National Blood Transfusion Committee

20 October 2020

Appropriate Specification for Emergency Red Cells

Executive Summary:

O D negative red cells are a precious resource and the demand on the supply chain continues to increase. Emergency blood provision is for life threatening situations to enable the patient to survive and avoid exsanguination, without serious ABO incompatibility consequences. To protect national O D negative red cell stocks for patients who really need them the National Transfusion Laboratory Managers (NTLM's) group recommend the following:

Males: Use O D Positive red cells

Women >51 years of age: Use O D Positive red cells

Women and children: Use O D negative, K negative red cells (CMV- to be considered only in the maternity setting)

Please review your current ordering practice against the information below and national guidelines.

Background Information

It is well recognised that in certain situations, it is essential to give a red cell transfusion prior to completion of compatibility testing. The red cell units used in these circumstances are usually called 'emergency stock'

The transfusion of emergency stock is not without risk and should only be undertaken in extreme clinical situations.

Traditionally group O D negative red cells have been used as emergency stock, as this was considered to be of the least risk. Group O makes the units suitable for all and using D negative will mean that patients would not be sensitised to the D antigen.

The demand for O D negative red cells has increased over time, and this has led to a change in recommendations for what red cells should be used as emergency stock to avoid demand outstripping supply.

The Use of O D positive

The D negative units have been traditionally used to prevent sensitisation to the D antigen, this is especially important in female patients with childbearing potential as anti-D has the potential to cause Haemolytic Disease of the Fetus and Newborn (HDFN).

However, female patients with childbearing potential make up less than 40% of the typical patients who may require emergency stock. For patient's outside this group, the use of O D positive red cells are of no greater risk and as such should be used whenever possible.

Specification of O D negative

For female patients with childbearing potential, or if it is not possible to ascertain the gender of the patient, the safest red cells to use are O D negative.

However, not all O D negative units are the same and the specification of the units requested varies considerably, so what specification is required?

Looking at options

Group O If you don't know the group of the patient you will have to use group O

D type For females with childbearing potential, you will need to use D negative as you want to avoid sensitisation to the D antigen and potential risk of HDFN

K type For females with childbearing potential, you will need to use K negative to avoid sensitisation to the K antigen (up to 90% of patients will be K negative). Again, this is to reduce the potential risk of HDFN.

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The ideal specification for emergency stock for females with childbearing potential is **O D negative, K negative**

Other regularly requested options:

CMV negative This may be required, but only for Pregnant patients and young children. Consider how many emergency units are given to this type of patient. If this is very low volumes (may be less than 5% in some hospitals) consider only giving CMV negative emergency stock to those who require it, and not all patients.

HbS negative Sickle cell trait donors are eligible to donate but the proportion of units in the UK which are HbS positive is low. Transfusing red cells which contain HbS is only a potential issue if multiple units are transfused at the same time, when the percentage of HbS may become high enough to interfere with oxygen carrying capacity. It is not recommended to request HbS negative units for emergency stock.

S negative NHSBT receive many requests for emergency stock units to be S negative. It is unclear as to why this is as only approximately 45% of the UK population is S negative, and although the antibody can cause HDFN it is unclear why S is being specified above other antigens like Jk(a) etc. It may be that there is some confusion and the staff member is intending to order HbS negative units but order S negative in error. Neither S negative or HbS negative are a requirement for emergency blood.

Irradiated It is recognised that approximately 3% of all patients require irradiated blood. However, the percentage of patient's requiring irradiated blood in an emergency is extremely small. The overwhelming majority of patient's requiring emergency blood will not require irradiated components. Receiving a large volume of irradiated units quickly as may be seen in a massive haemorrhage could potentially contribute to the development of hyperkalaemia. Chowdhury et al reported such a case in 2017. The BSH

guidelines on the use of irradiated blood components (2020) recommend avoiding using irradiated blood for patients undergoing massive haemorrhage unless otherwise indicated. The risk of receiving a non-irradiated unit is genuine but it should be noted that each year a number of patients who require irradiated units receive non-irradiated products and yet few cases of Transfusion associated GvHD are reported. The BSH guidelines on the use of irradiated components recommend not delaying transfusion of components in an emergency situation if no irradiated components are available and the patient requires irradiated components.

Should units be cde/cde?

The majority of O D neg donors will be rr. However approximately 1.7% will express the E or C antigen. By requesting only rr the remaining units are more likely to be wasted in the supply chain. There is no serological data to support the requesting of rr units for emergency stock and much of this practice is a historical habit. In reality if we were to be concerned about the extended Rh phenotype and the possibility of sensitising a patient then we should be doing this for all patient's not just those receiving emergency stock.

'Fresh Units'

NHSBT use a system of First In, First Out to aid with stock management, which means that the oldest units are sent out to hospitals first to avoid wastage. Review of ordering practice has shown that many hospital blood banks order fresh units for emergency blood, with some asking for units as fresh as <3 or 7 days old. Units for emergency use do not need to be 'fresh'. There are several studies including the ABLE study (Walsh et al, 2017), that demonstrates fresher blood does not lead to better outcomes. There are only a handful of clinical indications for fresh blood.

This practice is often because hospital blood banks will want to ensure that emergency units not used in a satellite location have a long enough expiry dates to be used upon rotation and not to expire in stock. We advise not

requesting anything fresher than 14 days old for emergency blood and reviewing practice to ensure stock rotation occurs frequently enough to avoid wastage. Where fresh units are requested due to low transfusion frequency please consider if you can develop a stock sharing agreement with a high user. Unnecessary demand for fresh units exacerbates the challenges of managing O D negative supplies.

Summary:

As with all stock management/transfusion issues – we are trying to do the best for the patient, however we must also consider the impact on national supply and the possible resulting effect to other patients in need of this limited resource. If there is national shortage of O D negative red cells, it will affect all of us. Working together to best practise guidelines will protect the supply chain, conserving adequate stock when patients need it. Laboratories should critically look at their own ordering practices and consider if they can help the transfusion community overall to ensure we are making the best use of the precious resources we have.

Julie Staves and Kerry Dowling on behalf of the National Transfusion Laboratory Managers working group of the NBTC.

References:

Chowdhury, F., Regan, F., Robertson, B. (2017) Hyperkalaemia associated cardiac arrest in paediatric trauma case. Transfusion Medicine, 27, (Suppl. 2), S67.

BSH Guidelines on the use of irradiated blood components (2020)

NBTC Appropriate use of group O D negative red cells

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