

**Intestinal transplantation: Organ allocation**

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*This Policy replaces  
POL193/6*

**Copy Number**

**Effective 13/05/16**

**Summary of Significant Changes**  
Para 1.3.1.6 - Amendment to donor and recipient age match points to reflect the fact that paediatric recipients now receive 5000 points in the scheme when the donor is paediatric, as opposed to 1000.

**Policy**

*This policy has been created by the Bowel Advisory Group on behalf of NHSBT.*

*The policy has received final approval from 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 2016  
Approved by TPRC: September 2015*

The aim of this document is to provide a policy for the allocation and acceptance of organs to adult and paediatric recipients on the UK national transplant list. These criteria apply to all proposed 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 the *Non Compliance with Selection and Allocation Policies*  
<http://www.odt.nhs.uk/transplantation/tools-policies-and-guidance/policies-and-guidance/#noncompliance>

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.

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### 1. Allocation policy

This policy covers the allocation of all UK-wide donor organs or combination of donor organs that include the intestine (please note that this policy does not cover pancreas grafts which are retrieved with a segment of duodenum). These comprise donor organs suitable for patients requiring **intestine** (bowel) only, **multivisceral** (liver, bowel, pancreas, with or without stomach), **modified multivisceral** (bowel, stomach, pancreas) or **intestine together with any combination of kidney or pancreas transplantation**.

#### 1.1 Rationale for allocation policy

Intestinal (bowel) transplantation is an established treatment for selected patients (inadequate intravenous access, life-threatening line sepsis, advanced liver disease, severe fluid/electrolyte disturbances) with intestinal failure. This treatment is currently delivered at four nationally designated transplant centres (two paediatric centres – Birmingham Children's Hospital, Birmingham and King's College Hospital, London; two adult centres – Addenbrooke's Hospital, Cambridge and The Churchill Hospital, Oxford). With the expansion of intestinal transplant activity, an advisory group called the Bowel Advisory Group (BAG) to NHSBT was set up in 2010.

The current need for intestinal transplantation is approximately 25–30 grafts per year, with half of these patients requiring a combined liver and intestinal transplant. This has implications for allocation of other transplant organs, especially with respect to the liver, pancreas and kidney.

It is important that all potential deceased donation after brain death (DBD) donor families are approached for bowel donation by the Specialist Nurses in Organ Donation (SN-ODs). Currently, organs from donation after circulatory death (DCD) donors are not considered suitable for intestinal transplantation, but may be considered for approved research purposes.

#### 1.2 How the allocation policy was developed

This policy was originally developed by a sub-group of the BAG which was set up to define the principles of organ allocation for intestinal transplantation. The sub-group included representation from all four intestinal transplant centres. Any subsequent changes to the policy are agreed by the BAG.

#### 1.3 Allocation policy

##### **Background - factors influencing donor and recipient matching and graft outcomes for listed intestinal transplant patients**

Several factors determine the suitability of a donor for a particular bowel transplant patient. The key issues relate to size mismatch, especially for patients with short gut and the presence of liver disease as indications for intestinal transplantation. Approximately half of all children waiting for an intestine-containing transplant weigh 10 kg or less and it is this group that experiences the largest discrepancy between donor and recipient organ availability. Most paediatric donors are larger children or teenagers, so the paediatric transplant centres need to consider reduction of these grafts prior to implantation into the smaller patients.

The highest risk of mortality on the transplant list is for patients with advanced liver disease accompanied by small recipient size. Markers of advanced liver disease in patients with intestinal failure are different from end-stage cirrhosis and include: high serum bilirubin (level >200 µmol/l associated with increased mortality) and low platelet count. These may occur in the absence of coagulopathy and hypoalbuminaemia. For this reason, it is unlikely that existing liver disease assessment scores such as Model for End-stage Liver Disease (MELD) score and UK End-stage Liver Disease (UKELD) score, currently used to prioritise adult elective liver transplant patients, will be prognostic in this population of patients.

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The international Intestinal Transplant Registry (ITR) has identified three factors associated with favourable outcomes after intestinal transplantation and these are:

1. Transplantation from home
2. Increased experience of the transplant centre
3. Intestinal transplantation with liver transplantation (only patients who have survived one year after transplantation are considered)

The ITR has also demonstrated that in patients who have survived a year after transplant, there is a liver protective effect with significantly better long-term survival in recipients of grafts containing the liver compared with those intestinal grafts transplanted without a liver. This survival advantage is not seen when survival is analysed from the date of transplantation as there is a greater mortality in bowel grafts containing the liver during the first year.

*1.3.1 Details of policy*

*1.3.1.1 Donor criteria for 'bowel' retrieval*

The donor criteria for bowel retrieval are:

- DBD donors aged < 56 years and donor weight < 80kg
- Absence of underlying chronic intestinal disease and intra-abdominal sepsis
- For abdominal wall/fascia donation: Absence of extensive surgical scars/damage to the abdominal wall/fascia.

For the purposes of deceased organ donation and donor family consent, a 'bowel' graft is defined as a graft that may contain any or all of the following parts of the GI tract: stomach, duodenum, jejunum, ileum, colon. A very small number of patients with abdominal wall loss or limited abdominal domain may also be listed to require an abdominal wall graft, in addition to a bowel graft. Additional consent is needed to be obtained from the donor family in this unique situation (controlled document INF1262 provides guidance to SN-ODs on abdominal wall donation).

At present, the National Organ Retrieval Standards (MPD1043) state that the four intestinal transplant centres are expected to contribute expertise to the retrieval of organs for intestinal transplant recipients. Centres can send a surgeon or their own team instead of a National Organ Retrieval Service team but there should be no more than one full team present to retrieve.

*1.3.1.2 Donor–recipient blood group criteria*

Donor to recipient blood group matching is preferable for the following reasons:

1. To maintain equity of access to a transplant for patients across all blood groups and, in particular, to minimise the disadvantage to blood group O patients (blood group O donor organs are compatible with all blood group patients)
2. Transplantation between compatible but non-identical blood groups may result in increased risk of graft-versus-host disease, including immune-mediated haemolytic anaemia.

Identical blood group matching is preferable together with blood group AB patients receiving blood group A donor offers and blood group B patients receiving blood group O donor offers, as per table below; other compatible blood group matching is allowed but is less favourable.

Donor blood group	Potential recipient blood group			
	O	A	B	AB
O	a		a	
A		a		a
B			a	
AB				a

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### 1.3.1.3 Prioritisation of patients listed for intestinal transplantation

Bowel transplant recipients requiring other organs (livers, pancreases or kidneys) are prioritised ahead of all non super-urgent liver recipients and all kidney and pancreas recipients. This policy was put in place for paediatric bowel recipients in 2004 and adult bowel recipients in 2010. This is to allow the small numbers of vulnerable bowel patients (with historically the highest transplant list mortality, and with severely limited donor pool options) to have UK-wide access to the small numbers of paediatric and small adult DBD donors. An audit performed in 2010 showed no impact on paediatric liver recipient transplant list mortality 4 years following the introduction of this pathway.

### 1.3.1.4 'Super-urgent' transplantation

The need for super-urgent allocation of a multivisceral graft containing the liver, bowel and pancreas was identified in 2012. Following this, the Bowel and Liver Advisory Groups agreed to list and prioritise patients with acute liver failure and intestinal failure or extensive porto-mesenteric venous thrombosis. These super-urgent patients have the same priority and status as current patients listed to receive emergency liver transplants for acute liver failure or acute liver graft failure, and ahead of all non super-urgent patients listed to require any type of intestine or liver containing graft.

### 1.3.1.5 Overseas donors and recipients

A small number of donor offers are received from several European Organ Donor systems (Eurotransplant, Scandiatransplant, Ital-transplant, ONTS Spain, Swiss-transplant, France-transplant). These are offered in the same way as UK donor offers.

UK centres accept a small number of European eligible patients for intestinal transplantation, as this treatment option is available at limited European transplant centres.

Group 2 intestinal transplant patients are also occasionally accepted for transplantation in the UK. These patients are offered organs only if there is no suitable Group 1 patient. This applies to Group 1 patients on other organ transplant lists; not only the intestinal transplant list. Specifically, the offering sequence for bowels and pancreases is:

1. Group 1 pancreas and bowel
2. Group 1 pancreas/islets and Group 1 bowel
3. Group 2 pancreas and bowel
4. Group 2 pancreas and Group 2 bowel.

If it is not possible to identify a suitable intestinal recipient on the UK transplant list, then these potential bowel grafts should be offered to the other European Organ Transplant Systems (e.g. Eurotransplant). As the liver and pancreas will have been allocated, it is likely that only isolated intestine grafts will be available for offer to other European intestinal transplant centres via their organ procurement organisations. It is hoped that in the future there will be similar formal Europe-wide arrangements, in order to maximise the use of this very scarce and valuable international resource.

### 1.3.1.6 Prioritisation of listed patients – the points system

The National Bowel Allocation Scheme (NBAS), introduced in 2013, is designed to allocate deceased donor organs to patients listed nationally for grafts containing the intestine, using an objective and clinically appropriate allocation system. A ranked priority is calculated for all patients on the national transplant list using a points system, along similar lines to that used for the prioritisation of kidney and pancreas patients. This applies to patients listed for bowel grafts (non super-urgent), with or without combination of other organs.

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When a donor becomes available that is suitable for the purposes of intestinal transplantation (as defined in section 1.3.1.1), all eligible patients on the national transplant list are given points based on several criteria and the total score is used to determine the order of offering. Given the small number of intestinal transplants performed worldwide, there is limited data on the weighting of the different factors considered for the scoring system. The proposal agreed to by the BAG was to introduce this scheme on the basis of best knowledge available and to audit outcomes annually with a view to revising the Scheme on a two-yearly basis.

The following five factors are included in the NBAS:

1. Donor and recipient age match points
2. Waiting time points
3. Urgency (medical complications) points
4. Points accrued for additional organs to be transplanted
5. Sensitisation points

**Donor and recipient age match points**

Paediatric donors are defined as those aged <16 years at time of offering.

Adult donors are defined as those aged 16 years or more at time of offering.

Paediatric recipients are defined as those aged < 18 years at time of offering.

Adult recipients are defined as those aged 18 years or more at time of offering.

A cut-off age of 18 years for adult recipients allows patients between 16 and 18 years to be treated at either an adult or a paediatric centre.

Adult recipients with a weight ≤ 35 kg may be given paediatric status in the NBAS, if specified on the Intestinal Failure Transplant Recipient Registration form, as it is almost impossible to find size matched donors from the adult donor pool. This will have a minimal impact on paediatric graft availability, for example: as at 27 June 2011, there were no UK adults listed weighing ≤35 kg.

The points awarded are as follows:

<b>Donor</b>	<b>Recipient</b>	<b>Points</b>
Paediatric	Paediatric	5000
Adult	Adult	500
Adult	Paediatric	250
Paediatric	Adult	0

**Waiting time points**

Patients on the transplant list receive 1 point for each day on the transplant list. Points start to be accrued only when the patient is activated on the transplant list for the first time, but continue to be accrued during periods when the patient is subsequently inactivated or suspended.

**Additional waiting time points**

In exceptional cases where it is felt that a patient has missed out on waiting time due to an administration error, the facility exists to add additional waiting time points if it is agreed the patient is entitled to it. The process is:

1. Centres detail in writing (via email) the reasons why they believe their patient is entitled to additional waiting time and the number of days they are asking to be added. This should be sent to the Chair of BAG (if the patient is from the same centre as the Chair, the other adult or paediatric centre representative will be contacted) for review and copied to [ifald.waitingtime@nhsbt.nhs.uk](mailto:ifald.waitingtime@nhsbt.nhs.uk)

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2. A response in writing (via email) would be sent to the centre, and copied to ODT Information Services, within one week as to whether it was agreed by the Chair of BAG (or Deputy) that additional waiting time could be added.
3. ODT Information Services would then add the agreed number of days for the patient.

### Urgency (medical complications) points

Patients awaiting intestinal transplantation vary in urgency and it is appropriate that this is reflected in the prioritisation scheme. The following table lists the additional points allocated for specified urgency criteria. If a patient satisfies more than one of these criteria then the points allocated for each of the urgency criteria satisfied will be added together to give the total points allocated for urgency.

Urgency criteria		Points
Loss of intravenous line access	Single remaining conventional access site (supradiaphragmatic)	1000
Liver failure	Serum bilirubin of 200 µmol/l or greater	1500
	Serum bilirubin of 100–199 µmol/l	750
Diagnosis of malignancy		500
In-hospital status		500

These data are collected on the Intestinal Transplant Recipient Registration form at the time of registration and can be updated using the Sequential Data Collection form if the clinical status of the patient changes.

### Points accrued for additional organs to be transplanted

Some patients on the transplant list require additional organs to the intestine. This has an effect on transplant list prognosis and is, therefore, reflected in the points allocated as follows. If a patient requires a combination of organs then the points allocated for each additional organ required will be added together to give the total points allocated for additional organs to be transplanted.

Additional organ required	Points
Liver	300
Kidney	200
Pancreas	100
Abdominal wall	100

### Sensitisation points

Potential recipients may have pre-existing human leukocyte antigen (HLA) antibodies as a result of exposure to the different HLA antigens through blood transfusion, previous transplants and pregnancy. In the event that the donor human leukocyte antigen (HLA) is known prior to offering, listed patients with known HLA antibodies that are present in the donor HLA type will be excluded from the matching run and therefore not be offered the organs.

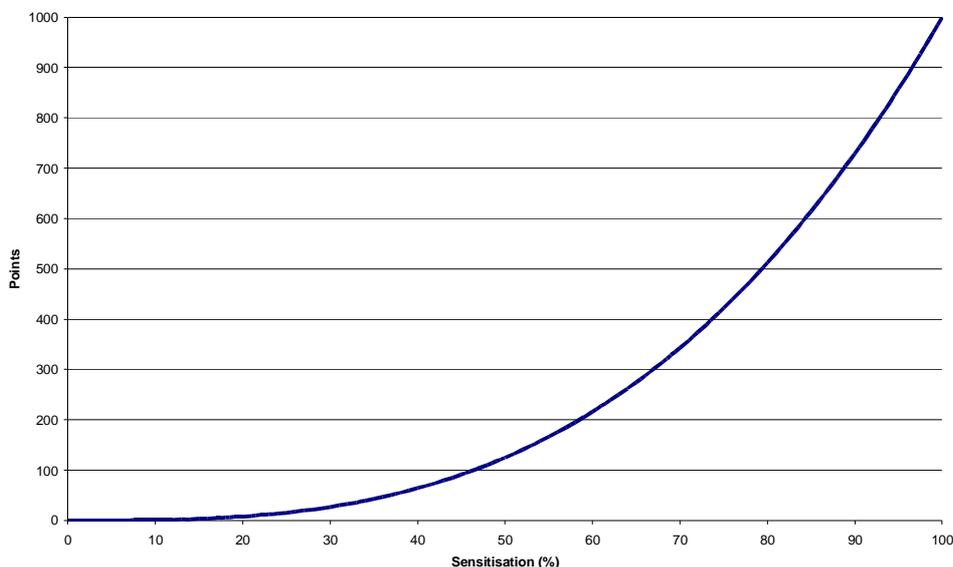
It is desirable that, as far as possible, organs are allocated in such a way as to maximise the probability that patients with high levels of sensitisation receive donor organs with a negative cross-match. For this reason, patients on the transplant list are given points in proportion to the level of sensitisation, as shown in Figure 1 (taken from pancreas allocation algorithm).

The aim is to maximise the chance of patients with high levels of sensitisation receiving the offer when an HLA compatible donor becomes available. This is particularly important for patients with

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high levels of sensitisation and does not unduly affect patients with low levels because they are HLA compatible with a much larger pool of donors.

**Figure 1. Sensitisation points taken from the pancreas allocation algorithm**



### 1.3.1.7 Calculating the total points score (TPS)

TPS = **Donor to recipient age matching points:**

Paediatric donor to paediatric recipient	= 5000 points
Adult donor to adult recipient	= 500 points
Adult donor to paediatric recipient	= 250 points
Paediatric donor to adult recipient	= 0 points

+ **Waiting time points:** Waiting time in days

+ **Urgency points:**

Loss of intravenous line access (single access site remaining)	= 1000 points
Liver failure (serum bilirubin of 200 µmol/l or greater)	= 1500 points
Liver failure (serum bilirubin of 100–199 µmol/l)	= 750 points
Diagnosis of malignancy	= 500 points
In-hospital status	= 500 points

+ **Requirement for other organs points:**

Liver	= 300 points
Kidney	= 200 points
Pancreas	= 100 points
Abdominal wall	= 100 points

+ **Sensitisation points:**  $Sensitisation(\%)^3 / 1000$   
(See Figure 1)

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## 1.3.1.8 Example: TPS

Assume compatibility of blood groups between donor and patient

**Donor 1:** Aged 8 years, donation after brain death donor

**Donor 2:** Aged 45 years, donation after brain death donor

**Patient 1:** Aged 4 years, waiting 724 days, cRF 0%, serum bilirubin of 451 µmol/l, requires liver and pancreas, in hospital

**Patient 2:** Aged 36 years, weight 35 kg, waiting 611 days, cRF 80%, serum bilirubin of 13 µmol/l, requires kidney, in hospital, loss of intravenous line access

**Patient 3:** Aged 16 years, waiting 252 days, cRF 10%, serum bilirubin of 12 µmol/l, requires no additional organs (bowel only)

**Patient 4:** Aged 45 years, weight 55 kg, waiting 165 days, cRF 25%, serum bilirubin 102 µmol/l, requires liver, kidney and pancreas, diagnosis of malignancy, in hospital

## Total points score calculation examples

Points score								
Factor	Patient 1		Patient 2		Patient 3		Patient 4	
	Donor 1	Donor 2	Donor 1	Donor 2	Donor 1	Donor 2	Donor 1	Donor 2
Age match	5000	250	5000	250	5000	250	0	500
Waiting time	724	724	611	611	252	252	165	165
Urgency								
Loss of intravenous line	0	0	1000	1000	0	0	0	0
Liver failure	1500	1500	0	0	0	0	750	750
Diagnosis of malignancy	0	0	0	0	0	0	500	500
In-hospital status	500	500	500	500	0	0	500	500
Other organs required	400	400	200	200	0	0	600	600
Sensitisation	0	0	512	512	1	1	16	16
<b>Total Points Score (TPS)</b>	<b>8124</b>	<b>3374</b>	<b>7823</b>	<b>3073</b>	<b>5253</b>	<b>503</b>	<b>2531</b>	<b>3031</b>

## Bowel matching run result examples

Donor 1			Donor 2		
Patient	TPS	Rank	Patient	TPS	Rank
1	8124	1 (First offer)	1	3374	1 (First offer)
2	7823	2 (Second offer)	2	3073	2 (Second offer)
3	5253	3 (Third offer)	4	3031	3 (Third offer)
4	2531	4 (Fourth offer)	3	503	4 (Fourth offer)