A proposed field emergency donor panel questionnaire and triage tool

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BACKGROUND: The provision of transfusion support to isolated military or civilian projects may require the use of an emergency donor panel (EDP) for immediate warm fresh whole blood (WFWB). The aim of this short discussion article is to raise and resolve some of the practical aspects for the nonspecialist faced with the emergency collection of WFWB whole blood in the austere medical environment (AME).

METHODS AND RESULTS: A proposed field EDP questionnaire and triage tool (QTT) is presented. It is designed for the hostile, remote, or austere environment that falls outside normal regulated supply of cold-stored blood products or removed from trained blood collection personnel, where collection may fall to an isolated medical provider. The tool has been drafted based on review of existing guidelines and consultation with practitioners. It serves as a point of reference for local guidelines and has yet to be validated.

CONCLUSIONS: The use of the EDP is associated with risk; however, it remains the simplest method of providing rapid transfusion support. The best way to manage the risk is to brief and prescreen blood donors before deployment. An abbreviated donor QTT can be an aide to decision making at the time of donation. The tool should be tailored to requirements and underpinned by policy and training.

Massive hemorrhage is a medical emergency and an immediate threat to life. The resuscitation of patients with massive hemorrhage requires the early use of transfusion support. Military and civilian guidelines promote the use of transfusion strategies that recapitulate the functionality of whole blood (so-called "balanced transfusion") for both trauma and nontraumatic hemorrhage such as bleeding associated with childbirth and gastrointestinal bleeding.[1-4] Whole blood or blood components may not be available in a situation where they are required urgently. Team members and supporting staff may be asked to donate whole

ABBREVIATIONS: AME = austere medical environment; EDP = emergency donor panel; FWB = fresh whole blood; PoCT = point-of-care testing; QTT(s) = questionnaire and triage tool(s); WFWB = warm fresh whole blood.

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blood or collect blood from an otherwise uncharacterized donor pool. Cordova and colleagues[5] graphically describe such an event where 5 units of fresh whole blood (FWB) were transfused following a 12-hour battle during which building fires threatened the isolated aid station.

The context of this article is access to blood for isolated military or civilian projects with extended lines of supply or limited logistical support, that is, the austere medical environment (AME). Examples include military special operations, humanitarian missions, remote islands or industry, the cruise industry, and scientific exploration. The medical planning for remote activity should consider the requirements for resuscitation including transfusion support. If medical evacuation is delayed or prolonged and there is no capacity to provide cold stored blood products, then the emergency use of FWB should be considered. Team members and staff should be prescreened according to national standards for blood donation (e.g., transfusion-transmitted disease testing, blood typing, hemolysis titer assessment) as members of an emergency donor panel (EDP). However, the emergency screening and management of unknown additional blood donors may also be required. Blood donation for the healthy individual is safe; however, there are risks.[1,6] There may be a challenge in balancing the safety and management of both critically ill patients and their blood donors. Careful donor screening and care is essential to optimize the safety for both. However, the context may not support a conventional donor assessment, and a more rapid or focused donor screen may be required. Relaxing donor acceptance criteria will introduce risk; the decision will ultimately be one of risk–benefit analysis. Risks may need to be further managed using "donor triage" and careful consideration of the need for transfusion. The aim of this short discussion article is to introduce a field EDP questionnaire and triage tool (QTT). The article also addresses some of the practical aspects for the nonspecialist faced with donor selection in the AME.

MATERIALS AND METHODS

Initiative

The initiative for this work follows the preconference exercise of the Remote Damage Control Resuscitation Symposium, which took place in Norway in June 2015. The work forms part of the "Blood Far Forward" program—a whole blood–based research and training program for austere environments. During training exercises, participants were required to rapidly assess several potential blood donors for emergency donation. Staff and participants identified that there was little guidance for the rapid assessment and triage of blood donors for the nonexpert.

Literature review

The following donor screening guidelines were reviewed.

- Military: US Special Operations Command, Tactical Trauma protocols (TTP) 2013,[7] and the Journal of Special Operations Medicine Training supplement 2012.[8] Standard operating procedures for the collection of whole blood, Centre of Defence Pathology, UK.
- THOR guidance.[9]
- Civilian: UK Blood Transfusion Services,[10] American Association of Blood Banks (AABB),[11] and the World health Organization (WHO).[12]

  Literature searches: A search was performed of PubMed and CINAHL using the search terms: *emergency donor panels, collection of whole blood, austere medical environment,* and *special forces medicine*. The search covered articles published up until September 2015.

Development

The field EDP QTTs were developed on the basis of experience gained through responding to military and civilian events. Members of the multinational exercise group were invited to comment on the feasibility of applying the tools.

Scope

The scope of this article is to provide guidance for operational teams supporting the critically ill patient when working in an AME. The technical aspects of blood collection are outside the scope of this paper but are well covered in previously published reviews[9] and the Special Operations Command, Tactical Trauma protocols. Readers are also referred to national guidelines for full donor selection and their own standard operating procedures for emergency procedures.

PROPOSED FIELD EDP QTT

The proposed field emergency donor panel QTT is shown in Fig. 1. The safest donors for warm FWB (WFWB) are members of a team that have been questioned, screened, and tested as conventional donors to national standards. Such donors may have donor cards or other proof of status. In the absence of preselected team members or the presence of other prequalified donors who can verify their status, the field EDP QTT may be used to help select the most appropriate donors from a mixed donor pool. Past donors are those that are not in date according to national norms for the mandated testing; however, they are preferred over unknown donors because they are familiar with the procedure and standards required.

Blood donor brief

The aim of the donor brief is to inform and identify potential donors. The donors can then be triaged into current,

Field Emergency Donor Panel Questionnaire and Triage Tool

- **Give blood donor briefing to potential donor group**
- **Confirm blood group(s) required**
- **Exclude air crew, HGV drivers and key machinery operators**

Primary Triage (Question as a group)

Serial	Question	Yes	No	Action
1	**Do you want to give blood?**			Disqualify if NO
2	**Have you given blood before**			If yes - Consider early selection

Secondary Triage (Question individually)

Serial	Question	Yes	No	Action
3	**Are you unwell now?** New Fever/ Diarrhea / Vomiting Chronic medical condition and not well			Disqualify if YES
4	**Are you taking medication for blood pressure; stroke or heart, lung, kidney, cancer or blood conditions?**			Disqualify if YES
5	**Have you had a blood transfusion or blood products in the last year**			Disqualify if YES Accept after 1 year
6	**Are you living with HEP B,C / HIV / AIDS – OR living with anyone with these conditions**			Disqualify if YES
7	**Have you ever been refused as a donor or told not to donate blood** (a past history of treated anemia may be acceptable)			Disqualify if YES
8	**Male donors only.** Have you **ever** had sex with another male?			Disqualify if YES
9	**Have you ever taken illegal drugs with a needle (even steroids)**			Disqualify if YES
11	**Are you currently pregnant or breast-feeding?**			Disqualify if YES
12	**Conduct a physical examination** **Check: Temperature / Rash / Malnutrition, / Pallor / Jaundice / Cyanosis / Shortness of breath / Intoxication from alcohol or drugs / Veins**			Disqualify any potentially unwell donor or donors with very difficult veins

- **The remaining group form the Emergency Donor Panel (EDP)**
- **Use the Risk Triage Screen to risk score the potential donors**

Fig. 1. Field EDP QTT.

past, and new donors. An initial group brief should cover the following:

- State that WFWB may be required;
- Outline the blood groups and amount of blood required;
- Explain the process;
- The importance of the health check;
- The tests that will be performed and that these might be positive;
- Donor deferral and confidentiality;
- Potential adverse donor reactions;
- Confirm that donors are volunteers and consented;
- Identify individuals who have previously given blood and those that are in date.

At this point, current and past donors, if previously accepted, can be directed for rapid assessment and donation if urgent. All donors must be well on the day of donation.

Risk Triage (Question Individually)

Score	Questions	Subtotal	Notes
	Blood donation history		
1	Regular Donor		Optimum
2	Previous Donor		
3	Non Donor		
	Veins and body weight		
1	Good lateral (outer) vein		Optimum
3	Poor or difficult vein		
3	Under 60 kg		Risk of fainting
	Infection		
1	> 21 Days Well		Optimum
3	< 21 Days Well		
	Travel		
1	No travel in the countries below in the last 6 months		Optimum
2	South America		
4	Asia and Africa		
	Life style:		
1	Sex with one partner		Optimum
3	Sex with multiple partners but protected		
-	Sex with a sex worker or in exchange for money/drugs		Avoid for 12 months
	Serious medical conditions		
1	None		Optimum
3	Past or present serious medical conditions but managed and well		
3	Untreated current medical conditions but well		
	TOTAL		

- **Add up score and record: Lowest score = Lowest Risk**
- **Use Point of Care Test for TTI's – Eliminate and counsel any positives**
- **Blood type donors and document results**

Fig. 1. Continued

The field EDP QTT

The QTT is a highly abbreviated version of a donor questionnaire. It is designed to be used after the group briefing for all donors. Donated blood should be safe and, in particular, should not put the patient at risk of infectious disease. The question set may need to be tailored to the situation. Some questions that are commonly asked such as those about tattoo may be nondiscriminatory because the behavior may be common to most or all donors. Likewise travel history may be nugatory in some communities. Questions related to sexual behavior may initially need to be simplified and then triage applied, that is, prepare to accept all donors but use them in order of lowest risk first. Infectious risk is commonly related to lifestyle and location. However, in many parts of the world infectious disease may have been acquired at birth or after medical treatment and individuals may not be aware and cannot declare the risk when questioned. The risk of transfusion-transmitted infection in screened blood donors in different countries may be estimated using published national data.

The QTT

The QTT is broken into three sections: primary triage, secondary triage, and risk triage. These three stages help to rapidly identify the individuals that may participate in the EDP and eliminate the individuals that may pose a relatively less acceptable risk to the transfusion recipient. The field EDP QTT is designed to assist and act as an aide memoire. It is not designed to replace clinical judgement and experience.

Primary triage

Primary triage identifies those who will consent to donation and those who may be regular donors who can be rapidly progressed through screening as the optimum candidates.

Secondary triage

Secondary triage seeks to disqualify candidates on the grounds of high risk to either donor or recipient on the grounds of current health, risk of disease, and pregnancy. It must be remembered that in extremes these candidates

may be considered for donation if no other donors exist, and while only the attending clinician can make this difficult decision they may also be able to obtain consent from the injured.

Risk triage

Risk triage seeks to quantify the remaining risk, giving a numerical value for the clinician to work with. It is an abbreviated field expedient questionnaire and serves only to guide and remind an isolated practitioner who will use this in conjunction with clinical experience and advice from telemedicine or other trusted sources. The numerical value is not an absolute value of risk involved, but merely an aid to quantifying the risk. The value is proportional to the risk, so the lower the score the lower the risk. There is no "cut point" of acceptable risk given the emergency setting of the potential transfusion; the scoring is thus relative.

The risk triage bases the scoring system on:

- Past blood donation history;
- Ease and safety of venipuncture;
- Lifestyle;
- Travel history;
- Veins and body weight;
- Occupation/role.

Individuals that are potentially suitable may be further triaged based on nationality and blood group if required.

Female donors

A number of the questions relate to female donors. Women tend to have greater iron demands and lower total blood volume and are more likely to faint especially if young and at first donation.[13] Women may also have smaller or more deeply set veins—factors that may make them less suitable donors in emergency situations where speed is of the essence. Pregnancy is associated with changes in blood volume, iron demand, and the development of white blood cell antibodies. Women should not donate when pregnant and are conventionally deferred for a period of time after pregnancy and while breastfeeding.

DISCUSSION

Transfusion support remains an important element of medical planning for individuals traveling or working remotely. The problems with transfusion support in the AME include availability, transfusion-transmitted diseases, accurate testing, and a secure cold chain. All efforts should be made to ensure *blood safety* through the appropriate sourcing, supply, and storage of blood. Transfusion support can be provided using stored blood components projected from the home nation or provided by specialized commercial companies or host nation support. However, blood is a logistically challenging materiel to manage and resupply especially where there is minimal medical infrastructure.

The advent of commercially available storage systems using phase change together with lightweight temperature monitoring devices permits storage for dislocated teams for extended periods of time.[14] However, it imposes a logistic and training burden. Alternative options include the use of fluids, dried plasma, and early evacuation. Where early evacuation is not an option, and blood is not available, medical planners should consider emergency whole blood donation as a resilience measure.[1] FWB offers the best physiological replacement fluid for major blood loss and the emergency collection of whole blood requires very little equipment.[15] The remote damage control resuscitation pack designed for blood donation described by Strandenes and coworkers[9] includes all of the materiel required for donation including point-of-care testing (PoCT). The pack weighs 780 g including freeze-dried plasma and a lactate analyzer.

Potential donor screening and consent

The key to safe blood is donor selection. A review of the literature demonstrated that there was very little published about the assessment of blood donors in the AME. The small numbers of teams undertaking EDPs appear to be using national donor questionnaires. The questionnaire takes time to deliver properly and may exclude a large number of potential donors. The challenge is a rapid assessment of donors to find the best available. Despite the emergency, we still advise that donors should be volunteers and give informed consent. A description of the process is important for planning purposes. It should be clear whether blood is to be taken immediately or whether donors are to remain on standby to be called forward as required.

The potential donors must also understand the purpose of the health check and the reason for screening. Caution must be exercised if language is a barrier and an interpreter is used. Potential donors are asked about confidential and sensitive aspects of their medical history and lifestyle. Not all donors define "sex" or "sexual contact" in the same way and local guidance may be required. Therefore, potential donors should be consented in a way which offers privacy to get an honest response. Donors should be assured that the information they provide will be kept confidential to the degree possible, recognizing that this may be challenging in isolated and small-group settings.

Untested donors and screeners should be aware that both screening and testing may reveal unexpected and unwelcome results. "Rejecting" individuals in a small and close community requires careful handling. Test results

may include both false and true "positives" and the donor may need psychological support if given unexpected news and in possession of firearms. It is recommended that potential donors consent for follow-up testing if required and that pretransfusion blood samples be retained for confirmatory testing if possible. Some countries may require all "bled" donors to have formal testing through either samples taken at the time of donation or samples taken on return to base. This is often not feasible due to tactical situations (ongoing combat, prolonged evacuation on multiple platforms, etc.) and it may be easier to follow-up the patients who have received emergency transfusion.

Abbreviated donor history questionnaires

The assessment of donor suitability aims to exclude donations from individuals at risk, particularly those who have recently acquired infections, which may not be detected by routine screening tests or with infections for which no effective screening is available. Certain behaviors have been shown by surveillance data to be associated with a high risk of transmission of human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV). These include skin piercing, IV drug use, exposure to treatment with blood and blood products, and unprotected sex especially with individuals in high-risk groups. High-risk groups include men who have sex with men and sex workers.

Donor history questionnaires are designed to identify risk and must be comprehensive. However, they need to be pertinent to the country and context. Questionnaires are constantly evolving and abbreviated questionnaires have been introduced by a number of blood transfusion services. Abbreviated questionnaires are designed to speed up the process but are used for known or repeat donors. An excellent civilian example of this is analysis of the Food and Drug Administration–approved 34-question abbreviated donor history questionnaire implemented in 2003 for repeat blood donors.[16] The travel, medication, and health history questions were decreased by 18 questions. Data were analyzed from more than 50,000 donations and showed that there was no significant difference in reactive screening and/or confirmatory tests. However, these results cannot readily be extrapolated to new donors. New donors may have to be accepted at risk in the AME with limited assessment tools.

Donor safety and performance

Blood donation should be a safe procedure in the healthy donor. The donor assessment not only enables a review of the donor's medical history but also provides an opportunity for a very basic health check, especially in unscreened individuals.

Physical assessment

Many countries do not include a physical assessment; however, it may add value in the context of a rapid questionnaire. Physical assessment on screening and before donation should look for clinical signs to exclude current infection, severe anemia, significant disease and intoxication such as temperature, rash, malnutrition, pallor, jaundice, cyanosis, shortness of breath, and intoxication from alcohol or drugs. The venipuncture site should be checked to see that the donor's veins are accessible and suitable for easy venipuncture.

It is essential that commanders have confidence that the operational performance of donors will not be compromised. Strandenes and coworkers[17] have demonstrated that the combat readiness skills of Special Forces soldiers are maintained immediately after donation of a single unit of whole blood. Despite this, caution must be applied to the use of certain occupational groups as donors. Avoid the use of donors operating key machinery or those responsible for transporting others. Do not bleed aircrew. Generally aircrew personnel should not fly within 4 days after blood donation. Flight personnel in combat or performing shipboard duties should not donate blood for 4 weeks before flying.

The impact of blood donation may be greater on less healthy individuals especially those with a smaller body mass and malnutrition. Blood donation leads to loss of iron. After whole blood donation, donors are required to be excluded from further whole blood donation for up to 12 weeks to permit natural recovery of iron stores. However, this can be safely shortened if hemoglobin (Hb) screening is available. Recommended satisfactory donor's Hb levels are more than 12.5 g/dL for females and more than 13.5 g/dL for males. It should be noted that Hb may not adequately characterize donor iron status, although this may be the only available metric in the AME setting. Recognized complications of donation include fainting and venipuncture-associated complications. These can be mitigated by predeployment training, selection of donors, including veins, and good donor care.

Blood group selection

Blood group selection

Group O whole blood with low anti-A/B titers from prescreened donors should be used where the blood group of the recipient is unknown or there is uncertainty.[18] The values cited by Strandenes in this article from the THOR group were an anti-A and -B titer less than 100 for IgM and 400 for IgG type. However, there is no international definition of high-titer hemolysin. The use of ABO-identical or -compatible blood may need to be considered if demand for group O/low titer exceeds supply or if no donors have been prescreened. The preferred nationality of donors may also be specified. The use of a

multinational donor panel is a policy decision based on preagreed standards. There are scientific and practical reasons to select donors within national lines such as population disease prevalence and blood groups.

ABO group

The use of incompatible blood may result in a hemolytic transfusion reaction and cause serious harm. It is essential that the blood group of the donor is known. ABO grouping is conventionally performed twice on new donors. In addition, formal ABO testing consists of both a cell group and a plasma group. Blood may need to be given on the basis of a pretested donor blood group alone where technical support is not available to fully confirm the blood group. Most teams using EDPs are using a PoCT (e.g., Eldon card for ABO and D). It should be noted that PoCT will only provide a forward group or a cell group, although this is acceptable in this setting. It is therefore recommended that the results of locally determined ABO types are compared with known results where available. The results should be the same and the donor should not be used until the group is confirmed. An additional safety check is to test the collected unit itself to confirm labeling and reduce the risk of error. If the donor pool is extended to include donors of other ABO groups besides O, a practical approach is the use of group A blood for group A recipients and group O for all others. If a preprepared donor panel is used for a small team, a "blood-buddy" matrix of ABO- and D-compatible personnel for small groups may be considered.[19]

D group

The distribution of blood groups varies between populations and may affect the choice of blood donors. Garcia Hejl and colleagues[20] observed that blood type frequencies in their "potential walking blood bank" were similar to those observed in European or American countries. However, they noted a low frequency of B blood group and D– in the "potential walking blood bank." Conventionally, D– blood can be used for all patients; however, it is often in short supply. The use of D– blood may need to be prioritized for females of childbearing potential (under the age of 50).

Disease screening

The risks to the patient associated with the emergency collection of FWB include blood group error and the risk of transfusion-transmitted disease and a rare risk of transfusion associated graft-versus-host disease. The risk of transfusion-transmitted disease is dependent on the prevalence of baseline blood-borne disease in the donor population and the risks associated with the location, such as malaria. In addition, donors should notify of any adverse events of illness within a 14-day period after donation. However, this may be impossible in the context of independent movement of donors, patients, and staff. Risks can be mitigated by vaccination, prophylaxis, vector exposure control, and similar measures but may have to be tolerated. Consideration should be given to follow-up of patients who have received emergency blood.

Prescreened donors are the safest donors in that they have been screened based on national donor selection guidelines and testing. WHO guidelines advise that all blood components should be fully screened to standards by an accredited blood service wherever possible. Mandatory tests include ABO and D blood group and tests for HIV, HBV, HCV, and syphilis. Positive screening results should ideally be forwarded to a specialist reference laboratory for confirmatory testing. PoCT may be used to screen locally collected units before release. However, the PoCT should be selected with the appropriate sensitivity and specificity for blood donation rather than disease screening.

Some organizations may also choose to take blood samples at the time of donation for later definitive testing. Samples must be packed and transported in IATA 650 packaging; most samples for confirmatory testing must be received within 5 days of sampling. Samples that cannot be tested within in this timeline should be separated and the plasma frozen until transport is available.

Training and recordkeeping

Training

Medical providers who anticipate the emergency collection of whole blood should consider the training of personnel. Personnel should know how to conduct an emergency donor session, store, issue, and account for any blood donated. Training should also address the indications for the collection of blood and the administration of blood. Transfusion training should be incorporated into predeployment training and include practical sessions in a high-fidelity environment. Strandenes and coworkers[21] demonstrated that nonmedic soldiers had a 100% success rate in both blood collection and blood reinfusion on fellow soldiers after a short introduction to the procedures.

Recordkeeping

National and international guidance requires a record of all blood donated and used. The standard of recordkeeping may be a simple entry in the field medical notes. The advantage of using a properly designed donor or resuscitation pack is that it should contain the paperwork for donation. Recordkeeping is designed to permit recall of donors and lookback exercises in the event of donors or patients found to have viral markers. Source tracing of infection across international boundaries and organizations may be challenging and consideration should be given to a local Point of Contact who would be responsible

for any donor follow-up. All procedures and the associated records related to the conduct of a field collection should be completed at the time of donation. It is recommended that the fate of all donations is recorded, both transfused and discarded. The use of EDP blood should also be recorded in the clinical notes and included in the handover.

DISCLAIMER

The discussion included in this article does not override the responsibility of health care professionals overseeing emergency donor programs to provide direction and training appropriate to the operational situation. All activities related to blood transfusion should be subject to appropriate legislation, quality, and clinical governance regulations. It is also advised that there is policy or authority for the use of emergency blood donation.

CONCLUSIONS

The use of the field EDP QTT is associated with risk; however, it remains the simplest local method of providing rapid transfusion support. The biggest risks are those associated with ABO mismatch and infection. It is very difficult to produce a satisfactory generic abbreviated donor history questionnaire. The best way to manage the risk of donation is to brief and prescreen donors before overseas travel. An abbreviated donor questionnaire can then be used to rapidly screen donors when required. Where donor selection is applied to a number of donors including untested donors, then a triage approach to donor management is recommended.

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CONFLICT OF INTEREST

The authors have disclosed no conflicts of interest.

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