Bedside Transfusion Practice Re-Audit:
A comparative observational audit of red cell administration in eight New Zealand Hospitals

Final Report

Audit proposal by:

Suzi Rishworth	Southern

Audit Data collated by:

Esther Cramer-Hamelink	Te Tai Tokerau Northland
Jomyn Diedericks	Waitematā
Soyoung Choi-Maxwell	Te Toka Tumai Auckland
Graeme Sykes	Counties Manukau
Christopher Corkery	Waikato
Liz Thrift	Te Pae Hauora o Ruahine o Tararua MidCentral
Fiona King	Ūpoko ki te Uru Hauora Capital, Coast and Hutt Valley
Susan Mercer	Canterbury

Audit Report by:

Richard Charlewood	NZBS
Suzi Rishworth	Southern

November 2022

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EXECUTIVE SUMMARY

Audits of blood transfusion practice from around the world have identified that patients are put at risk of suffering avoidable complications of transfusion through misidentification and lack of observation. The New Zealand Blood Service (NZBS) audit report released in 2009 identified only 69% of transfusions met the requirements of the 'bare essential' safety checks. Auditing the 'last line of defence' for compliance provides us with the opportunity to recognise both excellence and areas where improvement is warranted.

The aim of the re-audit of bedside transfusion practice was to review local District Health Board (DHB) policy and procedures for reference and compliance to current ANZSBT and NZBS guidelines; and to measure and compare the level of adherence to ANZSBT and NZBS recommended best practice guidelines for the safe administration of resuspended red cells transfusions by clinical staff, in various clinical settings, across multiple sites in New Zealand.

All sites had updated local blood policies and had endeavoured to implement the majority of recommendations subsequent to the NZBS 2009 Bedside Transfusion Practice Audit. There remains room for improvement in some areas, in particular for the one site that has not introduced bedside checklists or removed manual transcription.

All transfusion episodes were assessed against ten audit standards, informed by the ANZSBT *Guidelines for the Administration of Blood Products* (2018)[1], NZBS *Transfusion Medicine Handbook* (2016)[2] and the key areas of focus discussed in the previous NZBS audit.

385 transfusion episodes were audited across eight DHBs between September 2019 and July 2020, covering inpatients and outpatients, ICUs and general wards.

The audit has shown substantial improvement in the key 'bare essentials' of bedside transfusion checking practices. Nevertheless, one in thirty transfusions had sufficient gaps that an incorrect component could be transfused, or an adverse reaction overlooked.

Areas where improvement is needed include:

- **Asking the patient to state their full name.** Overall, this occurred prior to commencing in three quarters of the red cell units; with one outlier DHB, where the full name was requested in less than a third of transfusions.
- **Use of the identification (ID) wristband**. 3% of inpatients and almost half of outpatients were not wearing hospital ID bands. This has not improved since the previous audit[3] over ten years ago.
- **Legibility of the patient ID label** was another issue noted
- **Completion of the four-point checks** i.e. the component to the swing label to the prescription to the patient. This was only completed fully in a third of transfusions. This is an area where electronic checking can substantially improve speed and accuracy. In the absence of such equipment, clear messaging and education about what needs to be checked may lift performance.
- **Prophylactic Diuretics.** Used in 11% of transfusion episodes overall, despite good evidence that administering diuretics before the transfusion reduces Transfusion-associated Cardiac Overload (TACO), one of the commonest causes of transfusion-related mortality. A checklist such as that suggested by Sunnybrook Health Sciences Centre[4] could help identify patients at higher risk and improve the use of diuretics for those most in need of them.
- **Double Independent Checking.** A powerful tool to reduce errors but in this audit, only 10% of transfusions were genuinely independently double-checked.

Areas that were well performed included:

- The process and procedure of preparing for a transfusion (venous access, equipment, baseline vital signs) and monitoring a recipient (measuring initial vital signs and monitoring for the first 15 minutes) were generally very well done with high levels of adherence to recommended best practice.
- Documentation of the transfusion episode
- All adverse reactions were reported, which is an indicator of skilled monitoring and knowledge. The number of reactions was consistent with previous audits at 1-2% of transfusions.

Areas of inconsistency included:

- The use of medication to prevent transfusion reactions prior to the transfusion, which varied from 0% to 45% of transfusions. The practice does not have much evidence base and is associated with significant side-effects for patients.
- The swing label was not retained in one in twenty transfusions to ensure 100% traceability of blood in NZ.

In conclusion, although there have been significant gains since the previous audit, there is still substantial room for improvement. A move to electronic bedside checking could yield significant improvements in efficiency and accuracy.

INTRODUCTION

Every year thousands of New Zealanders need to be transfused resuspended red blood cells, the most frequently administered blood component[5]. Ensuring the patient is kept safe during a blood transfusion is a shared concern and underpins all aspects of the transfusion chain[1,6]. A plethora of processes, procedures and people are involved from vein (donor) to vein (recipient).

Safe patient outcomes are influenced by many factors with policy, guidelines and procedure designed to primarily protect and safeguard those receiving health-care. The first bedside audit report from the United Kingdom (UK), published in 2003[7] commented,

> "*Without a documented policy clarifying what is required during transfusion, staff errors due to ignorance of correct procedure may persist. Having correct policy is the first step toward safe transfusion, but compliance with it is also needed".*

The NZBS multi-centre Bedside Transfusion Practice audit, published in 2009[8] reviewed local hospital policy against Australia and New Zealand Society of Blood Transfusion (ANZSBT) guidelines to establish levels of adherence. All audited District Health Boards (DHB) had a blood policy and generally the sites complied, although there was some variance in the identifiers required on a wristband, the type of bedside checks undertaken, observation schedules and transfusion documentation. None of the DHBs had a bedside checklist at that time; the majority of hospitals included translocated details including unit numbers or blood groups on their paperwork, despite recommendations from UK Serious Hazards of Transfusion (SHOT) Report 2008[9]. SHOT reports that this practice adds unnecessary risk.

Recommendations for the management of patients receiving blood are available to guide hospital policies and procedures with the primary focus of ensuring the right blood is administered to the right patient at the right time for the right reason, and that the patient is monitored appropriately before, during and after transfusion. '*Guidelines for the Administration of Blood Products*' by the Australian and New Zealand Society of Blood Transfusion (ANZSBT) published in 2018[1]; '*The administration of blood components: a British Society for Haematology Guideline*' published by the British Society for Haematology (BSH) in 2018[6] and the NZBS *Transfusion Medicine Handbook* (2016)[2] all offer recommendations for ensuring every blood transfusion is safe[2,3,5.]. BSH identified the three key principles of safe transfusion practice as patient identification, documentation and communication[6].

The administration of blood to the wrong patient or the failure to identify early enough a developing transfusion reaction may lead to major morbidity or death. The NZBS Haemovigilance Programme[5] and the Serious Hazards of Transfusion (SHOT)[10] in the United Kingdom receive reports of adverse transfusion reactions and incidents such as incorrect blood component transfused and 'near-miss' events. Annual reports from both schemes have highlighted errors in bedside checking practices remain a contributor in many reported incidents.

The two-person bedside check prior to commencing the transfusion of a unit of red cells is recognised as the 'last line of defence' to protect the patient.[11–14] Lapses, slips, distraction, assumptions, knowledge deficits and workarounds all have the potential to influence the outcome of the final bedside checks, enabling human error to breach the safeguards designed to protect.

Audits of blood transfusion practice from around the world have identified that patients are put at risk of suffering avoidable complications of transfusion through misidentification and lack of observation[15–17]. The NZBS audit report[3] released in 2009 identified only 69% of transfusions met the requirements of the 'bare essential' safety checks. Auditing the 'last line of defence' for compliance provides us with the opportunity to recognise both excellence and areas where improvement is warranted.

AIM

The re-audit of bedside transfusion practice was conducted in two phases. The first phase aimed to:

- review local District Health Board (DHB) policy and procedures for reference and compliance to current ANZSBT and NZBS guidelines.
- ascertain local DHB policy or procedure statements on blood consent validity times, double (two-person) checking procedures, timing of swing label removal from the unit and any documented transfusion competency requirements.

- identify any interventions that may have been introduced subsequent to the previous multi-site audit (NZBS 2008-2009), including bedside checklists.

The second phase aimed to:

- re-audit of bedside transfusion practice was to measure and compare the level of adherence to ANZSBT and NZBS recommended best practice guidelines, by clinical staff, for the safe administration of resuspended red cells transfusions at the patient's bedside, in various clinical settings, across multiple sites in New Zealand.
- identify if any improvements or decline in practice had occurred

AUDIT STANDARDS

All transfusion episodes were assessed against ten audit standards (APPENDIX 1. Bedside Transfusion Practice Re-Audit Standards) to measure and compare the performance of each site to recommended best practice guidelines.

The audit standards were informed by the ANZSBT *Guidelines for the Administration of Blood Products* (2018)[1], NZBS *Transfusion Medicine Handbook* (2016)[2] and the key areas of focus discussed in the previous NZBS audit[3].

METHOD

A standardized *Hospital Audit Tool* (APPENDIX 2: Hospital Audit Tool) was developed for phase one of the re-audit to capture responses formally and was provided to each TNS from the participating sites to complete 'once only' as a baseline exercise. Each site was also requested to provide a copy of the transfusion document used to obtain informed consent, the blood policy statements and the issue or release blood form.

The tool utilised the ten defined bedside practice audit standards, underpinned by ANZSBT and NZBS guidelines; for each standard the DHB was asked if the blood policy included a statement for that parameter. In addition, the DHB was asked to comment on the 11 recommendations made in the 2009 NZBS audit and which of those had been implemented.

For phase two of the audit a standardized *Patient Audit Tool* (data capture form) was utilized (Appendix 2) for each red cell transfusion episode. In addition, a *patient information leaflet* was provided (Appendix 4).

Red cell transfusions were audited during a three-month period at the largest public hospital of Northland, Waitematā, Auckland, Counties Manukau, Waikato, MidCentral, Capital and Coast, and Canterbury District Health Boards (DHB). More than 70% of all red cells transfused in New Zealand occur within the eight nominated DHBs[1].

Each site aimed to audit a minimum of 50 episodes and a maximum of 100 episodes. An episode is defined as the transfusion of one unit of resuspended red cells. Episodes were selected randomly prior to red cell issue in Blood Bank from a proposed spread of clinical specialties (table 1).

Patient data collection occurred in two phases:

1. Initial data was obtained at the patient's bedside concurrent to the transfusion commencement via direct observation, by the NZBS Transfusion Nurse Specialist (TNS) or DHB Clinical Nurse Specialist (CNS).
2. Follow-up data was gathered retrospectively from the patient's clinical records after the transfusion has completed and from NZBS eTraceline (blood management system) and the various DHB patient management platforms.

AUDIT PROCESS

- Red cell transfusion only (the primary component issued and transfused at all sites, with the highest associated risk of major haemolytic events).
- Clinical areas were notified prior to the commencement of phase two that a bedside audit would occur within the hospital.
- Patients in the operating theatre, emergency department or undergoing a rapid massive transfusion were excluded from the audit.
- Audits were conducted predominantly during normal working hours, Monday to Friday.
- Each episode was auditing the compliance of clinical staff to recommended best practice and hospital policy.
- Efforts were made to limit patients to being audited only once and healthcare providers not more than twice.
- The TNS/CNS auditor obtained verbal consent from the patient before commencing the bedside audit, providing written information which contained further information and the auditors contact details. The patient could withdraw their consent at any time. As the consent was to offer patients the ability to opt out if the audit process made them uncomfortable, patients that were not aware of their surroundings were not excluded.
- The TNS/CNS auditor checked and verified patient identifiers on the identification (ID) band prior to commencement.
- Each audit episode proceeded without comment to the staff from the auditor except unless patient safety was compromised. The specific patient safety issues for which the auditor were required to intervene were if:
    i. the patient identity had not been established
    ii. it appeared the wrong unit was about to be transfused
    iii. there had been an unobserved transfusion reaction

  If intervention was indicated the TNS/CNS notified the line manager of the staff member for follow-up.

DATA COLLECTION AND DEMOGRAPHICS

The following data was collected for each episode via a standardized *patient audit tool*:

- National Health Index (NHI) number, age, gender of the recipient.
- Inpatient or outpatient status and clinical specialty/ward for this admission.
- Name of the staff member commencing the transfusion.
- Patient safety issues, namely bed position in the clinical area (open ward area, single room, intensive care area), level of consciousness.
- Parameters for standards one to ten (Appendix 1).
- Any adverse reaction to the transfusion, and if this occurred, was it reported to Blood Bank and documented in the notes.

Hospital specific data was collected once-only using a standardized *hospital audit tool* to establish local blood transfusion related policies and procedures. Interventions implemented subsequent to the NZBS 2008-2009 audit were also reviewed.

Data was entered into a secure web-based PostgreSQL database with restricted access. Patient identifiers are held separately and securely until completion and distribution of the final audit report, thereafter all paper-based audit tools used to re-associate episodes during analysis, will be securely destroyed.

STUDY DESIGN

The audit was an observational study assessed as minimal risk to participants. The audit proposal was submitted for two levels of peer review (nurse specialist and NZBS clinical advisory group) and thereafter submitted to the Health and Disability Ethics Committee (HDEC) to receive confirmation that formal ethics approval was not indicated. Agreement to proceed was obtained from each participating DHB, via the Chair of the Hospital Transfusion Committee (HTC), prior to commencement.

The provision of a *Safe Practice Notice* will also be provided with the final report as a clinical tool to summarize any identified changes or recommendations.

RESULTS

Phase1 – DHB Policy

Nine DHBs were invited to participate, with six providing complete responses (67%). The remaining three sites provided partial responses, specifically transfusion-related documentation which were then reviewed by the audit lead TNS. Inevitably this has added limitations to the preliminary phase of the audit. One site, Northland, had not participated in the first NZBS audit but it was excellent to note the majority of the recommendations made in 2009 were embedded into practice with strong evidence of collaboration and a commitment to improve transfusion practices. Dunedin, although included in the preliminary arm of the audit, withdrew from phase 2; their hospital audit findings have been retained to provide comparison to 2009 findings.

Blood policies were generally compliant with both ANZSBT and NZBS guidelines. There were some areas where further clarity could be warranted including consent validity times; mandatory patient identifiers on a wristband and alternative methods to identify a patient who is unconscious or unable to communicate. All nine sites mandated two-person checks at the bedside, only two (22%) had formally introduced double-independent checks, although neither site had a definition of what that check entailed.

Eight (89%) of the sites retained the swing label on the unit until the completion of the transfusion, which aligns to the AABB (formerly American Association of Blood Banks) recommendations[18] and provides the visual linkage between the unit transfusing and the patient's identification wristband at any point during the transfusion. 44% (n= 4) of the sites reported there was defined or mandated transfusion competency or education requirement; two sites have no statements, with the remaining three unknown.

Many of the recommendations made in 2009 have been implemented at all nine sites (figure 1). 89% (n= 8) of the audited sites have introduced transfusion checklists and removed manual transcription of unit numbers and blood groups. One site had not implemented either recommendation. Of the eight whom had, it was notable that the forms closely aligned. Only one site had a post transfusion advice contact card that was used across services; two sites had service specific contact cards with one site noting advice was documented within the discharge letter. Full results of both policy statements and recommendation implementation are provided in Appendix 2 and 3 respectively.

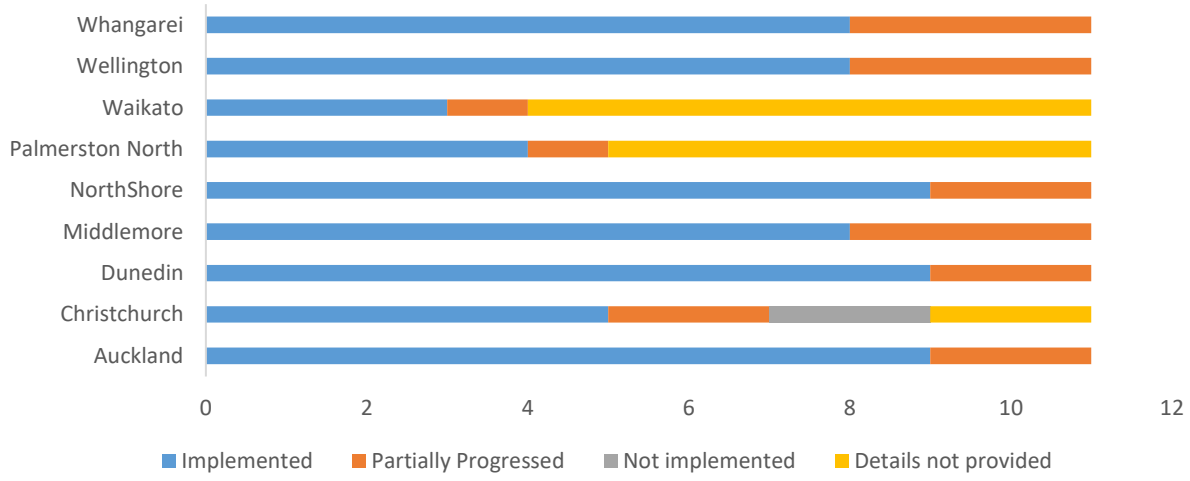

Figure 1: *Implementation rate by site of 2009 audit recommendations (baseline, pre-audit)*

Phase 2 – Bedside audit

385 transfusion episodes were audited across eight DHBs between September 2019 and July 2020 (table 1). The individual nurses performing the transfusion were audited once only in 94% of episodes, twice in 6% and three times in 1% (two occasions). The average age of recipients was 60.5 years and 53% were women. 96% of recipients were conscious with 2% each being confused or unconscious.

DHB	Gen Med	Gen Surg	Haem	ICU	Med Spec	O&G	Onc	Paeds	Surg Spec	Total episodes	% of annual transfusion
Auckland	16%	13%	31%	4%	8%	6%	6%	2%	14%	100	0.55%
Canterbury	10%	18%	25%	8%	6%	8%	8%	4%	14%	51	0.44%
Capital and Coast	7%	18%	25%	4%	11%	7%	11%	7%	11%	28	0.32%
Counties Manukau	16%	2%	12%	4%	28%	14%	6%	0%	18%	50	0.49%
MidCentral	14%	12%	26%	0%	7%	12%	7%	0%	21%	42	1.23%
Northland	4%	17%	4%	0%	13%	4%	38%	0%	21%	24	0.61%
Waikato	10%	16%	31%	2%	10%	4%	8%	4%	16%	51	0.52%
Waitematā	26%	15%	18%	0%	10%	8%	3%	0%	21%	39	0.51%
All audited sites	14%	13%	24%	3%	11%	8%	9%	3%	16%	385	0.52%
Proposed split	15%	15%	30%	5%	10%	5%	5%	2%	13%	-	-

Table 1: *Distribution of audited transfusion by DHB and clinical area*

Most audited transfusions were on inpatients but 22% were on outpatients. Episodes were distributed across high dependency units, intensive care units and general wards, as well as single rooms and open wards (table 2).

DHB	HDU	ICU	open ward	single room	in-patient	out -patient
Auckland	2%	3%	64%	31%	81%	19%
Canterbury	6%	4%	35%	55%	65%	35%
Capital and Coast	4%	7%	39%	50%	82%	18%
Counties Manukau	6%	0%	32%	60%	86%	12%
MidCentral	0%	0%	83%	12%	81%	19%
Northland	0%	0%	79%	21%	46%	54%
Waikato	14%	4%	37%	45%	80%	20%
Waitematā	0%	0%	87%	13%	82%	18%
Overall	4%	2%	56%	37%	77%	22%

Table 2: *Distribution of audited transfusion by DHB and type of location*

Standard One: *the registered medical officer or registered nurse practitioner documents in the clinical records the indication for transfusion, prescribes the red cells and obtains written informed consent from the patient (documented on the local consent form). The blood consent has not expired (as per the local DHB policy statement.*

DHB	Component Prescribed	Valid Consent	Indication in Notes	All present
Auckland	99%	92%	96%	89%
Canterbury	98%	94%	80%	75%
Capital and Coast	100%	96%	68%	64%
Counties Manukau	98%	100%	94%	92%
MidCentral	100%	95%	98%	93%
Northland	100%	100%	96%	96%
Waikato	100%	100%	73%	73%
Waitematā	97%	92%	95%	85%
Overall	99%	96%	89%	84%

Table 3: *Presence of a prescription, valid consent and indication by DHB*

Requirements for prescriptions and consent were generally well met, but the indication for the transfusion in the notes was missing in as many as a quarter or more of files, depending on the DHB (table 3).

Standard Two: *the patient receiving a red cell transfusion is wearing an identification band (or equivalent).*

DHB	Auckland	Canterbury	Capital & Coast	Counties Manukau	MidCentral	Northland	Waikato	Waitematā	Overall
ID band present	94%	65%	89%	100%	95%	88%	94%	95%	90%

Table 4: *Presence of an ID band on the patient by DHB*

Significant variation was noted across the DHBs in regard to the presence of ID bands (table 4). There was a clear correlation between the presence of an ID band and whether the patient was an inpatient or outpatient ($p<0.0001$) (table 5). Only one unconscious patient was not wearing an ID band.

	ID band on	no ID band
inpatient	288	9
outpatient	59	27

Table 5: *Presence of an ID band on the patient by inpatient or outpatient status*

Standard Three: *the patient's identification band contains a legible surname, first name, date of birth (DOB), national health index (NHI) number and gender.*

DHB	none	partial	full	n
Auckland	2%	71%	27%	100
Canterbury	39%	33%	27%	51
Capital and Coast	0%	4%	96%	28
Counties Manukau	0%	0%	100%	50
MidCentral	2%	12%	86%	42
Northland	8%	8%	83%	24
Waikato	6%	0%	94%	51
Waitematā	8%	90%	3%	39
Overall	8%	34%	58%	385

Table 6: *Legibility of the patients' ID bands by DHB*

In only 58% of episodes were all requirements on the ID band legible to both nurses checking the transfusion (table 5) with gender being the most problematic check (table 6).

DHB	surname check 1	surname check 2	first name check 1	first name check 2	DOB check 1	DOB check 2	NHI check 1	NHI check 2	gender check 1	gender check 2	n
Auckland	11%	11%	11%	11%	11%	11%	11%	11%	69%	69%	100
Canterbury	49%	57%	51%	59%	49%	57%	47%	55%	57%	61%	51
Capital and Coast	0%	0%	0%	0%	0%	0%	0%	0%	4%	4%	28
Counties Manukau	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50
MidCentral	2%	2%	2%	2%	5%	5%	5%	5%	14%	14%	42
Northland	8%	8%	8%	8%	8%	8%	8%	8%	17%	17%	24
Waikato	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	51
Waitematā	15%	33%	15%	33%	15%	33%	15%	33%	92%	95%	39
Overall	12%	15%	13%	16%	13%	16%	12%	15%	38%	39%	385

Table 7: *Percentage of identification checks on ID bands that failed by parameter and DHB*

Standard Four: *the two-person bedside checks will establish the identity of the recipient by asking the patient to state their full name and date of birth and checking this response against their identification band, prior to commencing the red cells. If the patient cannot respond to direct enquiry the identity details on the band will be checked to verify a match.*

DHB	none	partial	full	n
Auckland	0%	27%	73%	100
Canterbury	0%	71%	29%	51
Capital and Coast	0%	7%	93%	28
Counties Manukau	0%	8%	92%	50
MidCentral	0%	2%	98%	42
Northland	0%	13%	88%	24
Waikato	0%	18%	82%	51
Waitematā	0%	46%	54%	39
Overall	0%	26%	74%	385

Table 8: *Patient identity checks performed by transfusers by DHB*

Significant variation across the eight DHBs was noted again (table 8). Although asking patients to state their identity is often perceived as awkward, this was generally well done with 91% of first and second checkers obtaining this information. Checking the wristband was less well done with 12% and 15% of first and second checkers failing to do this.

Standard Five: *the two checkers will complete all procedural and clerical checks of the red cell unit, swing label and prescription at the patient's bedside directly prior to administration, including any special transfusion requirements (e.g. irradiation, pre-medication or diuretics).*

DHB	none	partial	full	n
Auckland	0%	75%	25%	100
Canterbury	0%	96%	4%	51
Capital and Coast	0%	64%	36%	28
Counties Manukau	0%	12%	82%	50
MidCentral	0%	40%	60%	42
Northland	0%	79%	21%	24
Waikato	0%	73%	27%	51
Waitematā	0%	92%	8%	39
Overall	0%	67%	32%	385

Table 9: *Two-person checks of the unit against the patient prescription and swing label by DHB*

This step involves multiple checks. Each checker must establish and correlate the patient's ID band, the blood group on unit's label, the blood group on the swing label, the donation number on the swing label, the donation number on the unit, the product's name, the patient and product identified on the prescription, the patient and product identified on swing label, the patient identified on issue form (where required by the DHB), the unit's expiry, and the unit's integrity. Given the number of checks required, it is perhaps not surprising, though still undesirable, that only 32% were performed in their entirety by both checkers (table 9).

Standard Six: *the correct equipment (e.g. blood infusion set) and patent venous access is present.*

DHB	IV Access	Equipment	Special
Auckland	100%	99%	92% (38)
Canterbury	100%	98%	83% (6)
Capital and Coast	100%	100%	60% (5)
Counties Manukau	100%	100%	100% (8)
MidCentral	100%	98%	94% (18)
Northland	100%	100%	68% (19)
Waikato	98%	96%	100% (11)
Waitematā	100%	100%	100% (7)
Overall	100%	99%	88%
n	385	385	112

Table 10: *Equipment and special requirements checks by DHB*

The sixth audit standard was very well met with the necessary equipment prepared and IV access patent before requesting for the unit from blood bank. Special requirements were less well met and varied significantly by DHB (Table 10).

Standard Seven: *the patient's vital signs (heart rate, temperature, blood pressure and respiration rate) will be recorded up to 60 minutes prior to the transfusion commencement, at 15 minutes and up to 60 minutes after completion of the unit (minimum requirement).*

DHB	Baseline observations			Initial observations			Final observations			n
	none	partial	full	none	partial	full	none	partial	full	
Auckland	1%	6%	93%	2%	2%	96%	16%	2%	82%	100
Canterbury	6%	0%	94%	20%	2%	78%	29%	2%	69%	51
Capital and Coast	7%	0%	93%	7%	4%	89%	25%	25%	50%	28
Counties Manukau	0%	0%	100%	0%	0%	100%	0%	2%	98%	50
MidCentral	0%	0%	100%	0%	0%	100%	5%	0%	95%	42
Northland	0%	0%	100%	0%	0%	100%	0%	0%	100%	24
Waikato	0%	2%	98%	2%	2%	96%	4%	4%	92%	51
Waitematā	0%	0%	100%	0%	0%	100%	8%	0%	92%	39
Overall	2%	2%	97%	4%	1%	95%	12%	3%	85%	385

Table 11: *Pre-transfusion (baseline), first observations after commencement (initial) and final vital sign observations by DHB*

Observations were generally performed well around the commencement of the transfusion but not as well at the end of the transfusion, with a quarter or more of two DHBs' transfusers not performing any checks at all at the end of the transfusion (table 11).

Standard Eight: *the patient is closely observed (continuous visual observation) for the first 15 minutes of the transfusion.*

DHB	% observed	n
Auckland	94%	100
Canterbury	69%	51
Capital and Coast	93%	28
Counties Manukau	100%	50
MidCentral	98%	42
Northland	100%	24
Waikato	98%	51
Waitematā	100%	39
Overall	93%	385

Table 12: *Proportion of transfusions closely observed for the first 15 minutes of the transfusion by DHB*

This was generally well performed by most DHBs (table 12).

Standard Nine: *the frequency of monitoring the patient's vital signs is compliant to local hospital blood policy.*

DHB	compliant	n
Auckland	78%	100
Canterbury	53%	51
Capital and Coast	46%	28
Counties Manukau	98%	50
MidCentral	98%	42
Northland	100%	24
Waikato	92%	51
Waitematā	92%	39
Overall	82%	385

Table 13: *Proportion of observations compliant with DHB policy by DHB*

Currently, the frequency of observations beyond the absolute minimum (audit standard eight) varies. The audit assessed whether the frequency of observations complied with the local DHB policy. Overall, most transfusions were observed according to local policy, with three outliers (table 13).

Standard Ten: *the record of transfusion is complete (consent, prescription, transfusion documentation) and the unit swing label is retained in the records.*

DHB	end time recorded	transfusion documented	swing label retained	n
Auckland	61%	94%	95%	100
Canterbury	86%	86%	94%	51
Capital and Coast	71%	96%	96%	28
Counties Manukau	100%	100%	100%	50
MidCentral	60%	100%	98%	42
Northland	75%	96%	100%	24
Waikato	49%	94%	94%	51
Waitematā	95%	100%	95%	39
Overall	73%	95%	96%	385

Table 14: *documentation at the end of the transfusion by DHB*

Much like the final observations (audit standard seven), which were not performed as well as other measures, there was considerable variance in the documentation of a transfusion 'end-time'. Other documentation was generally much better (table 14).

Supplementary Question to Standard Five: *Was it an independent double-check at the patient's bedside?*

DHB	Independent checking
Auckland	25%
Canterbury	8%
Capital and Coast	7%
Counties Manukau	6%
MidCentral	2%
Northland	0%
Waikato	6%
Waitematā	5%
Overall	10%

Table 15: *Independent checking by DHB*

For optimal effectiveness, the two people performing the checks, prior to starting the red cell transfusion, should be functioning independently of each other. This has been a difficult practice to introduce, and much work remains to achieve (table 15).

Supplementary Question to Standard Ten: *When was the swing label removed from the unit?*

DHB	Label removed before	Label removed after	n
Auckland	51%	49%	100
Canterbury	0%	100%	51
Capital and Coast	82%	18%	28
Counties Manukau	24%	76%	50
MidCentral	100%	0%	42
Northland	79%	21%	24
Waikato	51%	49%	51
Waitematā	21%	79%	39
Overall	47%	53%	385

Table 16: *Timing of the swing label removal from the unit and placement in the clinical records by DHB*

When transfusing, most DHBs require the transfuser to complete a checklist to ensure critical steps are completed. The transfuser is faced with a practical choice of removing the swing label and affixing to the checklist at the start, to verify the named unit has been checked, or retaining the swing label on the unit to ensure the patient identifiers remain aligned to the hanging unit and the patient ID band. The latter is the recommended best practice from AABB and the policy statements from seven (78%) of the nine DHBs audited in phase one. Of the remaining two DHBs, only one (11%) verified their policy statement was to remove the swing label at commencement, the remaining DHB did not submit their policy to confirm (Appendix *). For phase two, 75% (n=6) of the DHBs confirmed the policy is to retain the swing label until completion, only one hospital achieved 100% compliance (table 16). Conversely, the one DHB whom stated the swing label is to be removed at commencement only achieved a compliance rate of 51%. The remaining sites had varying levels of compliance to their own policy. NZBS is considering revising the swing label to incorporate a checklist; this would offer both visual certainty the unit transfusing has been checked, as well as retaining the patient identifiers on the unit which can swiftly be cross-checked against the patient ID band, at any time during the transfusion.

Adverse Reactions

Consistent with previous audits, 1.6% of transfusions resulted in an adverse reaction for the patient (table 17). All reactions were documented and reported to Blood Bank.

DHB	Adverse reactions	n
Auckland	1%	100
Canterbury	0%	51
Capital and Coast	12%	28
Counties Manukau	0%	50
MidCentral	0%	42
Northland	0%	24
Waikato	4%	51
Waitematā	0%	39
Overall	2%	385

Table 17: *Adverse reactions by DHB*

Medication

In an effort to reduce the number of adverse events, premedication and diuretics are used in selected patients (table 18). Premedication (e.g. paracetamol, antihistamine, steroids) are used with up to a twenty-fold variation between DHBs. Similarly, diuretics show variation by DHB. When used, they appear to be used in a 3:1:2 ratio for before, during and after the transfusion.

DHB	Pre-med use	Diuretics use					n
		all	prior	between	after	not	
Auckland	6%	4%		2	2	95	100
Canterbury	2%	4%	2			49	51
Capital and Coast	0%	4%			1	27	28
Counties Manukau	16%	20%	2		8	40	50
MidCentral	45%	17%	7			35	42
Northland	4%	4%		1		23	24
Waikato	2%	10%	3	2		46	51
Waitematā	18%	28%	7	2	2	28	39
Overall	11%	11%	21	7	13	343	385

Table 18: *Premedication and diuretic use by DHB*

There was a weak correlation (r^2=0.41) between recipient age and diuretic use. (table 19).

Age up to	20	30	40	50	60	70	80	90	100
% diuretics	7%	6%	0%	16%	9%	6%	10%	22%	33%

Table 19: *Diuretic use by patients' age*

Transfusion Times

Red cells must not be out of controlled refrigeration for more than 4 hours (240 minutes). In addition, if the transfusion cannot be commenced promptly, the unit needs to be returned to blood bank within 30 minutes, for the unit to be accepted back into stock.

DHB	Minutes to start (range)	Minutes to complete (range)	Transfusion > 4 hours	Minutes out of fridge (range)	Out of fridge > 4 hours	n
Auckland	20 (4-43)	136 (0-262)	3 (4%)	156 (19-282)	5 (7%)	72
Canterbury	18 (7-64)	141 (40-225)	0 (0%)	158 (50-254)	1 (2%)	43
Capital and Coast	16 (5-40)	124 (50-235)	0 (0%)	140 (60-250)	1 (5%)	21
Counties Manukau	22 (10-41)	139 (31-195)	0 (0%)	161 (41-226)	0 (0%)	49
MidCentral	15 (5-40)	108 (5-150)	0 (0%)	122 (16-165)	0 (0%)	29
Northland	14 (5-35)	128 (8-195)	0 (0%)	139 (15-210)	0 (0%)	18
Waikato	19 (5-47)	167 (0-255)	3 (11%)	186 (15-277)	4 (15%)	27
Waitematā	24 (5-225)	161 (65-219)	0 (0%)	186 (93-370)	1 (3%)	37
Overall	19 (4-225)	139 (0-262)	6 (2%)	158 (15-370)	11 (4%)	296

Table 20: *Time taken to start and complete transfusions and time out the fridge by DHB*

Times were not available for all units, but of the 296 episodes (77%of the audit) that could be assessed, 2% had transfusions lasting longer than 4 hours, with the longest lasting 4 hours 22 minutes. 4% of units were out of controlled storage for more than 4 hours, with the longest out of the blood fridge for 6 hours 10 minutes (table 20).

Intervention

It would be irresponsible for an auditor to observe unsafe practice without intervening. Three specific patient safety issues were defined and agreed upon:

i. the patient identity had not been established
ii. it appeared the wrong unit was about to be transfused
iii. there had been an unobserved transfusion reaction

In each case the line manager was to be notified of the unsafe practice (table 21). Unfortunately, this was not achieved on all occasions. The interventions were restricted to those which could cause the greatest risk to life. Although other omissions were witnessed, intervention did not occur because diverting attention during a critical task can adversely affect patient safety with loss of situational awareness and time required to recall 'correctly' the memory of the primary task[19]. One site reported auditor interventions that exceeded the agreed parameters, raising incidents to address errors outside the parameters above.

DHB	interventions	% of interventions notified	n
Auckland	11%	9%	100
Canterbury	14%	14%	51
Capital and Coast	4%	100%	28
Counties Manukau	4%	100%	50
MidCentral	12%	100%	42
Northland	0%	0%	24
Waikato	8%	50%	51
Waitematā	26%	60%	39
Overall	10%	45%	385

Table 21: *Auditor interventions and the proportion of interventions requiring notification to manager by DHB*

Bare Essential Safety

In the previous NZBS-led multi-DHB audit, we included a 'bare essential checklist' which attempted to assess the checks necessary for the 'immediate safety' of the patient being transfused. The 'bare essentials', which at least one of the two checkers must complete were, as follows:

- patient stated his/her identity and/or the wristband was checked
- prescription was checked
- patient identity, unit number and blood group on the swing label were checked
- unit number, blood group and expiry on the unit were checked
- any special requirements were checked
- a two person check took place at the bedside
- initial observations (respiration rate, temperature, heart rate, blood pressure) were checked and/or the patient was closely observed for the first 15 minutes of the transfusion

Revisiting this list, accepting that the data capture methodology was different between the two audits, showed significant improvement (table 22).

DHB	Current audit		Previous audit	
	meet all bare essential safety checks	n	meet all bare essential safety checks	n
Auckland	97%	100	73%	51
Canterbury	98%	51	56%	62
Capital and Coast	93%	28	65%	51
Counties Manukau	100%	50	79%	33
MidCentral	98%	42	56%	50
Northland	75%	24	-	-
Waikato	100%	51	68%	56
Waitematā	100%	39	59%	61
Overall	97%	385	67%	364

Table 22: *Comparing bare essential safety checks between audits by DHB*

Comparing DHBs that participated in both audits showed 98% of episodes in the current vs 64% of episodes in the previous audit met all bare essential safety checks ($p < 0.0001$). All DHBs that participated in the previous audit have shown substantial improvements in this audit.

LIMITATIONS

Although representing approximately 0.5% of all units transfused in the year, the re-audit of bedside practices provides only a snap shot of activity. Efforts were made to eliminate inter-site variation by having a standardised *patient audit tool* and database, as well as regular meetings to discuss any issues the auditors were noting. Despite these efforts, it is inevitable that some differences will exist, for e.g. one site reported interventions occurred more frequently than the audit proposal had defined. It is not possible to quantify if excessive interruptions contributed to the some of the non-compliance.

The complete set of requested DHB policy statements were not supplied. As a consequence, the first phase of the audit cannot accurately assess compliance across all sites. Without a policy statement it is difficult to manage deviations to recommended best practice, as such results of the audit may have been impacted.

The audit data was collected by direct observation as well as retrospective examination of the clinical notes. Notes do not necessarily reflect what occurred, only what was documented. Transfusions in operating theatres or emergencies, including massive transfusions, were not included in the audit. As a

result, rapid and large volume transfusions, in the presence of the decision maker and prescriber or transfusions administered by other health care professionals (medical officers, anaesthetic technicians, perfusionists) have not been captured.

The aim of the audit was to cover as many different staff as possible, so repeated auditing of the same clinical staff was avoided. Nevertheless, due to the demographics of many episodes within hospitals, a degree of repeated auditing, of some clinical staff, did inevitably arise.

The re-audit did not endeavour to assess clinical outcome, other than adverse effects noted at the time of transfusion, as this was beyond the scope and capacity of the audit.

The latter part of the audit was undertaken during a time of uncertainty and change in the healthcare system, as emerging new pathogens, specifically SARS-CoV-2, started to impact services. Some hospitals restricted internal movement between wards and units significantly, making audit more challenging, not all sites able to achieve the proposed number of episodes.

Lastly, direct observation of transfusion practice, although time consuming, has been shown to be an effective way to identify deviations from written blood administration policies[8]. However, it is recognised that the fact of being observed, the Hawthorne effect[20], may alter performance behaviour.

DISCUSSION

A key part of all medical practice is an agreed way of delivering the service – in this case, the blood transfusion policies. It is excellent to see all sites have updated local blood policies and endeavoured to implement the majority of recommendations subsequent to the NZBS 2009 Bedside Transfusion Practice Audit. There remains room for improvement in some areas, in particular the one site that has not introduced bedside checklists or removed manual transcription of both blood groups and unit numbers.

Despite some differences in consent documentation, wristband details and vital signs schedules, the hospitals who did provide their documents, generally fulfilled the audit standards criteria well. Exceptions to this included, one hospital that did not mandate a ‘no wristband, no transfusion’ policy; another that did not require an ‘end time of the transfusion’ to be documented. Finally, several did not state how to positively identify patients that are unable to communicate.

Transfusing a biological medicine, with a one in three chance of being incompatible with the patient, requires a high degree of attention to detail to ensure the patient’s safety. Ten standards were used to audit the process, and many standards had multiple steps. For this audit, 68 actions by the nurses performing the transfusion were captured. Although missing any one step is unlikely to cause harm due to the overlapping nature of the checks, if multiple errors occur, the patient is exposed to risk, the so-called Swiss cheese phenomenon[21]. With the steady improvement over the years in the quality of the components themselves, it is not surprising that incorrect blood components transfused represents one of, if not the, biggest risk to patients now[10,22].

This audit has shown substantial improvement in the key ‘bare essentials’ of bedside transfusion checking. Nevertheless, one in thirty transfusions have sufficient gaps that an incorrect component could be transfused or an adverse reaction missed.

A key item in ensuring safety is establishing the identity of the patient. It is well documented that asking the patient to verify a prompted name is a weak form of checking. (“Are you Mr John Smith?”). However, asking the patient to, state their full name, was only done in three quarters of the transfusion episodes; down to less than a third in one DHB.

The second aspect of identity verification is the identification (ID) wristband. 3% of inpatients and almost half of outpatients were not wearing hospital ID bands. This has not improved since the previous audit[3] over ten years ago. Legibility of the label was an issue also noted. While moves are being made to electronic bedside checking to manage the large number of checks required, the absence of an ID band will make this initiative problematic.

The multiple checks required of the component to the swing label, to the prescription, to the patient, were only fully completed in a third of transfusions. Given the large number of checks involved, this is perhaps not surprising. This is an area where electronic checking can substantially improve speed and accuracy. In the absence of such equipment, clear messaging and education about what needs to be checked may lift performance[23].

The procedure of actually transfusing the units was generally very well done with high levels of performance on venous access, transfusion equipment, baseline & initial vital sign observations and monitoring for the first 15 minutes. Special requirements and final observations were generally well done but not to the level of the other parameters. This is similar to previous audits[3,24] where there was a noticeable decline in performance as the transfusion end time approached.

The use of medication prior to the transfusion, to prevent adverse reactions, varied from 0% to 45% of episodes. The practice does not have much evidence base and is associated with significant side-effects for patients[25–27]. This is an area that hospital transfusion committees could consider when reviewing hospital blood policy.

Diuretics were used only 11% overall, despite good evidence that giving diuretics before transfusion reduces Transfusion-Associated Cardiac Overload (TACO), one of the commonest causes of transfusion-related mortality[4,28]. A checklist such as that suggested by Sunnybrook Health Sciences Centre[29] could help identify patients at higher risk and improve the use of diuretics for those most in need of them.

Documentation was well performed and, specifically, in 95% of cases, the swing label was retained. However, this also means the swing label was not retained in one in twenty transfusions. This is similar to other audits of DHB documentation around the country. This is a key part of any lookbacks due to donor-derived or patient-derived illness, with 100% traceability indicated. Although NZBS holds electronic records of all transfusions, there is no formal transfusion confirmation in New Zealand, where the ward formally notifies the blood bank of the patient's receipt of the unit. Verification of administration is evidenced via the swing label in the patient's clinical records, which is why the absence of so many, is a concern.

Independent double-checking is a powerful tool to reduce errors[14] and to minimise confirmation bias. Used in a variety of areas, its ability to reduce errors was dramatically demonstrated in a study of dispensing errors where 95% of errors were detected by the second independent checker[13]. However, the catch is that it needs to be independent and used judiciously to minimise staff resistance and avoid workarounds[30]. The difficulty is that it takes more time and can disrupt workflow. Its adoption has been patchy and slow as a result[12]. In this audit, only 10% of transfusions were genuinely independently double-checked.

All adverse reactions were reported, which is an excellent outcome for patients. The number of reactions was consistent with previous audits at 1-2% of transfusions.

In conclusion, although there have been significant gains in some areas since the previous audit[3], there is still substantial room for improvement. A move to electronic bedside checking could yield significant improvements in efficiency and accuracy.

RECOMMENDATIONS

1. Some sites have yet to implement all the recommendations from the previous audit. Taking these steps is strongly recommended for all sites (see appendix 3).
2. Patient identification using the standard method (asking patient to state name, and checking wristband) remains an area of concern. This affects all services provided the hospital. Reinforcement of this need to all staff is urged.
3. Observations remain an area of some weakness. While this may be exacerbated by staff shortages, it is the hospital's responsibility to ensure it has the necessary staff to undertake procedures and that those staff are suitably trained and aware of their responsibilities.
4. TACO is the adverse effect most commonly associated with transfusion-related mortality. Clinicians are urged to give attention to preventing this with pre-transfusion diuretics. This is especially in patients 70 years and older, patients with renal dysfunction (Creatinine > 100 mmol/L), patients with Left Ventricular dysfunction (LVEF ≤ 60%) and patients with prior or current CHF (including prior Furosemide use).

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APPENDIX 1. Bedside Transfusion Practice Re-Audit Standards

All transfusion episodes will be assessed against the following ten audit standards to measure and compare the performance of each site to recommended best practice guidelines.

The audit standards are informed by the ANZSBT *Guidelines for the Administration of Blood Products* (2018)[2], NZBS *Transfusion Medicine Handbook* (2016)[5] and the key areas of focus discussed in the previous NZBS audit[15].

Standard One: the registered medical officer or registered nurse practitioner documents in the clinical records the indication for transfusion, prescribes the red cells and obtains written informed consent from the patient (documented on the local consent form). The blood consent has not expired (as per the local DHB policy statement).

Standard Two: the patient receiving a red cell transfusion is wearing an identification band (or equivalent).

Standard Three: the patient's identification band contains a legible surname, first name, date of birth (DOB), national health index (NHI) number and gender.

Standard Four: the two-person bedside checks will establish the identity of the recipient by asking the patient to state their full name and date of birth and checking this response against their identification band, prior to commencing the red cells. If the patient cannot respond to direct enquiry the identity details on the band will be checked to verify a match.

Standard Five: the two checkers will complete all procedural and clerical checks of the red cell unit, swing label and prescription at the patient's bedside directly prior to administration, including any special transfusion requirements (e.g., irradiation, pre-medication or diuretics).

Standard Six: the correct equipment (e.g., blood infusion set) and patent venous access is present.

Standard Seven: the patient's vital signs (heart rate, temperature, blood pressure and respiration rate) will be recorded up to 60 minutes prior to the transfusion commencement, at 15 minutes and up to 60 minutes after completion of the unit (minimum requirement).

Standard Eight: the patient is closely observed (continuous visual observation) for the first 15 minutes of the transfusion.

Standard Nine: the frequency of monitoring the patient's vital signs is compliant to local hospital blood policy.

Standard Ten: the record of transfusion is complete (consent, prescription, transfusion documentation) and the unit swing label is retained in the records.

Supplementary Questions to Standards Five (s.5) and Ten (s.10):
S.5. Was it an independent double check at the patient's bedside?
S.10. When was the swing label removed from the unit?

APPENDIX 2: Hospital Audit Tool

Hospital:	**Bed No:**	**Auditor:**	**Date:**
Audit Standards **- underpinned by ANZSBT/NZBS guidelines**	**Confirm local DHB blood policy & procedures includes a statement (or document/form) on each parameter**		
Standard One: *the registered medical officer or registered nurse practitioner documents in the clinical records the indication for transfusion, prescribes the red cells and obtains written informed consent from the patient (documented on the local consent form). The blood consent has not expired (as per the local DHB policy statement)*	Indication for transfusion documented in clinical notes	Yes ❍	No ❍
	Registered medical officer or registered nurse practitioner -prescribes the red cells -obtains & documents informed consent	Yes ❍ Yes ❍	No ❍ No ❍
	Dedicated blood consent form Section within generic consent Combination of above	Yes ❍ Yes ❍ Yes ❍	No ❍ No ❍ No ❍
	Consent validity (expiry) statement: *e.g. 6 months, 1 year …*		
Standard Two: *the patient receiving a red cell transfusion is wearing an identification band (or equivalent)*	No wristband, no transfusion principle	Yes ❍	No ❍
Standard Three: *the patient's identification band contains a legible surname, first name, date of birth (DOB), national health index (NHI) number and gender.*	Legible ID details: *circle mandated identifiers* Surname / first name / DOB / NHI / Gender / **Other?**		
Standard Four: *the two-person bedside checks will establish the identity of the recipient by asking the patient to state their full name and date of birth and checking this response against their identification band, prior to commencing the red cells. If the patient cannot respond to direct enquiry the identity details on the band will be checked to verify a match.*	Two-person bedside check directly prior?	Yes ❍	No ❍
	'Ask' for full name and DOB	Yes ❍	No ❍
	Verify with wristband ID details	Yes ❍	No ❍
	Unable to respond- alternative method defined?	Yes ❍	No ❍
Standard Five: *the two checkers will complete all procedural and clerical checks of the red cell unit, swing label and prescription at the patient's bedside directly prior to administration, including any special transfusion requirements (e.g. irradiation, pre-medication or diuretics).*	Procedural/Clerical Checks, specifically:		
	*Positively ID patient to unit	Yes ❍	No ❍
	*Unit to swing label	Yes ❍	No ❍
	*Verify/match prescription	Yes ❍	No ❍
	*Check irradiation, special requirements	Yes ❍	No ❍
Standard Six: *the correct equipment (e.g. blood infusion set) and patent venous access is present.*	Equipment and venous access requirements	Yes ❍	No ❍
Standard Seven: *the patient's vital signs (heart rate, temperature, blood pressure and respiration rate) will be recorded up to 60 minutes prior to the transfusion commencement, at 15 minutes and up to 60 minutes after completion of the unit (minimum requirement).* ***Standard Eight:*** *the patient is closely observed (continuous visual observation) for the first 15 minutes of the transfusion.* ***Standard Nine:*** *the frequency of monitoring the patient's vital signs is compliant to local hospital blood policy.*	Specify: Local blood observation schedule ❍Baseline TPR / BP up to 60 minutes prior ❍15 minutes ❍Other, e.g. 30 minutes, hourly… ❍End: TPR / BP up to 60 minutes post		
Standard Ten: *the record of transfusion is complete (consent, prescription, transfusion documentation) and the unit swing label is retained in the records.*	Specify: Documentation requirements		
S.5 Independent double check	How is the blood policy defined? ❍ two-person double check ❍ independent double check If *independent double check* is stated – provide the definition:		
S.10 swing label removal	❍ Remove at start ❍ Remove at end		

Is transfusion competency/education defined or mandated?	Yes ❍	No ❍	Specify:	
Submit copy of: ❍ **Local blood documentation (issue form/checklist & consent form)** ❍ **Clinical specialties (e.g. cardiac surgery) for demographic comparison**				

Have recommendations from the 2009 NZBS bedside practice audit report been implemented? (see report recommendations page 3)				
1.	Yes ❍	No ❍	Partial ❍	Specify:
2.	Yes ❍	No ❍	Partial ❍	Specify:
3.	Yes ❍	No ❍	Partial ❍	Specify:
4.	Yes ❍	No ❍	Partial ❍	Specify:
5.	Yes ❍	No ❍	Partial ❍	Specify:
6.	Yes ❍	No ❍	Partial ❍	Specify:
7.	Yes ❍	No ❍	Partial ❍	Specify:
8.	Yes ❍	No ❍	Partial ❍	Specify:
9.	Yes ❍	No ❍	Partial ❍	Specify:
10.	Yes ❍	No ❍	Partial ❍	Specify:
11.	Yes ❍	No ❍	Partial ❍	Specify:

APPENDIX 3: Recommendations from NZBS Bedside Practice Audit Report 2009.

1. Correct patient identification is a key component to any transfusion. To ensure this:
    - Hospital policy must state how neonates and outpatients will be identified for transfusion, and in particular, address whether and how wristband labels or other reliable identification will be applied.
    - Standard wristband labels should be used which include all five identifiers (first name, surname, date of birth, NHI number and gender)
2. Manual transcription of blood unit numbers and blood groups introduces the potential for erroneous transfusion. Any forms used to request blood should not have the unit number or group written on the form. The swing label (also known as the compatibility label) together with the unit are sufficient to identify the unit to the patient.
3. The two-person checks must occur at the bedside. Consideration should be given to reinforcing this via ongoing education. Developing a bedside checklist, preferably incorporated into existing paperwork, would be ideal.
4. Hospital policy needs to be clear regarding the role of respiratory rate measurements vs. oxygen saturation devices in monitoring transfusion. Clarity from the Australian and New Zealand Society for Blood Transfusion on pulse oximetry's role in transfusion monitoring should also be sought.
5. Current guidelines recommend checking respiration as part of monitoring for transfusion reactions. As the lungs are affected in the commonest severe transfusion reactions, transfusion related acute lung injury (TRALI) and transfusion-associated cardiac overload (TACO), as well as the less severe allergic reactions, this needs to be emphasised in teaching and training of staff.
6. The first few minutes of a transfusion is when the most severe reactions will present. It is therefore critical that the patient is closely observed for the first 15 minutes of each unit transfused.
7. Adverse reactions, however minor, may be clinically significant both for the current transfusion as well as future transfusion. Accordingly, all adverse reactions need to be reported to blood bank
8. Consideration should be given to providing day-case transfusion recipients with a contact card for obtaining advice in case of a delayed transfusion reaction.
9. Documentation of transfusion is needed to provide the information necessary to be able to interpret response to transfusion, any adverse reactions and to be able to perform look-backs in the future. This needs to be emphasised in teaching and training of staff. In particular, recording the end time of transfusion appears to be most in need of improvement.
10. Red cells are subject to bacterial contamination. Transfusion duration should therefore be less than four hours, other than in exceptional circumstances.
11. DHBs are encouraged to work together to establish nationally consistent processes and documentation. NZBS will be happy to support this development.

Full audit report, 2009, located at:
https://www.clinicaldata.nzblood.co.nz/resourcefolder/audits/Bedside%20Transfusion%20Practice%20Audit%20Final%20Report.pdf

APPENDIX 4: The Patient Audit Tool and Patient Information Leaflet

Hospital:	Bed No:	Auditor:	Date:

Audit Standards **- underpinned by ANZSBT/NZBS guidelines**	**Confirm local DHB blood policy & procedures includes a statement (or document/form) on each parameter**		
Standard One: *the registered medical officer or registered nurse practitioner documents in the clinical records the indication for transfusion, prescribes the red cells and obtains written informed consent from the patient (documented on the local consent form). The blood consent has not expired (as per the local DHB policy statement)*	Indication for transfusion documented in clinical notes	Yes ❍	No ❍
	Registered medical officer or registered nurse practitioner -prescribes the red cells	Yes ❍	No ❍
	-obtains & documents informed consent	Yes ❍	No ❍
	Dedicated blood consent form	Yes ❍	No ❍
	Section within generic consent	Yes ❍	No ❍
	Combination of above	Yes ❍	No ❍
	Consent validity (expiry) statement: *e.g. 6 months, 1 year …*		
Standard Two: *the patient receiving a red cell transfusion is wearing an identification band (or equivalent)*	No wristband, no transfusion principle	Yes ❍	No ❍
Standard Three: *the patient's identification band contains a legible surname, first name, date of birth (DOB), national health index (NHI) number and gender.*	Legible ID details: *circle mandated identifiers* Surname / first name / DOB / NHI / Gender / **Other?**		
Standard Four: *the two-person bedside checks will establish the identity of the recipient by asking the patient to state their full name and date of birth and checking this response against their identification band, prior to commencing the red cells. If the patient cannot respond to direct enquiry the identity details on the band will be checked to verify a match.*	Two-person bedside check directly prior?	Yes ❍	No ❍
	'Ask' for full name and DOB	Yes ❍	No ❍
	Verify with wristband ID details	Yes ❍	No ❍
	Unable to respond- alternative method defined?	Yes ❍	No ❍
Standard Five: *the two checkers will complete all procedural and clerical checks of the red cell unit, swing label and prescription at the patient's bedside directly prior to administration, including any special transfusion requirements (e.g. irradiation, pre-medication or diuretics).*	Procedural/Clerical Checks, specifically:		
	*Positively ID patient to unit	Yes ❍	No ❍
	*Unit to swing label	Yes ❍	No ❍
	*Verify/match prescription	Yes ❍	No ❍
	*Check irradiation, special requirements	Yes ❍	No ❍
Standard Six: *the correct equipment (e.g. blood infusion set) and patent venous access is present.*	Equipment and venous access requirements	Yes ❍	No ❍
Standard Seven: *the patient's vital signs (heart rate, temperature, blood pressure and respiration rate) will be recorded up to 60 minutes prior to the transfusion commencement, at 15 minutes and up to 60 minutes after completion of the unit (minimum requirement).* ***Standard Eight:*** *the patient is closely observed (continuous visual observation) for the first 15 minutes of the transfusion.* ***Standard Nine:*** *the frequency of monitoring the patient's vital signs is compliant to local hospital blood policy.*	Specify: Local blood observation schedule ❍Baseline TPR / BP up to 60 minutes prior ❍15 minutes ❍Other, e.g. 30 minutes, hourly… ❍End: TPR / BP up to 60 minutes post		
Standard Ten: *the record of transfusion is complete (consent, prescription, transfusion documentation) and the unit swing label is retained in the records.*	Specify: Documentation requirements		

S.5 Independent double check	How is the blood policy defined? ❍ two-person double check ❍ independent double check If *independent double check* is stated – provide the definition:
S.10 swing label removal	❍ Remove at start ❍ Remove at end
Is transfusion competency/education defined or mandated?	Yes ❍ No ❍ Specify:

Submit copy of:

❍ **Local blood documentation (issue form/checklist & consent form)**

❍ **Clinical specialties (e.g. cardiac surgery) for demographic comparison**

Have recommendations from the 2009 NZBS bedside practice audit report been implemented? (see report recommendations page 3)			
1. Yes ❍	No ❍	Partial ❍	Specify:
2. Yes ❍	No ❍	Partial ❍	Specify:
3. Yes ❍	No ❍	Partial ❍	Specify:
4. Yes ❍	No ❍	Partial ❍	Specify:
5. Yes ❍	No ❍	Partial ❍	Specify:
6. Yes ❍	No ❍	Partial ❍	Specify:
7. Yes ❍	No ❍	Partial ❍	Specify:
8. Yes ❍	No ❍	Partial ❍	Specify:
9. Yes ❍	No ❍	Partial ❍	Specify:
10. Yes ❍	No ❍	Partial ❍	Specify:
11. Yes ❍	No ❍	Partial ❍	Specify:

Today we will be observing the clinical staff who administer your blood transfusion. Thank you for agreeing to this.

Your identity is protected. We do not share or analyze your personal information, instead we look at how the transfusion is commenced by the clinical staff caring for you today.

What we learn from this audit will be used to improve how we deliver health care across New Zealand.

You can withdraw your consent at any time.

If you would like more information, you can contact me via phone (weekdays):

Name _____

Phone _____

Date _____

NZBLOOD
Te Ratonga Toto O Aotearoa

APPENDIX 6: NZBS Audit Recommendations and Implementation Rates by Site (pre-audit)

Number	2009 Recommendation Summary
1	Neonatal and Outpatient ID policy; five identifiers on ID (first name, last name, DOB, NHI, gender)
2	Remove Manual Transcription in Transfusion paperwork, e.g. blood group / unit numbers
3	Develop Bedside Checklist
4	Clarity on Respiration Rate and Oxygen Saturation measurement in policy
5	Education regarding importance of Respiration rate in detecting TACO, TAD, TRALI.
6	Closely observe patient for first 15 minutes of transfusion
7	Report all Reactions
8	Consider contact-card for day-stay transfusion recipients
9	Education re transfusion documentation, specifically documenting end-time
10	Transfuse within four hours of issue (release from controlled storage)
11	Encourage collaboration and develop nationally consistent processes.

NZBS Audit 2009- Recommendation Implementation by Site (baseline, pre audit)

	Auckland	Christchurch	Dunedin	Middlemore	North Shore	Palmerston North	Waikato	Wellington	Whangarei
Recommendation One (1)	1	2	✓	3	✓	-	?	4	✓
Recommendation Two (2)	✓	X 5	✓	✓	✓	✓	✓	✓	✓
Recommendation Three (3)	✓	X 6	✓	✓	✓	✓	✓	✓	✓
Recommendation Four (4)	✓	-	✓	✓	✓	-	-	✓	7
Recommendation Five (5)	✓	✓	✓	✓	✓	-	-	✓	✓
Recommendation Six (6)	✓	✓	✓	✓	✓	-	-	✓	✓
Recommendation Seven (7)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recommendation Eight (8)	✓	-	8	9	10	11	-	12	13
Recommendation Nine (9)	✓	✓	✓	✓	✓	-	-	✓	✓
Recommendation Ten (10)	✓	✓	✓	✓	✓	-	-	✓	✓
Recommendation Eleven (11)	14	14	14	14	14	14	14	14	14

KEY	
✓	Implemented
x	Not implemented
-	Not provided
1	Wristband recommendation not implemented (four identifiers only)
2	Neonate policy not known. Wristband identifiers not known.
3	Wristband recommendation not implemented (four identifiers only)
4	Wristband recommendation not implemented (four identifiers only)
5	Blood group and unit/batch numbers remains on bedside paperwork (QMR022A & QMR022B)
6	Bedside paperwork unchanged, checklist addition not implemented. (Patient ID occurs at bedside)
7	Stated generically, further clarity identified as current target
8	Oncology & haematology use a card; other areas advised via discharge paperwork
9	HDW use a system which asks recipients to contact them if feeling unwell
10	No specific card but via discharge paperwork
11	Piloted and use a dedicated card
12	No specific card but via discharge paperwork
13	No specific card but via discharge paperwork
14	Collaboration between all audited sites occurs with process development. Majority of sites utilise similar paperwork.

APPENDIX 5: Hospital Policy and Procedure Compliance and Comparison by Site (pre-audit)

	Auckland	Christchurch	Dunedin	Middlemore	North Shore	Palmerston North	Waikato	Wellington	Whangarei
Hospital Audit Tool Submitted	✓	-	✓	✓	✓	-	-	✓	✓
Transfusion Documents Supplied	1	✓	✓	✓	✓	2	3	✓	✓
Indication documented	✓	✓	✓	✓	✓	✓	✓	✓	✓
RMO or NP prescribes	✓	✓	✓	✓	✓	✓	✓	✓	✓
RMO or NP consents	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dedicated Consent form	x	x	✓	✓	x	x	✓	x	x
Generic consent with blood section	✓	✓	✓	✓	✓	✓	x	✓	✓
Combination consent form	✓	-	✓	✓	-	-	✓	✓	✓
Consent expiry statement	✓	✓	✓	✓	x	✓	✓	x	✓
No wristband, no transfusion	✓	✓	✓	✓	x	✓	x	✓	✓
Five legible identifiers on wristband	4	4	5	4	5	4	5	4	5
Two-person check at bedside	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ask for full name	✓	✓	✓	✓	✓	✓	✓	✓	✓
Verify wristband ID details	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alternative method to ID if cannot communicate	✓	x	✓	✓	x	✓	✓	x	✓
Positively ID patient to Unit	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unit to swing label	✓	✓	✓	✓	✓	✓	✓	✓	✓
Verify and match prescription	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check special requirements	✓	✓	✓	✓	✓	✓	✓	✓	✓
Equipment and venous access guidance	✓	✓	✓	✓	✓	✓	✓	✓	✓
Baseline TPR / BP up to 60 min pre	✓	✓	✓	✓	✓	✓	✓	✓	✓
15 minute standard	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ongoing observation schedule	✓	✓	✓	✓	✓	✓	✓	x	✓
TPR/BP up to 60 min post	x	✓	✓	✓	✓	✓	✓	✓	✓
Documentation standards	✓	✓	✓	✓	✓	x	✓	✓	✓
Defined as two-person checks at bedside	x	x	✓	✓	✓	✓	x	✓	✓
Defined as double-independent checks	✓	✓	x	x	x	✓	x	x	x
Swing label removed at start	x	x	x	x	x	x	✓	x	x
Swing label removed at completion	✓	✓	✓	✓	✓	✓	x	✓	✓
Defined or mandated competency or education	x	-	✓	✓	✓	x	✓	x	✓

KEY	
✓	Yes
x	No
-	Not provided
1	local issue form only - supplied via TNS MDHB
2	local issue form only - supplied via TNS MDHB
3	local issue form only - supplied via TNS MDHB
4	four identifiers on ID (first name, last name, DOB, NHI)
5	five identifiers on ID (first name, last name, DOB, NHI, gender)

APPENDIX 6: NZBS Audit Recommendations and Implementation Rates by Site (pre-audit)

Number	2009 Recommendation Summary
1	Neonatal and Outpatient ID policy; five identifiers on ID (first name, last name, DOB, NHI, gender)
2	Remove Manual Transcription in Transfusion paperwork, e.g. blood group / unit numbers
3	Develop Bedside Checklist
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5	Education regarding importance of Respiration rate in detecting TACO, TAD, TRALI.
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7	Report all Reactions
8	Consider contact-card for day-stay transfusion recipients
9	Education re transfusion documentation, specifically documenting end-time
10	Transfuse within four hours of issue (release from controlled storage)
11	Encourage collaboration and develop nationally consistent processes.

NZBS Audit 2009- Recommendation Implementation by Site (baseline, pre audit)

	Auckland	Christchurch	Dunedin	Middlemore	North Shore	Palmerston North	Waikato	Wellington	Whangarei
Recommendation One (1)	1	2	✓	3	✓	-	-	4	✓
Recommendation Two (2)	✓	X 5	✓	✓	✓	✓	✓	✓	✓
Recommendation Three (3)	✓	X 6	✓	✓	✓	✓	✓	✓	✓
Recommendation Four (4)	✓	-	✓	✓	✓	-	✓	✓	7
Recommendation Five (5)	✓	✓	✓	✓	✓	-	✓	✓	✓
Recommendation Six (6)	✓	✓	✓	✓	✓	-	✓	✓	✓
Recommendation Seven (7)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recommendation Eight (8)	✓	-	8	9	10	11	X	12	13
Recommendation Nine (9)	✓	✓	✓	✓	✓	-	✓	✓	✓
Recommendation Ten (10)	✓	✓	✓	✓	✓	-	✓	✓	✓
Recommendation Eleven (11)	14	14	14	14	14	14	14	14	14

KEY	
✓	Implemented
x	Not implemented
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