POLICY POL230/7

Donor Lung Distribution and Allocation

This Policy replaces POL230/6	**Copy Number**
	Effective **23/06/17**

Summary of Significant Changes

Change to offering process (Section 9) to describe new procedure of simultaneously offering to all centres for non-urgent patients for any organ not accepted during super-urgent and urgent offering. This change is being implemented to shorten the length of the offering process whilst maintaining agreement with the allocation prioritisation described herein.

Policy

This policy has been created by the Cardiothoracic Advisory Group (CTAG) on behalf of NHSBT.

The policy has been considered and approved by the Transplant Policy Review Committee (TPRC), which acts on behalf of the NHSBT Board, and which will be responsible for annual review of the guidance herein.

Last updated: April 2017
Approved by TPRC: April 2017

The aim of this document is to provide a guideline for the acceptance and allocation of donor lungs to adult and paediatric patients on the UK transplant list. These criteria apply to all recipients of organs from deceased donors.

In the interests of equity and justice all centres should work to the same allocation criteria. Non-compliance to these guidelines will be handled directly by NHSBT, in accordance with http://www.odt.nhs.uk/pdf/non_compliance_with_selection_and_allocation_policies.pdf*: NHS Blood and Transplant Organ Donation and Transplantation: Policy on Non-compliance with Selection and Allocation policies.*

It is acknowledged that these guidelines will require regular review and refreshment. Where they do not cover specific individual cases, mechanisms are in place for the allocation of organs in exceptional cases that ensure equity and fairness.

The guidance in this document describes how lungs donated by deceased donors are allocated.

1. Policy Overview

1.1 Rationale

The rationale of the allocation system is to provide a transparent allocation process for lungs from deceased donors that balances the need to reduce mortality on the waiting list with the need to match donor lungs with recipients to provide the best outcome for all listed patients.

1.2 Basis of Allocation

There are three tiers of allocation; the Super-Urgent Lung Allocation Scheme (SULAS), the Urgent Lung Allocation Scheme (ULAS) and the Non-Urgent Lung Allocation Scheme (NULAS). Selection criteria for these three schemes are documented in *http://www.odt.nhs.uk/pdf/lung_selection_policy.pdf: Lung Candidate Selection Criteria.* Lungs are

allocated to individual named patients on a national basis for those on the super-urgent and urgent lists. For patients on the non-urgent list, lungs are allocated on a centre basis for local allocation.

1.3 Patient Criteria

Patients meeting criteria for transplantation with organs from deceased donors must be registered with NHS Blood and Transplant. Selection criteria for lung transplantation are detailed in *http://www.odt.nhs.uk/pdf/lung_selection_policy.pdf: Lung Candidate Selection Criteria*. The person requesting registration is accountable for the accuracy of the information provided. NHSBT will ensure that patients meet registration criteria and refer back those where the criteria are not met.

1.4 Transplant Centres

There are six licensed lung transplant centres in the UK: Birmingham, Great Ormond Street Hospital, Harefield, Manchester, Newcastle and Papworth. Newcastle transplant adult and paediatric patients, and Great Ormond Street transplant paediatric patients only. The remaining centres transplant adult patients only. Additionally, Newcastle offer lung transplant services to patients from Scotland as the transplant centre in Glasgow performs heart only transplants at present.

2. Donor Information

An adult lung donor is defined as a donor aged 16 years or over at the time of death. A paediatric donor is defined as a donor aged less than 16 years at the time of death. Contraindications to organ donation are reviewed regularly and revised as needed.
http://www.odt.nhs.uk/pdf/contraindications_to_organ_donation.pdf: Clinical contraindications to approaching families for possible organ donation includes lung specific contraindications. As with all guidelines, these should be used with clinical judgement. **Appendix 1** and **2** offer additional guidance on non-retrieval criteria and acceptance criteria for donor lungs.

3. Recipient Information

Transplantation is associated with risk. It is the responsibility of the surgeon to ensure that the potential transplant recipient understands and accepts the risks associated with organ transplantation as well as the benefits. Obtaining informed consent is a process which involves the whole multi-disciplinary team. NHSBT and the British Transplantation Society have provided advice on consent in *Guidelines for consent for solid organ transplantation in adults.*
http://www.odt.nhs.uk/pdf/guidelines_consent_for_solid_organ_transplantation_adults.pdf:

3.1 Adult Patients

An adult patient is defined as being a patient aged 16 years or above at the time of registration.

3.2 Paediatric Patients

A paediatric patient is defined as being a patient aged less than 16 years at the time of registration. A paediatric patient who reaches their 16th birthday while on the waiting list will retain their paediatric status.

3.3 Small Adult Patients

A Small Adult is defined as a patient aged 16 or above and of height less than or equal to 155cm (this is done automatically and does not rely on indication on the registration form). Patients meeting these criteria will receive offers of lungs available from paediatric donors before other adults, but after paediatric patients, on the urgent and non-urgent lists.

3.4 Patient Categories

There are three patient categories for which a patient can be registered. Table 1 indicates which patient category (Paediatric, Small Adult or Adult) a patient is classed in depending upon the

registered status of the patient (i.e. by age and height) and which type of centre they are registered at. The type of centre is important because generally a 15 year old patient, for example, registered at an adult centre will by definition be of adult size and hence require adult sized organs, whereas generally a 15 year old patient at a paediatric centre will require specialist paediatric treatment and hence paediatric sized organs. A patient will only have one classification and cannot be 'dual listed' to receive offers as part of more than one category.

Table 1: Patient category for allocation (Paediatric/Small Adult/Adult) by patient status and centre type

Status of patient	**Adult Centre** (Harefield, Papworth, Birmingham, Manchester)	**Adult & Paediatric Centre** (Newcastle*)	**Paediatric Centre** (GOSH)
Aged under 16	Adult	Paediatric	Paediatric
Aged 16 or above (not Small Adult)	Adult	Adult	Paediatric
Small Adult Aged ≥16 and height ≤155cm	Small Adult	Small Adult	Paediatric

* Newcastle is counted as both an adult centre and a paediatric centre in the document

4. Allocation Zones

In some aspects of lung offering, 'zonal centre' priority is given to the patients at a centre when the donor is located within the centre's allocation zone. Each transplant centre is assigned an allocation zone, with the exception of Great Ormond Street. This means that every donating hospital is assigned to one of the transplant centre allocation zones, based on geography and donor density. Allocation zones are reviewed annually by CTAG and arrangements made to ensure equity for patients by adjusting the allocation zone boundaries to reflect the demand for transplantation at each centre.

The current list of hospitals in each lung allocation zone can be found on-line at http://www.odt.nhs.uk/transplantation/guidance-policies/allocation-zones/.

5. Lung Offering Sequence

5.1 Group 1 Patients

Offers are made to centres in the priority order indicated in Figure 1 for an adult donor and Figure 2 for a paediatric donor. Both diagrams describe the offering sequence for Group 1 patients only; the final step in the offering sequence is to offer to Group 2 patients (as described in Section 5.2). Group 1 and Group 2 patients are defined in the Directions of NHS Blood and Transplant and reflect NHS entitlement (*http://www.odt.nhs.uk/odt/regulation/NHSBT-directions-2005/*).

Figure 1 Allocation for adult donor lungs (donor ≥ 16 years)

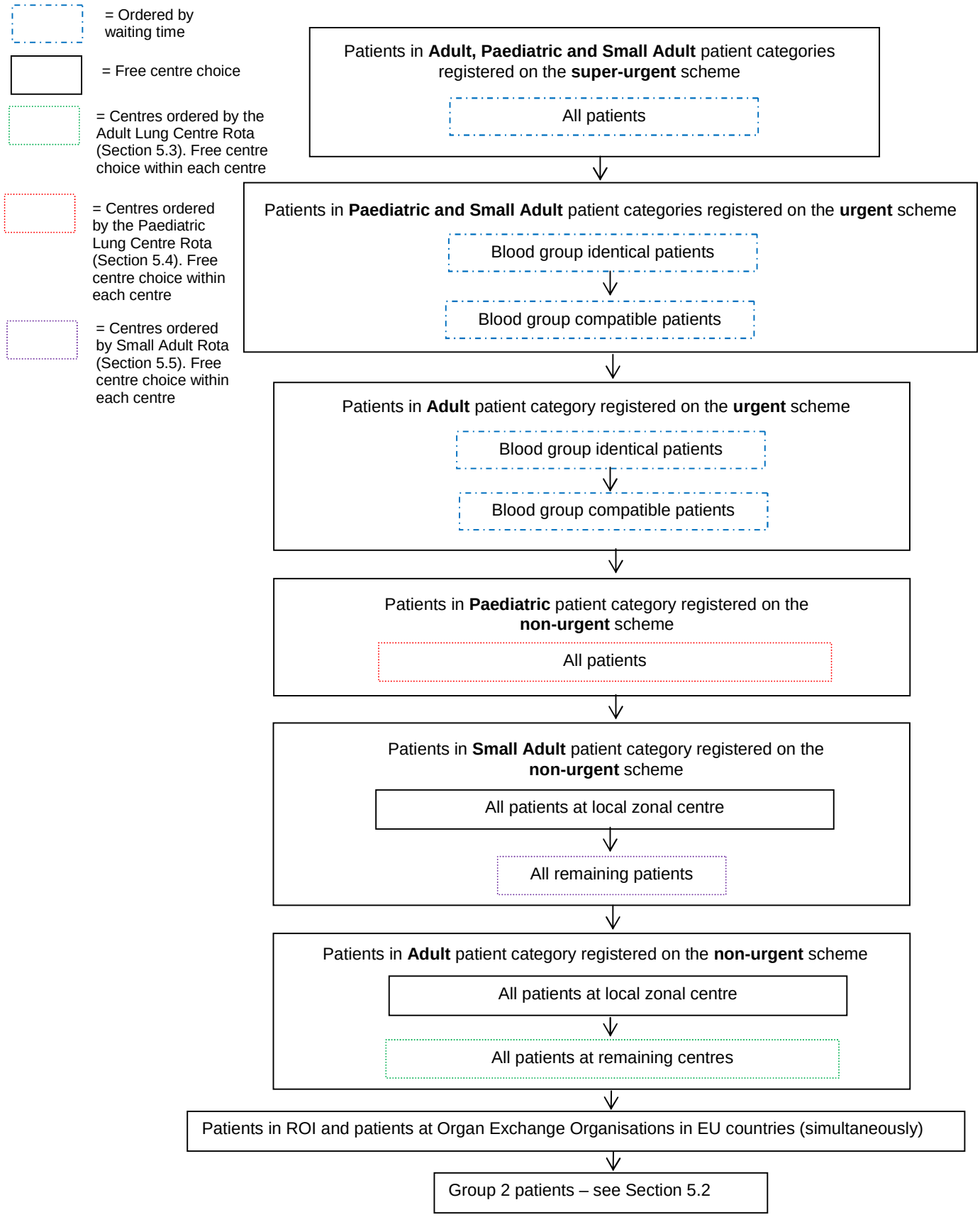
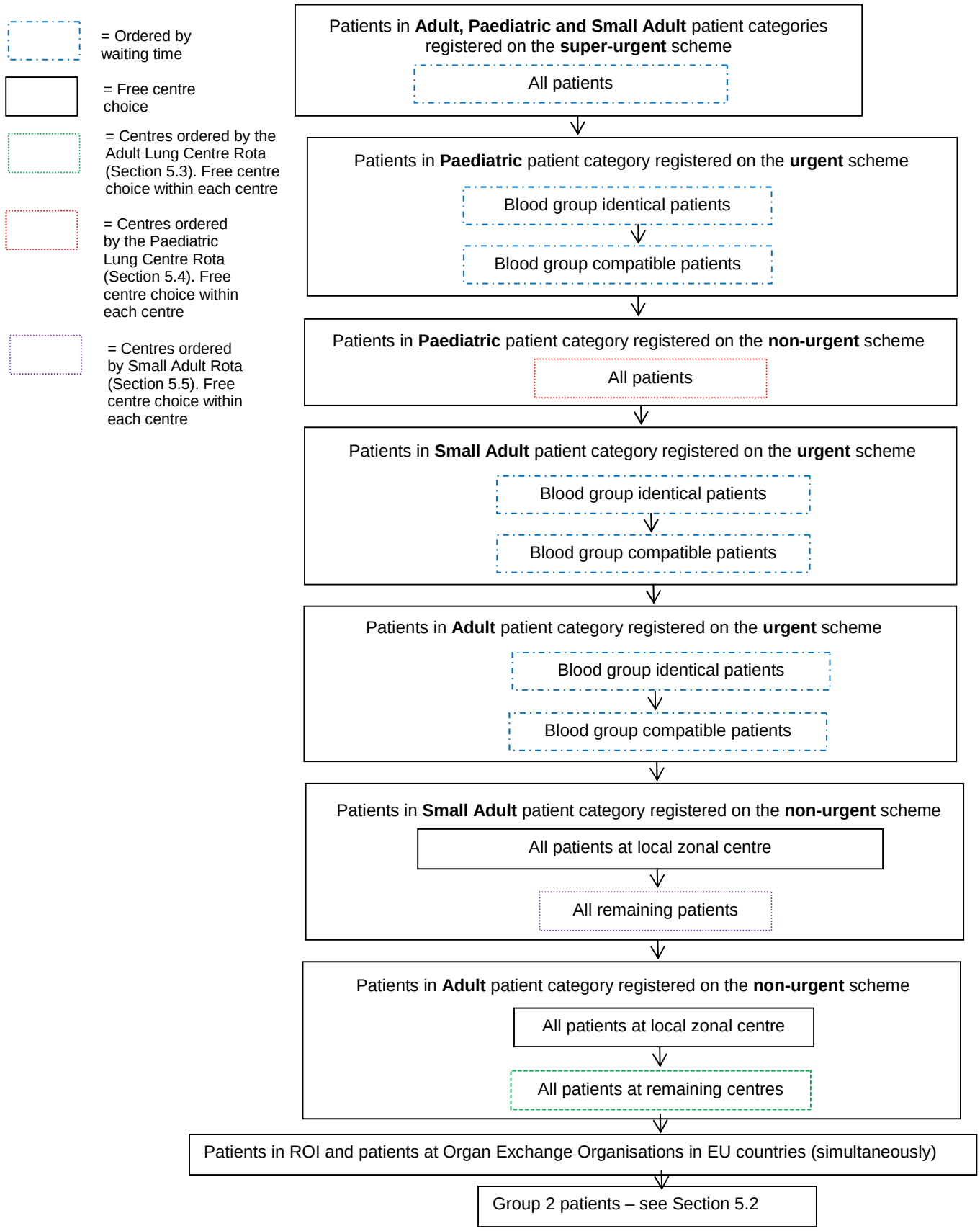


Figure 2 Allocation for paediatric donor lungs (donor < 16 years)



5.2 Group 2 Patients

Offers of adult donor lungs to Group 2 patients are made to centres in the following priority order:

1. The local zonal transplant centre
2. All other transplant centres in the UK, according to the Adult Lung Centre Rota (see Section 5.3)
3. Organ Exchange Organisations in EU countries

Offers of paediatric donor lungs to Group 2 patients are made to centres in the following priority order:

1. Transplant centres in the UK with a paediatric registered, according to the Paediatric Lung Centre Rota (see Section 5.4).
2. Transplant centres in the UK with a Small Adult registered, according to the Small Adult Rota (see Section 5.5).
3. The local zonal transplant centre for adult patients
4. Centres in the UK for adult patients, according to the Adult Lung Centre Rota (see Section 5.3)
5. Organ Exchange Organisations in EU countries

5.3 Adult Lung Centre Rota

Donor lungs are allocated to non-urgent patients in the Adult category (see Table 1) on a centre basis. After the zonal centre, the order in which centres are prioritised follows the Adult Lung Centre Rota, as follows:

- All adult centres are ordered in reverse-chronological order of last transplant date for non-urgent Adult patients when organs (from an adult or paediatric donor) are accepted and used outside of their own allocation zone.
- If a centre accepts and uses an organ from within their own zone, it does not move position on the rota.
- As each centre carries out a transplant for non-urgent Adult patients using an organ donated from within the UK and imported from another zone, it will be moved to the bottom of the rota.
- A centre transplanting an organ donated from outside the UK will retain its place and not be moved to the bottom of the rota.
- A centre importing a heart-lung block for transplant into a non-urgent Adult patient will be rotated to the bottom of both the Adult Cardiac Centre Rota (http://www.odt.nhs.uk/pdf/heart_allocation_policy.pdf Heart Transplantation: Organ Allocation) and the Adult Lung Centre Rota.

5.4 Paediatric Lung Centre Rota

Donor lungs are allocated to non-urgent patients in the Paediatric category (see Table 1) on a centre basis. The order in which centres are prioritised follows the Paediatric Lung Centre Rota, which consists of the two paediatric transplant centres and is as follows:

- Paediatric centres are ordered in reverse-chronological order of last transplant date for non-urgent Paediatric patients when organs (from an adult or paediatric donor) are accepted and used.
- As each centre carries out a transplant for a non-urgent Paediatric patient using an organ donated from within the UK, it will be moved to the bottom of the rota.
- A centre transplanting an organ donated from outside the UK will retain its place and not be moved to the bottom of the rota.
- A centre accepting a heart-lung block for transplant into a non-urgent Paediatric patient will be rotated to the bottom of both the Paediatric Cardiac Centre Rota (http://www.odt.nhs.uk/pdf/heart_allocation_policy.pdf Heart Transplantation: Organ Allocation) and the Paediatric Lung Centre Rota.

5.5 Small Adult Rota

Donor lungs are allocated to non-urgent patients in the Small Adult category (see Table 1) on a centre basis. The order in which centres are prioritised is determined by the length of time each centre's longest waiting Small Adult has been waiting. The centre with the longest waiting Small Adult will feature at the top of the rota, after the zonal centre. If a centre has more than one Small Adult waiting, they are able to select which patient to transplant as this is a centre offer.

5.6 Allocation Within Centres

Organs are allocated to non-urgent patients in each of the patient categories on a centre basis. This allows the clinicians to select the most appropriate recipient within their centre, based on need, benefit and other clinical issues. Most centres will allocate the lungs to the patient with the greatest need, but other factors will also need to be considered to obtain optimal outcomes. Donor factors include age, smoking history, bilateral or single lung offer and graft quality; recipient factors include their respiratory diagnosis, age, height and blood group (which together influence the chance and speed of identifying matched donors) and expected cold ischaemia time. Discussions are necessary with all patients concerning varying risk associated with some donors. Patient preferences should be considered and appropriate consent must be obtained. There should be a documented audit trail so the surgeon can justify the decision.

6. Super-Urgent Lung Allocation Scheme

The Super-Urgent Lung Allocation Scheme (SULAS) is available for all patient categories.

- Offers are made for named patients registered on the national SULAS waiting list in the order of their time spent waiting on the super-urgent list for this registration.
- Offers are not made to patients who are blood group incompatible with the donor. When a patient is registered, indication can be made to request only blood group identical or both identical and compatible donor lung offers.
- In addition, patients on the SULAS can be registered with gender-specific maximum and minimum donor heights they are willing to accept, at the time of registration. These patients will subsequently not receive offers of donor lungs from donors that fall outside of these specified criteria.
- If a patient is suspended from the super-urgent list for more than 14 days their waiting time will be reset when/if reactivated and a new registration form will be required.

7. Urgent Lung Allocation Scheme

The Urgent Lung Allocation Scheme (ULAS) is available for all patient categories and the offering process differs depending on whether the donor is adult (Figure 1 and Section 7.1) or paediatric (Figure 2 and Section 7.2).

- Offers are not made to patients who are blood group incompatible with the donor. When a patient is registered, indication can be made to request only blood group identical or both identical and compatible donor lung offers.
- In addition, patients on the SULAS can be registered with gender-specific maximum and minimum donor heights they are willing to accept, at the time of registration. These patients will subsequently not receive offers of donor lungs from donors that fall outside of these specified criteria.
- A patient that has moved from the SULAS to the ULAS will retain their waiting time spent on the SULAS, which will be added on to their ULAS waiting time.
- Patients moving from the ULAS to the SULAS will not retain any waiting time from their urgent registration.

- If a patient is suspended from the urgent list for more than 14 days their waiting time will be reset when/if reactivated and a new registration form will be required.

7.1 Adult Donor Lungs

Adult donor lungs are offered to all patients in the ULAS Paediatric and Small Adult patient categories before being offered to patients in the ULAS Adult patient category (Figure 1). Patients in the Small Adult patient category rank alongside those in the paediatric group. Urgent lung patients are ranked by 1) blood group and 2) length of time spent waiting on the ULAS for this registration.

7.2 Paediatric Donor Lungs

Paediatric donor lungs are offered to all patients in the ULAS Paediatric patient category before being offered to patients in the NULAS Paediatric patient category (Figure 2). The donor lungs are then offered to ULAS Small Adult patients followed by ULAS Adult patients, NULAS Small Adult patients and finally to NULAS Adult patients. Urgent lung patients are ranked by 1) blood group and 2) length of time spent waiting on the ULAS for this registration.

8. Non-Urgent Lung Allocation Scheme

The Non-Urgent Lung Allocation Scheme (NULAS) is available for all patient categories and the offering process differs depending on whether the donor is adult (Figure 1) or paediatric (Figure 2). This scheme utilises the Adult Lung Centre Rota, Paediatric Lung Centre Rota and Small Adult Rota as described above. The priority order is non-urgent paediatric patients, followed by non-urgent Small Adult patients, followed by non-urgent Adult patients. Additionally, for paediatric donors, non-urgent paediatric patients come before *urgent* Adult patients and Small Adult patients.

9. Offering Process

The offering process is split into two components: (1) sequential offering to named patients in the super-urgent and urgent categories and (2) simultaneous offering to all centres for non-urgent patients. The exception is for paediatric donors, where non-urgent paediatric offers are included in the first component. During the offering process the centre should maintain contact with the Specialist Nurse for Organ Donation. If the donor is becoming increasingly unstable and continuing with the offering sequence is likely to jeopardise other solid organ retrieval, the Specialist Nurse for Organ Donation should discuss with the Regional Manager on call whether it would be appropriate to abort the offering sequence. Wherever possible echocardiography and invasive monitoring (including cardiac output studies) should be utilised to endorse this decision.

Super-urgent and urgent offering:

- Offers are made in turn to named patients in the super-urgent and urgent schemes, on the basis of a firm offer to the centre with the highest ranked patient and a provisional offer to the second centre in line.
- Centres to which a firm offer has been made must advise within 45 minutes whether they wish to accept or decline the offer for their named patient. If the organ is declined, it will be offered to the second in line as a firm offer and to the third in line as a provisional offer, and so on throughout the super-urgent and urgent lung allocation sequence.
- If an offer is accepted by the first centre outside of the agreed time and the offer has already been accepted by the second centre, the donor lung will be automatically allocated to the second centre. For firm offers made to a centre previously advised provisionally, the centre has 30 minutes to advise whether they wish to accept or decline the firm offer.
- In the case of paediatric donor lungs, the paediatric centres will also receive offers for non-urgent patients during this part of the offering process.

Non-urgent offering:

- If the donor lungs have been declined for all super-urgent and urgent patients, the ODT Duty Office will send out a simultaneous offer to all transplant centres for consideration for all their non-urgent patients.
- Centres will have 45 minutes to respond to simultaneous offers of lungs only, or 60 minutes for simultaneous offers of the heart-lung block.
- A centre wishing to accept a simultaneous offer must call the ODT Duty Office within the specified time stating which patient category they wish to accept for (Paediatric / Small Adult / Adult). The centre must state whether they wish to accept double lungs or a single lung. If the centre does not wish to accept the simultaneous organ offer, they need not respond.
- At the end of the response time of the simultaneous offer, if more than one centre wishes to accept the offer, the organ(s) will be allocated according to the priority order shown in Figure 1 or 2, as appropriate, and in agreement with http://www.odt.nhs.uk/pdf/heart_allocation_policy.pdf: Heart Transplantation: Organ Allocation.
- If the heart or lung(s) are eventually declined on inspection, the ODT Duty Office will contact the next centre that wished to accept, if applicable. If no other centre wished to accept, the organ(s) will not be fast-tracked as per Section 11 as it will be presumed that no centre wishes to use the organ.

A centre wishing to accept an organ will retain its place on the lung allocation sequence while a decision is pending. If a centre chooses to decline the offer of an organ, it will retain its place in the centre rota.

10. Acceptance of One Lung in a Bilateral Lung Offer

- Donor lungs are usually accepted as a pair. However, there are some recipients who are listed for a single lung transplant.
- If a centre only accepts one donor lung when a pair of lungs is being offered with the intention of doing a single lung transplant, they **MUST** specify which side is being accepted. This is to allow the remaining donor lung to be allocated on to recipients at other centres with certainty of which lung is being offered on.
- It is unacceptable to leave the choice of the lung being accepted to the time of assessment by the retrieval team.
- If a centre does not specify which single lung is being accepted within the offering timeframe, the bilateral donor lungs will be automatically offered to the next centre in the allocation sequence.

11. Fast Track Offer Scheme

The Fast Track Offer Scheme is initiated in two scenarios:

1. When lungs are available at short notice from a UK donor, i.e.:
    - aortic cross-clamp (DBD donors) or withdrawal of treatment (DCD donors) is expected within 90 minutes of the referral to NHSBT, or
    - lung(s) have already been removed or are in the process of removal, and
    - all UK centres have not already had an opportunity to decline the lungs.
2. When lungs are available from Europe.

The scheme operates as follows:

- Offers of lungs meeting the Fast Track offer scheme criteria will be made to all centres simultaneously.
- Offers will be made by the ODT Duty Office by either simultaneous text message to pager/mobile phone or facsimile transmission of donor information.
- Centres must respond by telephone to a Fast Track offer to the ODT Duty Office within 45 minutes of the offer if they wish to accept. The ODT Duty Office will not follow-up those

centres that do not respond within this time. Centres not responding will be deemed to have declined the offer.

- Lungs will be allocated to the first accepting centre and may be for a super-urgent, urgent or non-urgent patient. However, if more than one centre wishes to accept the Fast Track Offer, negotiation can be made between centres.
- Group 1 patients will be allocated organs before Group 2 patients. Centres accepting for Group 2 patients must wait until the 45 minutes have lapsed to ensure no centre is accepting for a Group 1 patient.

12. Multi-Organ Allocation

Heart-lung block allocation is described in http://www.odt.nhs.uk/pdf/heart_allocation_policy.pdf: Heart Transplantation: Organ Allocation. Other multi-organ allocation is described in http://www.odt.nhs.uk/pdf/introduction_to_selection_and_allocation_policies.pdf: Introduction To Patient Selection And Organ Allocation Policies.

13. Acceptance of Allocated Organs

It is the responsibility of the recipient surgeon to decide whether to accept an organ and this decision will depend on both donor and recipient factors. Organs from all donors will carry some degree of risk and the risks associated with transplantation must be balanced against the benefits of transplantation and the risks of awaiting a further offer. The recipient is entitled to decline organs from donors with particular characteristics and these wishes should be respected.

APPENDIX 1

Suggested Criteria for Non-Retrieval of Lungs

A decision not to proceed with offering would be based on a documented PaO_2 <25kPa (187 mmHg) on FiO_2 1.0 and PEEP 5cmH_2O provided that:

- Endotracheal tube malposition had been excluded by chest x-ray (CXR) or bronchoscopy.
- Rigorous attempts had been made to recruit atelectatic segments by ventilator adjustment and physiotherapy.
- There are bilateral pathological changes on CXR.
- A clear cause for hypoxaemia has been established e.g. bilateral pulmonary contusion or other trauma, documented aspiration, CXR evidence of major pulmonary consolidation.
- In the presence of PaO2 <25kPa on FiO2 1.0 and PEEP 5cm.H_2O and unilateral CXR changes only, the possibility of single lung transplantation should be considered (pulmonary venous sampling during attempted organ retrieval is recommended).

APPENDIX 2

Suggested Donor Lung Acceptance Criteria

These are at the discretion of the recipient centre and should be in line with previously documented patient wishes

- Age up to 70 years.
- No or minimal chest trauma.
  - Pneumothorax and/or a chest drain are not a contraindication.
  - No previous chest surgery on the retrieval side.
- Ventilated less than 10 days.
  - Tracheostomies are acceptable.
- Normal CXR appearance reported on retrieval day.
  - Normal cardiac silhouette, normal lung fields.
  - Normal cardiothoracic ratio (i.e. less than 50% on standard CXR).
  - Borderline gases with a unilateral abnormality on CXR may mask a usable contralateral lung.
- No evidence of respiratory infection as demonstrated on CXR or the presence of purulent sputum and confirmed pathogens.
  - Purulent secretions do not necessarily rule out lung donation. Multiple organisms on gram stain may indicate normal flora and are unlikely to lead to infection. No donor should be rejected based on history of purulent sputum without bronchoscopic evidence of infection (i.e. infected mucosa).
  - Heavy fungal contamination of the bronchial tree may exclude donation. Candida infection should be treated with an azole.
- No systemic sepsis (i.e. white cell count >20,000/mL or pyrexia > 38^0C of unknown origin).
- Acceptable arterial blood gases (ABG):
  - On FiO_2 100%, $PaO_2 \geq 35$ kPa and on
  - FiO_2 of 40%, $PaO_2 \geq 14$ kPa
  - PO_2 (kPa) should preferably be 35 x FiO_2
  - PO_2 of 25 x FiO_2 may be considered at the discretion of the senior implanting surgeon.
- Normal ventilatory parameters with normal compliance.
  - The addition of 8 cmH_2O of positive end-expiratory pressure (PEEP) is recommended.
- Mild asthma is acceptable (but may be transmitted).
- Current pulmonary oedema if associated with CXR changes and borderline ABG excludes donation. May consider if treated and resolved. Fluid overload should be avoided.
- No evidence of aspiration. The presence of a positive history, poor gases and abnormal CXR and bronchoscopic findings suggesting aspiration will preclude donation. In cases of history suggesting inhalation, donors should have abnormal bronchoscopy before being turned down.
- CMV mismatches are acceptable unless specified in high risk recipients
- Carbon monoxide poisoning is acceptable with caution as long as there is no smoke inhalation.
- Smoking history should not be the sole reason for refusal of a well-functioning organ. Acceptable up to 30 pack years (i.e. 1 pack per day for 30 years). If greater than this, other factors should be considered in conjunction with smoking history as reasons for refusal.

Donor heart-lung acceptance criteria

- In addition to the above, heart acceptance criteria should apply. These are covered within http://www.odt.nhs.uk/pdf/heart_allocation_policy.pdf: Heart Transplantation: Organ Allocation.