfusion end time documented?		269	92%
Count – Yes	269		
Count – No	22		
Count – Not Assessed	18		
Was the transfusion completed within 4 hours from time of issue from TS?		260	97%
Count– Yes	260		
Count– No	9		
Count– Unknown	40		
Were vital signs checked on completion of the transfusion?		291	94%
Did the TS label/tag remain attached to the component until completion of the transfusion?		306	99%
Does the paper/electronic medical record (EMR) documentation provide the identity of the transfusionist?		306	99%
Does the paper/electronic medical record (EMR) documentation include:			
Count– Volume transfused	274		89%
Count– Vital signs	297		96%
Count– Patient assessments (if applicable)	183		59%
Counts– Not assessed	5		