

NBTC Guidance on Pre-hospital Pre-transfusion (PHPT) Sampling

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Aim of the Guidance

This guidance is aimed at enhancing the collaboration between pre-hospital clinical services and blood transfusion laboratories teams; to enable wider acceptance of PHPT samples, this will enable earlier switch to ABO/D group to conserve precious emergency group O blood.

Background Information

A pre-transfusion sample is an important indicator of the patient's blood group and can ensure a speedy supply of group specific / cross matched blood. The absence of a sample taken prior to transfusion of blood components may result in a delay obtaining an ABO/D group on the patient and/or application of an incorrect ABO/D group to the patient.

The published evidence specifically evaluating pre-hospital pre-transfusion (PHPT) sampling is surprisingly sparse (table 1). Most of the literature comes from UK air ambulance and pre-hospital blood transfusion programmes, where the main question asked was whether obtaining a blood sample before administration of emergency blood components/products improves transfusion laboratory workflow and patient care.

Few studies directly investigate PHPT sampling, the strongest evidence-base for implementing pre-hospital pre-transfusion sampling from the current available literature (table 1) supports the need for strong transfusion governance and coordination with receiving hospitals. Although operational details vary by system, obtaining and transferring pre-transfusion samples where feasible can support blood grouping, antibody screening, compatibility testing and future haemovigilance investigations (table 2).

The evidence base is strongest for operational and transfusion-safety benefits rather than direct improvements in mortality.

Table 1- Published evidence and guidance on PHPT

The table below summarises the most relevant published evidence and guidance currently available on PHPT samples.

Study	Study Design	Population	Main Findings
Regional Whole Blood Program ⁽²⁾	Retrospective programme evaluation	Trauma and non-trauma patients receiving pre-hospital whole blood	Highlighted the importance of pre-hospital blood sample acquisition to support transition from emergency O blood to definitive hospital transfusion pathways and alloimmunisation investigations.
Characteristics, Regional Evaluation, and D-Antigen in Transfusions by Emergency Medical Services ⁽³⁾	National cohort study (10,444 patients)	EMS patients receiving pre-hospital transfusion	Demonstrated rapid growth of pre-hospital transfusion and increasing use of RhD-positive whole blood. Findings indirectly strengthen the rationale for baseline pre-transfusion sampling due to requirements for blood group confirmation, alloimmunisation monitoring, and RhD exposure tracking.
Pre-hospital Blood Transfusion Coalition Clinical Practice Guideline (2025) ⁽¹⁾	Consensus guideline	Civilian EMS programmes	Recommends robust transfusion governance, traceability, communication with hospitals and blood banks. Provides operational support for obtaining samples before transfusion where feasible.
TROOP Trial Protocol (2025) ⁽⁴⁾	Randomized trial protocol	Trauma patients receiving LTOWB vs component therapy	Highlights increasing importance of transfusion monitoring, alloimmunisation assessment, and transfusion governance in emergency blood programmes.

Table 2 -Benefits of PHPT sampling

Benefit	Supporting rationale
Earlier ABO/Rh determination	Blood banks can begin testing before arrival, reducing time to group-specific blood.
Earlier antibody screening	Identifies clinically significant alloantibodies before they are obscured by emergency transfusion.
Reduced emergency O blood use	Facilitates earlier switch to type-specific blood products.
Improved investigation	Provides a true pre-transfusion baseline sample.
RhD alloimmunisation monitoring	Particularly important when O-positive whole blood is used in patients of childbearing potential.
Improved transfusion traceability and governance	Increasingly important as pre-hospital blood programmes expand.

Blood supply challenges

In the last few years, the national O negative blood stocks in England have become increasingly fragile with high demand for usage and ongoing donor shortages ⁽⁵⁾. Since the COVID-19 pandemic, NHS Blood and Transplant has had to declare two amber alerts, the first was for all groups in October 2022 which lasted 4 weeks, and another amber alert for group O red cells in July 2024, which lasted almost a year. Climate change and the extreme heatwaves seen recently pose additional challenges on the blood supply chain,

making collections of donations more difficult. To alleviate pressures on the national supply chain, recommendations are now being made to move away from dependence on O negative, by carrying dual inventory of red cells or only O positive red cells and transitioning to using group specific blood as early as possible. Pre-hospital services may need to move over to carrying just O positive red cells if O negative stock is insufficient.

Rosen et al⁽³⁾ show there is growing acceptance of D positive whole blood and red cells in emergency haemorrhage resuscitation. In England there are eighteen pre-hospital services (ambulance and helicopter emergency medical services (HEMS)), and they carry blood components for emergency transfusion. These typically include red blood cells (RBC), fresh frozen plasma (FFP), and/or Lyoplas (freeze dried plasma). However currently only six of the eighteen pre-hospital services in England carry dual inventory of O RBC, with one unit carrying only O positive RBC and one unit carrying plasma only (see table 3).

There are many factors which prevent pre-hospital services switching over to dual inventory. These include space in the pre-hospital vehicle, obtaining stock from hospitals which is restricted by capacity of the blood transfusion laboratory providing blood components; this is affected by workload in replenishing stock for multiple vehicles when staffing shortages of laboratory Biomedical Scientists is a national concern and storage capacity for stock, as well as cold (credo) boxes. Most pre-hospital teams carry group O negative RBC to mitigate the risk of Haemolytic Disease of Foetus/Neonate (HDFN) in patients of childbearing potential (i.e., less than 50 years of age). However, current literature indicates that death from traumatic haemorrhage is greater than the long-term risk of RhD alloimmunisation⁽⁶⁻⁹⁾ and repeated national audits have shown that 70-80% of trauma patients are male.

Lange et al⁽¹⁰⁾ describes how to manage RhD negative girls who receive RhD positive blood products.

Table 3- HEMS units

This table shows the pre-hospital services, their base, the hospital that provides them with blood components, the stock they carry and the main sites that trauma patients are taken.

Service	Based at	Contact Details	Group (RBC)	No. RBCs	Group (FFP)	Blood provided by	Patients taken to (Main / MTCs in bold)
Kent, Surrey, and Sussex Air Ambulance	Redhill Aerodrome (Surrey) Rochester Airport (Kent)	01634 471900	O-/O+		A (+ Lyoplas)	East Kent Trust (William Harvey Hospital) & East Surrey Redhill in partnership	King's College Hospital (London) (MTC) Royal Sussex County Hospital (Brighton) (MTC) St George's Hospital (Tooting) (MTC) The Royal London Hospital (Whitechapel) (MTC) Southampton General Hospital (Hampshire) St. Richard's Hospital (Chichester) Worthing Hospital (Worthing) Eastbourne District General Hospital (Eastbourne) Conquest Hospital (Hastings)
Cornwall Air Ambulance	Trevithick Downs, Newquay	01637 889926	O-/O+	4	A	Royal Cornwall NHS Trust	Royal Cornwall Hospital, Truro University Hospitals Plymouth, Derriford (MTC) Bristol Children's Hospital (MTC)
Devon Air Ambulance	Exeter Airport Eaglescott Airfield, North Devon	01392 466666	-----			<i>TBC - blood not currently on-board air ambulance</i>	Royal Devon University Hospitals, Exeter University Hospitals Plymouth, Derriford (MTC)
Dorset & Somerset Air Ambulance	Henstridge Airfield	01823 669604	O-/O+	4	A	Dorset County Hospital	Southmead Hospital (Bristol) (MTC) University Hospital, Southampton Derriford Hospital, Plymouth (MTC) Bristol Children's Hospital (MTC) Morrison Hospital, Swansea (Burns Unit)

East Anglian Air Ambulance	Norwich Airport Cambridge Airport	03450 669 999	O-	4	Lyoplas	Cambridge University Hospitals, Addenbrookes	Cambridge University Hospital, Addenbrooke's (MTC) Norfolk and Norwich University Hospital Ipswich Hospital James Paget University Hospital, Gorleston West Suffolk Hospital Cambridge University Hospital, Royal Papworth Queen Elizabeth Hospital, King's Lynn Lister Hospital, Stevenage Bedford Hospital Broomfield Hospital, Chelmsford Peterborough City Hospital
Essex and Herts Air Ambulance	North Weald Airfield Earls Colne Airfield	0345 2417 690	O-/O+	4	A (+ Lyoplas)	Princess Alexandra Hospital	Cambridge University Hospital, Addenbrooke's (MTC) St Mary's Hospital London (MTC) Royal London Hospital (MTC) Basildon Hospital Broomfield Hospital, Chelmsford Queens Hospital, Romford
Great Western Air Ambulance	Almondsbury (Bristol)	0303 444 4999	O-	4	A	Southmead Hospital, Bristol	Southmead Hospital (Bristol) (MTC) University Hospital Cardiff Bristol Royal Infirmary / Bristol Heart Institute Gloucestershire Royal Hospital Bristol Children's Hospital (MTC) Royal United Hospital (RUH)

Hampshire and Isle of Wight Air Ambulance	Southampton Airport	023 8074 3510	O-/O+	4	A	Southampton	University Hospital Southampton (MTC) Portsmouth's Queen Alexandra Hospital Isle of Wight's St. Mary's Hospital Basingstoke and North Hampshire Hospital
Lincs and Notts Air Ambulance	HEMS Way (Lincoln)	01522 548 469	O+	4	A	Lincoln County (Supported by QMC Notts for Plasma use)	Queen's Medical Centre (Nottingham) (MTC) Hull Royal Infirmary Sheffield Northern General Hospital Lincoln County Hospital Addenbrookes Sheffield Children's Hospital
London Air Ambulance	Royal London Hospital (Whitechapel)	020 7220 5470	O-			Barts Health (Royal London Hospital)	Royal London Hospital (MTC) St Mary's Hospital (MTC) King's College Hospital (MTC) St George's Hospital (MTC)
Magpas (E of E) Air Ambulance	Alconbury Weald (Huntingdon)	01480 371060	O-	2	Lyoplas	Addenbrookes	Cambridge University Hospital, Addenbrooke's (MTC) Royal Papworth Hospital
Great North Air Ambulance	Progress House, Urray Nook Rd, Stockton-on-Tees, TS16 0QB	01325 487263	O-	2	A	RVI (Newcastle Hospitals)	Royal Victoria Infirmary (RVI) Newcastle (MTC) Royal Preston Hospital (MTC) James Cook University Hospital, Middlesbrough

North West Air Ambulance	Blackpool Airport Barton Airfield	0800 587 4570	O-/O+	4	A	Salford Royal Hospital	Salford Royal Hospital (Greater Manchester) (MTC) Royal Preston Hospital (MTC) (Lancashire) Aintree University Hospital (Merseyside) (MTC) Manchester Royal Infirmary (MRI) (Greater Manchester) (MTC) Royal Blackburn Teaching Hospital (Lancashire) Royal Manchester Children's Hospital (Greater Manchester) Alder Hey Children's Hospital (Merseyside) Whiston Hospital (Merseyside) Blackpool Victoria Hospital (Lancashire)
Yorkshire Air Ambulance	Nostell Priory & Topcliffe	01422 237900	O-	2	n/a	Mid Yorkshire NHS Trust (Pinderfields Hospital)	Leeds General Infirmary (Leeds) (MTC) Hull Royal Infirmary (Hull) Northern General Hospital (Sheffield) James Cook University Hospital (Middlesbrough) Pinderfields Hospital (Wakefield) Huddersfield Royal Infirmary (Huddersfield) York Hospital (York)
Wiltshire and Bath Air Ambulance	Outmarsh (Semington)	01225 300536	O-/O+	4	Lyoplas only	Southmead Hospital, Bristol	Southmead Hospital, Bristol (MTC) University Hospital, Southampton (MTC) Oxford University Hospital (MTC) Royal United Hospital, Bath Great Western Hospital, Swindon Salisbury District Hospital, Salisbury

Midlands Air Ambulance	Shifnal (HQ), Tatenhill, & Strensham	0800 840 2040	O-	2	A	QE - Birmingham (? UHCW)	Queen Elizabeth Hospital Birmingham (MTC) Royal Stoke University Hospital, Staffordshire (MTC) University Hospital Coventry & Warwickshire (MTC) Birmingham Children's Hospital (MTC) New Cross Hospital, Wolverhampton
Thames Valley Air Ambulance	RAF Benson	0300 999 0135	O-	2	A	Oxford University Hospitals (John Radcliffe)	Oxford University Hospitals (JR) (MTC) Southampton University Hospitals (MTC) Royal Berkshire Hospital (Reading) Stoke Mandeville Hospital (Aylesbury) Wexham Park Hospital (Slough) Milton Keynes University Hospital (Milton Keynes) Harefield Hospital
The Air Ambulance Service (TAAS) includes Warwickshire & Northamptonshire Air Ambulance (WNAA), the Derbyshire, Leicestershire & Rutland Air Ambulance (DLRAA)	Heli 53 @coventry airport Heli 54 @ Nottingham heliport	0300 3045 999	O-		A	Queens Medical Centre (Nottingham) Coventry	University Hospital Coventry & Warwickshire (UHCW) (MTC) Queen's Medical Centre (QMC), Nottingham (MTC) Queen Elizabeth Hospital (QEH), Birmingham (MTC) Sheffield Northern General Hospital John Radcliffe Hospital, Oxford (MTC)

Indication for PHPT samples

A pre-hospital blood transfusion is indicated in patients showing signs of severe haemorrhagic shock^(4, 9, 11-14). Diagnosis of this is from clinical assessment based on factors including history, mechanism of injury, physiology, response to resuscitative efforts (e.g. lack of response to fluid given by other pre-hospital providers).⁽¹⁾ Massive Haemorrhage Protocol / Code Red activation criteria warrant transfusion. Taking a PHPT sample is important to establish the patient's blood group and can ensure speedy supply of group specific or cross matched units at the receiving hospital. The absence of a pre-transfusion sample may delay determination of the patient's ABO/D group and could potentially lead to the interpretation of an incorrect ABO/D group due to circulating donor cells. The delay in ABO/D group determination has wider implications for potential solid organ donation recipients and the supply of universal (i.e., group O) blood.

Taking PHPT samples

Pre-hospital samples should only be collected by pre-hospital teams when managing a single patient. In incidents involving multiple casualties, there is an increased risk of sample misidentification or mix-ups.

A pre-transfusion sample should be taken before transfusion of any components is undertaken, ideally at the point of gaining intravenous access.

The sample should be drawn from a peripheral vein, through an unflushed cannula, by a femoral stab or via intraosseous access. Ideally 6mL EDTA sample (pink or purple top) should be taken and hand labelled with a pre-hospital identifier (on address line of sample label - see figure 1 (3)) at the time of phlebotomy. On arrival to the Emergency Department (ED), the person who took the sample must complete labelling the sample using the local hospital's trauma identifier system. This cannot be assigned to someone else.

Manual labelling of PHPT samples

Assurance of the identity of who the pre-hospital sample has been taken from is of paramount importance. It is recognised that in almost all cases HEMS teams will only be treating and conveying one code red patient at a time. Equally, clinical demands on the scene may make physical labelling of samples challenging. As such, although labelling samples on scene at the time of taking is recommended, it is accepted that the HEMS team will label the sample at an appropriate time but before it is handed over to the receiving team in hospital.

Where possible the sample must immediately be labelled with a unique HEMS identifier (on address line of sample labelled 3 in figure 1) be signed, dated, and timed at the time of phlebotomy. The sample should be kept with the patient in a sample bag at all times.

In ED after a trauma name ID band is given to the patient, the person who collected the sample, must complete the labelling of the PHPT sample with the hospital's trauma name & MRN from the ID band, perceived gender / sex and age.

The request form should clearly identify this is a PHPT sample and should include number and type (O positive / O Negative) of RBC transfused pre-hospital, this is important for traceability, see example of request form in appendix 1. It should be clear on the request form which HEMS service has taken the sample as some hospitals receive patients from multiple services.

The sample and request form should then be placed into the clinical sample bag, sealed and handed to the ED clinical team to send for group and screen with instructions to send the sample to the laboratory immediately for processing.

Recommendation 1: Action for HEMS:

A pre-transfusion sample should be taken at the point of insertion of intravenous access before transfusion of any components. Labelling will ideally occur on scene at the point of being taken but must occur prior to the sample hand over to ED staff.

If more than 4 units of blood is likely to be transfused, a second sample should ideally be taken from the patient as early as possible and clearly identified as sample 2 to enable laboratory staff to interpret mixed field results. Once a patient has been transfused ≥ 4 units, it may not be possible to see mixed field results on subsequent samples taken in ED and this will delay the identification of the patient's ABO / D group.

Recommendation 2: Action for HEMS:

Ideally a second sample should be taken if ≥ 4 units of blood are given or expected to be given in the pre-hospital setting. This should be clearly labelled sample 2 by the person taking the sample.

Pre-hospital teams who take patients to 1-2 hospitals only, if possible, should obtain and carry patient identifier packs provided by the relevant local organisation. These may be pre-registered on the patient administration systems at local major trauma centre, or other hospitals that may receive the patients. Agreements between organisations regarding labelling and receipt of samples are critical to reduce the risk of sample rejection when the patient is admitted.

Recommendation 3: Action for HEMS and Transfusion Laboratory Management:

Where pre-hospital samples are hand-written there should be a local agreement between pre-hospital sites for a standardised request form to accompany the samples.

Recommendation 4: Action for Transfusion Laboratory Management:

Organisations that supply blood to HEMS, and their associated organisations (as shown in table 3) should ensure that agreements are in place for pre-hospital sample labelling and acceptance/rejection.

Recommendation 5: Action for HEMS and Transfusion Laboratory Management:

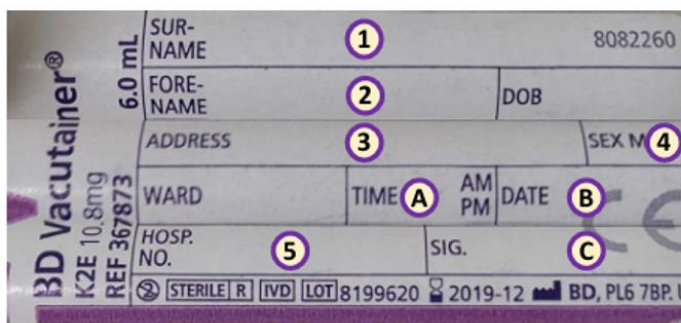
The guidance for pre-hospital sample labelling criteria should be included in the SLA for blood component provision. Local ED staff must be made aware of these samples and the importance of sending them ASAP to the transfusion laboratory without any modifications or alterations made by ED staff.

Recommendation 6: Action for Major Trauma Centres:

Pre-registered trauma/unknown patient packs should be provided to HEMS by the major trauma centre (or hospital most likely to receive the patient) when possible. These should include ID bands.

Figure 1- Labelling of PHPT samples

Use of the address line (3) is recommended to document unique patient ID e.g., ID number from 999 call.



	Key
1	Trauma Name (Surname)
2	Trauma Name (First)
3	Unique identifier for 999 call
4	Perceived gender/sex
5	Hospital MRN
A	Time of blood draw
B	Date of blood draw
C	Signature of person who drew blood and labelled sample

Pre-transfusion sample – Electronic method

If electronic systems are available and the pre-hospital team has ID bands and unique identifiers available at scene these can be utilised to avoid hand labelling issues.

The electronic label will include the wristband points of ID, staff identifier, date, time and signature and a request form may not be required.



Recommendation 7: Action for HEMS and Transfusion Laboratory Management:

Where electronic systems are available, pre-hospital teams should carry an appropriate scanner (e.g., PDA) and printer. Electronically print the label and apply to the sample at the point of venesection. There should be local agreements for sample acceptance without a request form.

Concessionary release

Samples are only taken by pre-hospital teams when they are dealing with a single patient in extreme situations. Therefore, if the sample is not dated/timed/signed or has expired, it is acceptable to process the sample under concessionary release. **Local ED staff must be made aware of these samples and the importance of sending them ASAP to the transfusion laboratory without any modifications or alterations by ED staff.**

Recommendation 8: Action for Transfusion Laboratory Management:

Procedures should be in place for pre-hospital sample acceptance under concessionary release where routine acceptance criteria are not met.

Recommendation 9: Action for HEMS:

Sample taking and labelling must be included as mandatory in all pre-hospital transfusion training and competency assessment packages for induction and refresher updates.

Recommendation 10: Action for HEMS and Transfusion Laboratory Management:

PHPT sampling must be included in pre-hospital key performance indicators (KPIs) and audits or surveys of MTCs.

Transfusion laboratories

It is important that transfusion laboratory staff and HEMS teams work together to implement a sample process that is safe and efficient meeting the needs of both services.

It is imperative that laboratories accept pre-hospital samples and have a documented procedure including concessionary release process for lack of date /time/stamp. If there is no date/time on request or sample, it is acceptable to backdate to midnight of the date of receipt of sample in the laboratory.

Laboratories may need to work with surrounding hospitals that might receive patients from the pre-hospital service to ensure samples can be accepted at the receiving hospital. Especially if samples are labelled with a unique identifier from the hospital providing the blood on board.

Recommendation 11: Action for HEMS and Transfusion Laboratory Management:

Mechanisms should be in place to monitor compliance with pre-hospital sample labelling, with incident reporting and appropriate improvement actions where gaps are identified.

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Appendix 1: Request Form

Example of a request form is shown below to enable PHPT samples to be easily recognised nationally.

PRE-HOSPITAL PRE-TRANSFUSION SAMPLE REQUEST FORM			
Patient and Sample Details		Treatment and Clinical Details (if available)	
Surname (if available)	First name (if available)	Tranexamic Acid Dose ☐	Time
D.O.B (if available)	Hospital / MTC MRN	O D negative ☐	O D positive ☐
Gender Male ☐ Female ☐	Unique Identifier from HEMS	Number of units / mls Time	Number of units/mls Time
HEMS Treating Team (insert name)		Lyoplas ☐	Pre thawed FFP ☐
Clinical history		Number of units / mls Time	Number of units/mls Time
		Is patient taking any medications Antiplatelets ☐ DOAC ☐ LMWH ☐ Warfarin ☐	Reversal Administered PCC ☐ Dose Time
Sample Collector (print name)		Female patients only Not pregnant ☐ Pregnant ☐ Pregnant in last 3 months ☐ Pregnancy status unknown ☐	
Signature		Date /Time	
		Previous Transfusion History / under care of Specialty Team? - Yes ☐ state which teams(s) No ☐	
I confirm that the patient ID and this request form has been checked with patient verbally &/or their wristband and that the sample has been labelled in the presence of the patient 6mls EDTA blood sample in pink or purple topped tube required in patient >4months of age ERRORS IN PATIENT AND SAMPLE IDENTITY CAN RESULT IN FATALITY			
Lab use	Sample Receipt Date	Laboratory number	Blood group
	Time		

Appendix 2 Notification of Transfusion

Example of information sent by pre-hospital team to BT laboratory where blood sourced from

TVAA have given blood:

Date: **30/07/2026**
Time: **23:36**
TVAA call sign: **ND026**
TVAA Doctor: **, (SJW)**
TVAA Job ID: **024103**
TVAA Patient ID: **015582**
SCAS CAD No: **2585**

Blood product unit number(s):

plasma **G052526748296X**
blood **G0525263684627**
plasma **G052526369010A**
blood **G052526356975L**
plasma **G052526748722T**

Patient Details:

Patient name:
Patient DOB:
Hospital:

Appendix 3 - PRE-HOSPITAL PRE-TRANSFUSION (PHPT) POSTER

TAKE THE SAMPLE BEFORE BLOOD TRANSFUSION

Every PHPT sample helps:

-  Improve pre-hospital to hospital integration
-  Enable earlier laboratory testing
-  Support safer transfusion practice
-  Facilitate earlier group-specific transfusion

Conserve scarce emergency Group O blood



BEFORE TRANSFUSION

-  Obtain Group & Screen sample before first blood component
-  Use approved sampling tube

SAMPLE LABELLING

-  Label on scene (recommended), or as soon as clinically feasible
-  Include patient identifiers
-  Clearly mark: "**PHPT SAMPLE**"
-  Ensure sample travels with patient

DOCUMENT & COMMUNICATE

-  Document blood components administered
-  Inform receiving clinical team
-  Inform transfusion laboratory
-  Complete traceability documentation

KEY MESSAGE: Take the sample before the blood whenever feasible