

NHS BLOOD AND TRANSPLANT

RESEARCH, INNOVATION AND NOVEL TECHNOLOGIES ADVISORY GROUP

TWO MONTH REVIEW – RESEARCH ALLOCATION SCHEME

SUMMARY

BACKGROUND

- 1 A new allocation scheme for research organs went live on 20 February 2017 where studies are ranked in order of priority. Prior to this, research organs were offered to studies on a geographical basis.
- 2 A review of offering data was first carried out in 2017. This paper presents the results of a second two-month review to determine the effectiveness of the research organ allocation scheme.

DATA AND METHODS

- 3 Data collected by NHSBT for research organs is limited and does not capture the offering of research organs. Hub Operations were therefore asked to complete a spreadsheet for the purposes of this review by going through their log notes for donors where an organ was retrieved and not transplanted within a two-month period from 1 October to 30 November 2017.

SUMMARY

- 4 Whilst 91% (128) of organs with consent for research were offered for research, 43 (31%) of these organs were not used.
- 5 111 organs were offered through the research organ allocation scheme, 72% of which were used.
- 6 Utilisation of offered research organs appears to be higher between 9am and 9pm and mid-week (Tuesday, Wednesday, Thursday).
- 7 The average number of responses per offer was 1 which gave studies a good chance in receiving an organ if the study was active. This meant that studies that were lower in ranking were still able to receive an organ.

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TWO MONTH REVIEW – RESEARCH ALLOCATION SCHEME

BACKGROUND

- 1 Until recently, research organs were offered to studies on a geographical basis via a phone call. A new allocation scheme for research organs was introduced on 20 February 2017. Research studies are now ranked through a scoring system such that studies with the capabilities of improving an organ for the purposes of transplantation are given higher priority.
- 2 Research organs are now offered to all studies via text messages. These organs (providing they are retrieved for the purposes of transplantation) are allocated to the highest ranked study that responds to an offer within 45 minutes. The exception to this rule is that isolating labs are able to keep pancreas islets isolated at their lab.
- 3 A two-month review was first carried out last year (20 February to 20 April 2017). This paper presents the results of a second review to determine the effectiveness of the research organ offering scheme.

DATA AND METHODS

- 4 Data collected by NHSBT for research organs is limited. A spreadsheet was therefore created for the purpose of this analysis to collect fuller information including; the time of offer, reasons for not offering an organ for research, the organ location at the time of offer, studies that responded to an offer and whether they responded within 45 minutes. Hub Operations completed the spreadsheet by going through their log notes for all donors where an organ was retrieved but not transplanted within a two-month period from 1 October to 30 November 2017.
- 5 Organs that went for research and were successfully transplanted as a result are not distinguished from other routine transplants on the transplant database and can thus not be included as research organs in this paper.
- 6 Data from this two-month review have also been combined with data from the initial 2017 review and are summarised in **Appendix I**.

RESULTS

- 7 A summary of organs retrieved for transplantation from 1 October to 30 November 2017 is shown in **Table 1**. There was one lung pair identified as being retrieved solely for the purposes of research. 16% (147) of the total number of organs retrieved were not transplanted and were potentially available to use in research.

Table 1 Summary of organs retrieved for transplantation, 1 October 2017 to 30 November 2017

Organ	Retrieved	Transplanted		Not transplanted		Offered for research		Used for research		Consent and disposed		No research consent	
	N	N	% Ret ¹	N	% Ret ¹	N	% not txd ²	N	% not txd ²	N	% not txd ²	N	% not txd ²
Liver	201	168	84	33	16	30	91	20	61	11	33	2	6
Liver segments	20	20	100	0	0	0	0	0	0	0	0	0	0
Kidney	515	453	88	62	12	54	87	42	68	16	26	4	6
Pancreas	65	34	52	31	48	25	81	16	52	14	45	1	3
Islets	18	4	22	14	78	12	86	12	86	2	14	0	0
Bowel	6	6	100	0	0	0	0	0	0	0	0	0	0
Heart	35	33	94	2	6	2	100	2	100	0	0	0	0
Lung/s	59	54	92	5	8	5	100	5	100	0	0	0	0
Total	919	772	84	147	16	128	87	97	66	43	29	7	5

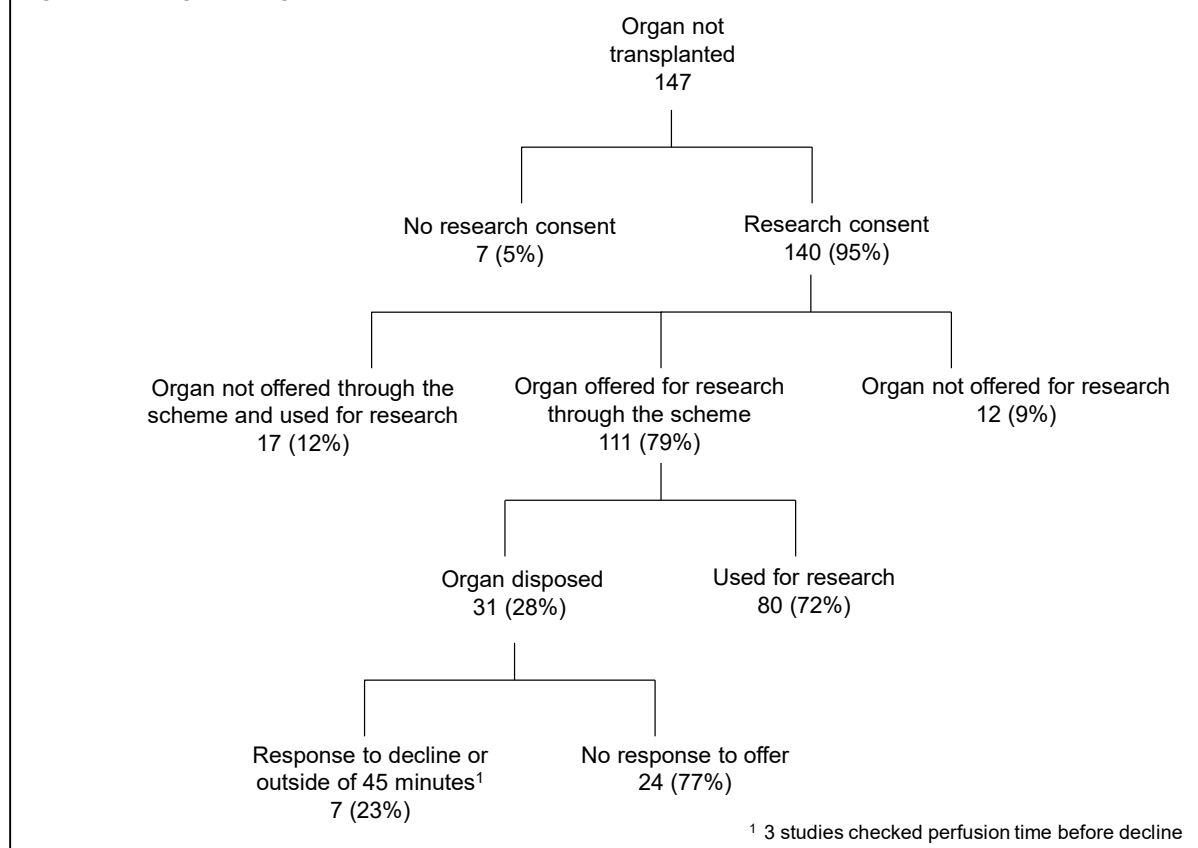
¹ Percentage of organs retrieved

² Percentage of organs not transplanted

³ Offered for research includes those that were not offered though the ranking system

8 **Figure 1** illustrates the pathway of the 147 organs which were retrieved and not transplanted from 1 October to 30 November 2017. Of those 147 organs that were not transplanted, 7 (5%) did not have consent for research. 111 organs were offered through the scheme, 80 (72%) of which were used for research. 43 organs were disposed of despite having research consent.

Figure 1 Tree diagram of organs that were retrieved and not transplanted from 1 October to 30 November 2017



- 9 12 organs were not offered for research for reasons other than no research consent. Reasons for not offering an organ for research where consent had been given are shown in **Table 2**.

Reasons for not offering	N
Hub operations had been advised that organ had been disposed of	4
CIT – too long to be used for research – disposed at lab	1
Used half kidney sent for urgent histology	1
Not used due to a cyst	1
Pancreas was dissected and inspected by surgeon and not suitable to offer for research	1
SNOD advised organ should be disposed of (tumour)	2
Used for histopathology	1
Not reported	1
Total	12

- 10 **Heatmap 1** presents the frequency of times-of-day and day-of-week that research organ offers were made. The darker the colour, the higher the number of offer. This shows that 41 (37%) of offers made through the scheme were made between 6pm and 12am. Mid-week (Tuesday, Wednesday, Thursday) offers also appear to be more common.

- 11 **Heatmap 2** presents the number of organs disposed of as a proportion of the number offered through the scheme. The darker the colour, the higher the proportion of organs disposed. Utilisation of offered research organs appears to be higher between 9am and 9pm and mid-week. Similar conclusions can be drawn when combining these data with the 2017 review data (**Appendix 1**).

	12am-3am	3am - 6am	6am-9am	9am-12pm	12pm-3pm	3pm-6pm	6pm-9pm	9pm-12am	Total
Monday	1	0	0	1	2	0	2	7	13
Tuesday	1	3	1	5	2	4	6	5	27
Wednesday	0	1	1	6	2	4	3	2	19
Thursday	2	1	5	2	2	3	1	3	19
Friday	3	3	0	2	1	1	1	1	12
Saturday	3	0	0	0	0	2	4	2	11
Sunday	3	0	0	0	2	1	3	1	10
Total	13	8	7	16	11	15	20	21	111

Heatmap 2 No. organs disposed/no. organs offered for offers made through the scheme, 1 October to 30 November 2017									
	12am-3am	3am - 6am	6am-9am	9am-12pm	12pm-3pm	3pm-6pm	6pm-9pm	9pm-12am	Total
Monday	0/1			0/1	0/2		0/2	4/7	4/13
Tuesday	0/1	2/3	0/1	1/5	0/2	0/4	0/6	2/5	5/27
Wednesday		0/1	0/1	0/6	1/2	0/4	0/3	1/2	2/19
Thursday	2/2	1/1	0/5	0/2	0/2	2/3	1/1	1/3	7/19
Friday	3/3	0/3		0/2	0/1	0/1	0/1	0/1	3/12
Saturday	3/3					0/2	1/4	0/2	4/11
Sunday	3/3				0/2	1/1	2/3	0/1	6/10
Total	11/13	3/8	0/7	1/16	1/11	3/15	4/20	8/21	31/111
No offer made									

- 12 Research studies have suggested in the past that they have not always been able to facilitate an organ due to geographical location. Travel times between organ location and final study location were therefore investigated. It was only possible to calculate such times for cases when the organ was originally located at a retrieval centre. The median travel time for the 75 known organ locations to final study location was 57 minutes (IQR: 0 – 159 minutes).
- 13 Long cold ischemia times may occur due to the length of the offering process. The median time from the start of the last offer for transplantation to the time the research organ was offered was 112 minutes (IQR: 49 – 683 minutes). Hub Operations state that offers are made for research organs as soon as all offers for transplantation have been declined by centres.
- 14 The average number of responses per offer was 1 which gave studies a good chance in receiving an organ if the study was active. This meant that studies that were lower in the ranking were still able to receive an organ.
- 15 **Tables 3 and 4** summarise the offers of organs for research made between 1 October and 30 November 2017 broken down by research study, for cardiothoracic and abdominal organs, respectively. The studies are ranked in order of priority as at October 2017. More information on the studies can be found in the **Appendix II**.
- 16 One heart and two lungs were offered through the scheme over this two-month period. 54 kidneys, 29 livers and 24 pancreases were offered during the same period.
- 17 Please note that the study number of the research study that received an organ is entered as free text on the database and there are cases that may contain typographical errors. **Tables 3 and 4** are summaries of the raw data.

Table 3 Responses to research offers for cardiothoracic organs by study, 1 October to 30 November 2017

Organ	Study Number	Ranking as at October 2017	Total offers through scheme	Offer responses in 45 minutes	Offer responses over 45 minutes	Offer responses to accept an organ	Offer responses to decline an organ	Total organs received not through scheme	Total organs received though scheme
Heart	67	1	1	1	0	1	0	0	1
	Not reported	.	1	0	0	0	0	1	.
	Total		1	1	0	1	0	1	1
Lungs	66	1	2	2	0	2	0	.	2
	58	2	2	1	0	1	0	2	.
	59	NA	2	0	0	0	0	1	.
	Total		2	3	0	3	0	3	2
Cardiothoracic organs	Total		3	4	0	4	0	4	3

Table 4 Responses to research offers for abdominal organs by study, 1 October to 30 November 2017

Organ	Study Number	Ranking as at October 2017	Total offers through scheme	Offer responses in 45 minutes	Offer responses over 45 minutes	Offer responses to accept an organ	Offer responses to decline an organ	Total organs received not through scheme	Total organs received though scheme
Kidneys	53	1	54	5	0	4	1	0	2
	49	2	54	1	0	1	0	0	0
	37	3	54	4	3	6	1	0	3
	48	3	54	15	0	11	4	0	8
	63	4	54	11	1	5	7	0	3
	23	5	54	8	0	8	0	0	6
	2	6	54	13	0	13	0	0	7
	40	6	54	6	0	5	1	0	1
	30	7	54	2	0	0	2	0	0
	4	Inactive	54	1	0	1	0	0	1
	31	Tissue bank	54	2	0	0	2	0	9
	36	Tissue bank	54	0	0	0	0	0	2
	Total		54	68	4	54	18	0	42
Liver	21	1	29	2	0	1	1	0	1
	62	1	29	8	0	3	5	0	1
	35	2	29	9	0	8	1	0	6
	60	2	29	6	0	6	0	0	3
	33	3	29	6	0	5	1	0	5
	56	4	29	2	0	2	0	0	2
	2	6	29	1	0	0	1	0	0
	68	7	29	1	0	1	0	1	1
Total		29	35	0	26	9	1	19	

Table 4 Responses to research offers for abdominal organs by study, 1 October to 30 November 2017

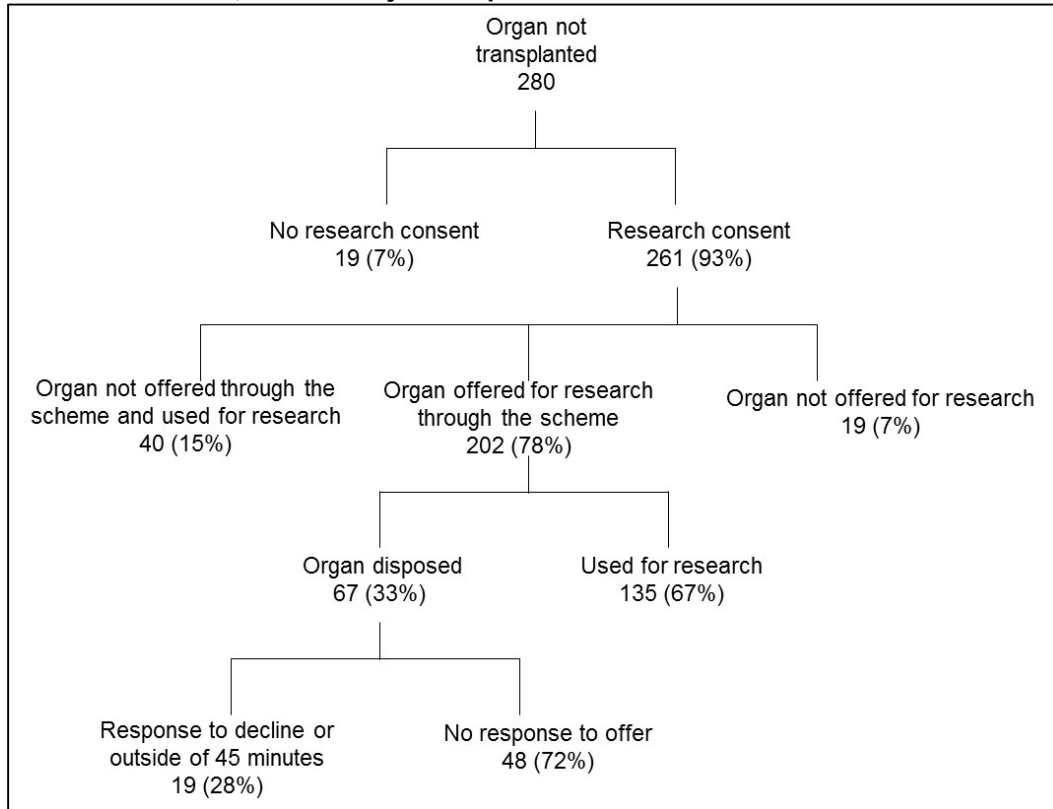
Organ	Study Number	Ranking as at October 2017	Total offers through scheme	Offer responses in 45 minutes	Offer responses over 45 minutes	Offer responses to accept an organ	Offer responses to decline an organ	Total organs received not through scheme	Total organs received through scheme
Pancreas	20	1	24	4	0	4	0	0	4
	45	2	24	4	0	3	1	0	3
	50	3	24	2	0	2	0	0	1
	3	5	24	4	0	4	0	0	2
	46	NA	24	2	0	2	0	1	2
	36	Tissue bank	24	0	0	0	0	0	1
	64	Inactive	24	3	0	3	0	0	2
	2	6	24	2	1	3	0	0	0
	Total		24	21	1	21	1	1	15
	Islets	45	2	1	1	0	1	0	6
3		5	1	1	0	1	0	0	0
40		6	1	1	0	1	0	0	0
47		King's lab	1	0	0	0	0	5	0
Total			1	3	0	3	0	11	1
Abdominal organs	Total		108	127	5	104	28	13	77

CONCLUSION

- 18 Whilst 91% (128) of organs with consent for research were offered for research, 43 (31%) of these organs were not used.
- 19 111 organs were offered through the research organ allocation scheme, 72% of which were used.
- 20 Utilisation of offered research organs appears to be higher between 9am and 9pm and mid-week.
- 21 The average number of responses per offer was 1 which gave studies a good chance in receiving an organ if the study was active. This meant that studies that were lower in the ranking were still able to receive an organ.

APPENDIX I – Combined allocation review data, 20 February to 20 April 2017 and from 1 October to 30 November 2017

Tree diagram of organs that were retrieved and not transplanted: combined data from 2 month allocation reviews, 20 February – 20 April 2017 and 1 October – 30 November 2017



Heatmap No. organs disposed/no. organs offered for offers made through the scheme, 20 February 2017 to 20 April 2017 and 1 October to 30 November 2017

	12am-3am	3am - 6am	6am-9am	9am-12pm	12pm-3pm	3pm-6pm	6pm-9pm	9pm-12am	Total
Monday	0/2			1/4	0/4		0/2	4/8	5/20
Tuesday	2/3	5/6	0/2	1/7	0/2	0/4	0/7	2/6	10/37
Wednesday	1/3	0/1	1/2	0/9	3/5	0/4	0/8	2/3	7/35
Thursday	3/4	1/1	0/6	0/2	0/2	3/8	2/2	4/10	13/35
Friday	4/5	1/4		1/5	0/5	0/3	3/5	2/3	11/30
Saturday	3/3			2/4	0/1	0/5	2/6	1/3	8/22
Sunday	5/7	2/2	2/2		1/4	1/3	2/4	0/1	13/23
Total	18/27	9/14	3/12	5/31	4/23	4/27	9/34	15/34	67/202

APPENDIX II – Ranking as at October 2017

Organ	Study	Rank	Location	Study Title
Heart	67	1	Imperial	Structural and functional analysis of intact myocardium and isolated cells from explanted hearts
Lung	66	1	Newcastle	Further Evaluation of Ex Vivo Lung Perfusion to Improve Transplantation Outcomes
Lung	58	2	Edinburgh	ENLIGHTEN - Multiplexed Optical Molecular Imaging and Sensing during Ex Vivo Lung Perfusion (EVLP)
Lung	38	NA	Harefield	Ex vivo transplant platforms used to explore the pathogenesis of acute lung injury
Lung	59	NA	Belfast	Human ex-vivo lung perfusion research consortium UK (HELP RCUK)
Liver	21	1	Cambridge	Development of pre-transplant normothermic perfusion reconditioning for human livers donated after circulatory death
Liver	62	1	Birmingham	Viability testing and transplantation of marginal livers - VITTAL
Liver	35	2	Birmingham	Normothermic Liver Perfusion Study (The development of NMLP for improvement of marginal human donor liver quality)
Liver	60	2	Oxford	Exploring the structural and functional effects of normothermic machine perfusion and de-fating agents on human steatotic livers
Liver	33	3	Birmingham	Expression and Function of Immune Regulatory Proteins in Human Liver
Liver	56	4	Edinburgh	Human Hepatic Progenitor Cells as a Source of Liver Regeneration
Liver	52	5	Newcastle	Establishing ex-vivo normothermic and hypothermic perfusion of livers for transplantation
Liver	50	6	Royal Free	Organ regeneration and disease modelling using 3D biological scaffold
Liver	18	6	Royal Free	Liver Viability Enhancement during Transportation - LIVET
Liver	68	7	King's	Hepatocyte Transplantation Project: Studies on isolated hepatocytes
Kidney	53	1	Cambridge	Quality assessment of Human Kidneys by Ex-vivo Normothermic Perfusion prior to Transplantation
Kidney	49	2	Birmingham	A study to determine the mechanism and effect of machine perfusion on cadaveric kidneys unsuitable for transplantation
Kidney	48	3	Newcastle	Establishing ex vivo normothermic perfusion (EVNP) of kidneys for transplantation
Kidney	37	3	Oxford	Normothermic Perfusion of Discarded Kidneys
Kidney	63	4	Guys	Transplanting the untransplantable - extending antibody incompatible transplantation using a normothermic perfusion model with cytoprotective agents
Kidney	23	5	Cambridge	Characterisation of ischaemia reperfusion injury in human kidneys Non-transplantable Kidneys
Kidney	2	6	Cambridge	Study of renal ischaemia-reperfusion injury and its amelioration
Kidney	19	7	Bristol	Establishment of cultured human glomerular cells for study of glomerular function in vitro
Kidney	40	8	Royal Free	Identification of genes involved in renal, electrolyte and urinary tract disorders
Kidney	30	9	Hammersmith	Use of Machine Perfusion for Improving Allograft Viability
Pancreas islets	20	1	Newcastle	Process development for islet isolation targeted at enhancing islet yield and viability
Pancreas islets	45	2	Oxford	Studies of Factors Influencing the Structure and Function of Human Pancreatic Islets for Transplantation
Pancreas	50	3	Royal Free	Organ Regeneration and Disease Modelling Using 3D Biological Scaffold
Pancreas	34	4	Worcester	A pre-clinical study of human islet function to improve long-term graft survival
Pancreas	3	5	Cambridge	Study of Pancreas Function, Physiology, Pathology and Therapeutics
Pancreas islets	40	6	Royal Free	Identification of genes involved in renal, electrolyte and urinary tract disorders
Pancreas	30	7	Hammersmith	Use of Machine Perfusion for Improving Allograft Viability
Pancreas islets	46	NA	Edinburgh	Edinburgh Islet Lab - supporting various islet research studies
Pancreas islets	47	NA	King's	King's Islet lab
Pancreas	64		Oxford	Assessment and Significance of Pancreatic steatosis in pancreas transplantation and its associations with graft pancreatitis