Consensus on general medical contraindications to organ donation?

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During 1989 and 1990 in England and Wales 453 confirmed brain stem dead patients in intensive care were reported to a confidential audit¹ as having a general medical contraindication to organ donation. In 437 cases the contraindication was briefly specified. Because the incidence of general medical contraindications to organ donation varied very significantly by region in England—from 9% in Oxford and Wessex (24 out of 266 confirmed brain stem deaths) to 27% in the North East Thames region and East Anglia (65 out of 237 confirmed brain stem deaths)¹—we speculated that there might be a lack of consensus among specialties on the medical contraindications to organ donation and disagreements also within specialties. We investigated these possibilities and report here our results.

Methods

The specialties were represented as follows: intensive care by past presidents of the Intensive Care Society (IC:2); transplant coordination by chairpersons of the United Kingdom Transplant Coordinators Association (TC:2); kidney transplantation by past presidents of the British Transplantation Society (KI:2); cardiothoracic transplantation by colleagues at Papworth Hospital, Cambridge (CT:2); and liver and corneal transplantation each by one surgeon (LI, CO).

With reference to the 437 listed general medical contraindications from the 1989 and 1990 confidential audit specialists were asked to score specific organs (1=transplantation is contraindicated; 2=possibly suitable: requires discussion; 3=transplantable; 9=not assessed). The only relevant information available to specialists in addition to the listed general medical contraindication (see figure) was the age, sex, and cause of death of the deceased (1=cerebrovascular accident, 2=head injury, 3=brain tumour, 4=other intracranial cause, 5=extracranial cause). Intensive care specialists and transplant coordinators scored every organ (corneas, kidneys, heart, liver, lungs); other raters scored only the organs which concerned their specialty.

Results

Mean age at confirmed brain stem death was 40.9 (SD 22.5) years for the 437 patients with a general medical contraindication to organ donation. Twenty three patients (5%) were aged 1 year or younger; 68 (16%) were aged 14 years or younger; and 144 patients (33%) were 55 years or older. There were 194 females (44%). Cause of death was cerebrovascular accident in 120 patients (27%), head injury in 81 (19%), brain tumour in 21 (5%), other intracranial cause in 122 (28%), and extracranial in 86 cases (20%). Cause of death was missing in seven cases (2%).

Table I shows the kidney scores assigned by the two renal specialists, who rated 316 (72%) cases identically. Moreover, their 107 scores subject to minor dispute (80 contraindicated/requires discussion, 27 requires discussion/transplantable) displayed no systematic

bias between raters. In only four cases, including a neonate and a haemophilic patient, was there serious disagreement (contraindicated versus transplantable). The two raters had commented as follows: KI (1)—“I seldom used code 3 because in most cases the contraindication given could have been genuine. I have therefore used code 2 a fair number of times and it would be most interesting to know more about these patients as I suspect there are a significant number where a transplant surgeon would have felt the contraindication was not genuine”; KI (2)—“When there was insufficient information I used code 2. It was perfectly possible that given all the information I might have then regarded transplantation to be contraindicated, but maybe the bottom line is that it is a relatively easy thing to discuss the doubtful cases with the transplant team and let it be a shared decision as to whether patients are offered for transplantation or not.”

Table II shows systematic disagreement between transplant coordinators and between intensive care specialists in assigned kidney and corneal scores, with the same scorer in each pair being always more liberal in interpreting the described medical contraindications. Tables III and IV give details of cases seriously disputed by transplant coordinators and by intensive care specialists.

Whereas the renal surgeon rated the kidneys as transplantable in only 28 cases listed as having a general medical contraindication to organ donation (6%) corneas were transplantable in 209 such cases (48%) according to the ophthalmic surgeon. In no case did the cardiothoracic surgeons judge heart or lungs as transplantable, and in only five cases (1%) did the hepatic surgeon score the liver as transplantable.

Other comments by raters were as follows.

TC (2)—“In the case of particular organs age rather than the medical condition gave grounds for exclusion. In the case of heart, heart and lung, and liver, in my experience bacterial infection, hypotension (and to an extent age) could be considered as relative contraindications depending on the nature of recipients who are awaiting transplants.”

IC (2)—“Many of the contraindications are quite clearly correct and therefore easy to assign code 1, for example, malignancy, infection, drug abusers, HIV, or hepatitis B positive. I would anticipate that most disputes are likely to arise as a result of imprecise descriptions of the alleged contraindication to organ donation—for example, the extent of hypoxia, hypotension, hypertension: obviously relevant, but cannot be assessed from these forms. Many apparent disagreements are likely to be attributable to different interpretations of the meaning of the stated contraindication rather than a real difference of opinion as to what constitutes a contraindication.”

CO—“Code 2 (requires discussion). These corneas may be suitable for transplantation but require further tests or checks to be carried out. They should be sent for storage in organ culture to allow for proper bacterial and fungal screening of the tissue (for example, from donors with septicaemia or meningitis) and allow time for postmortem confirmation of the cause of death and

RATER'S INITIALS

Please use codes 1 Transplantation is contraindicated
2 Possible suitability: requires discussion
3 Transplantable
9 Not assessed

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Region	Intensive care unit	Serial No	Cornea	Kidneys	Heart	Liver	Lungs
A	2	915702					
A	2	915711					
A	3	907652					
A	3	907656					
A	5	908018					
A	6	907970					
A	7	907935					
A	8	907916					
A	10	907591					
A	11	901486					
A	12	915747					
A	15	903141					
A	15	907715					
A	16	905190					
A	16	905195					
A	16	907772					
A	22	905255					
A	22	907836					
A	22	907840					
B	1	902290					
B	1	912772					
B	3	903352					
B	4	903372					
B	6	900103					
B	8	900146					
B	9	900158					
B	13	900260					
B	14	900309					
B	14	902312					
B	14	902313					
B	14	902324					
B	16	900376					
B	16	900379					

Coroner refused permission
Systemic lupus erythematosus, lung and cardiac involvement, myocardial infarction, hypertension
Viral meningitis
Severe chest infection, viral encephalitis, anaemia
Intravenous drug abuser, hepatitis B positive
Severe infection
Prolonged cardiac arrest, acute renal failure, Henoch-Schönlein purpura
Diabetes, arteriosclerosis
Hypotension, anuria
Renal failure, longstanding chronic obstructive airway disease
Multiple organ failure
Septicaemia, carcinoma
Septicaemia, bacterial endocarditis
Disseminated malignancy
Carcinoma
Meningitis
Septicaemia, renal failure
Systemic lupus nephritis, renal failure, hypertension, septicaemia
Meningococcal septicaemia
Nephrectomy for carcinoma
Hypotension, oliguria
Disseminated intravascular coagulation? Cause of illness? Meningitis
Gross hypertension
Septicaemia, multiorgan diabetic damage
Severe prolonged hypotension
Lobar pneumonia, acute myocardial infarction
Septicaemia and poorly controlled diabetes for 14 years
Chronic hypertension
Age (58)
Age (76)
Alcohol abuse
Septicaemia

Region	Intensive care unit	Serial No	Date of death	Sex	Age (years)	Cause of death code
A	2	915702	11/10/89	F	46	5
A	2	915711	18/12/89	M	48	4
A	2	918604	27/2/90	F	37	4
A	2	918615	11/8/90	M	11	5
A	2	932643	24/6/90	M	1	9
A	2	932649	20/12/90	M	66	1
A	3	907652	1/1/89	F	14	4
A	3	907656	19/1/89	F	50	2
A	3	932692	8/12/90	F	25	2
A	5	908018	30/10/89	M	25	2
A	6	907970	5/12/89	F	6	4
A	7	907935	19/4/89	M	23	5
A	7	918437	11/3/90	F	78	2
A	8	907916	27/9/89	M	54	1
A	8	918646	13/2/90	F	68	1
A	10	907591	8/10/89	M	70	2
A	11	901486	17/11/89	M	65	4
A	11	901491	23/1/90	F	57	1
A	11	901496	13/2/90	M	69	1
A	11	918528	17/7/90	F	64	5
A	12	915747	22/10/89	F	56	4
A	14	922566	9/9/90	F	18	5
A	15	903141	23/8/89	M	76	5
A	15	907715	5/4/89	M	60	1
A	16	905190	8/9/89	M	8	3
A	16	905195	1/10/89	F	45	1
A	16	907772	12/3/89	F	6	4
A	16	928252	1/7/90	F	3	4
A	22	905255	12/11/89	M	39	1
A	22	907836	26/7/89	F	18	5
A	22	907840	17/8/89	M	3	5
B	1	902290	23/4/89	M	53	1
B	1	912722	15/8/89	M	57	4
B	3	903352	15/1/89	F	26	5
B	3	915565	16/1/90	F	73	4
B	4	903372	20/11/89	M	34	4
B	6	900103	6/1/89	M	68	4
B	8	900146	18/9/89	F	58	1
B	8	921179	7/12/90	M	40	9
B	9	900158	27/4/89	M	65	5
B	9	931612	5/12/90	F	33	1
B	11	926063	6/4/90	F	42	4
B	11	926071	14/2/90	M	15	4
B	12	921185	11/5/90	F	42	4
B	13	900260	4/4/89	M	17	4
B	14	900309	1/7/89	F	24	1
B	14	902312	11/2/89	M	58	2
B	14	902313	11/2/89	F	76	2
B	14	902324	19/3/89	F	54	2
B	15	914773	8/1/90	M	0	1
B	16	900376	4/1/89	F	31	1
B	16	900379	15/1/89	F	30	4
B	16	900382	18/1/89	M	55	3
B	16	914740	1/12/89	F	52	1
B	16	914741	18/4/89	F	60	1
B	16	914755	12/1/90	M	37	2
B	16	921128	23/6/90	M	0	4
B	17	903289	29/7/89	F	69	1
B	17	903295	5/11/89	M	70	1

Cause of death codes are:

- (1) Cerebrovascular accident (haemorrhage or infarction)
- (2) Head injury
- (3) Brain tumour
- (4) Other intracranial cause
- (5) Extracranial cause

Listed general medical contraindications to transplantation in brain stem dead patients

also for more detailed examination of the corneal endothelium. Viral encephalitis or viral meningitis are contraindications to corneal transplantation."

CT (1)—"I have various comments to make. Firstly, you will see that I have not actually scored anything as transplantable simply because other information is not available and it may very well be that the causes given are merely the tip of the iceberg of the problem. However, I have scored quite a few that would need

discussion and, in particular, I think a large number of the viral meningitis patients may very well be suitable for cardiothoracic transplantation, and if this was their only problem I would have scored them 3. I have also scored as 2 quite a few patients who are hypotensive, and many of these may not actually be suitable for transplantation but following discussion might have been resuscitable with better measures and, therefore, ultimately good for transplantation. There is a third category which I have also scored 2—those who are obviously not considered for kidney transplantation, who are in the right age group, and have died of renal failure. Again, they may also have other organ problems, but if renal failure was the only other medical cause which rendered them unsuitable for transplantation they may very well have heart or lungs that could have been used, and these patients were not considered simply because they were not suitable as renal donors."

LI—"The major problem in deciding whether transplantation is contraindicated relates to the small

TABLE 1—Cross tabulation of kidney scores by renal specialists (percentages given in parentheses)

KI (1) scores	KI (2) scores				Total
	Contraindicated	Requires discussion	Transplantable	Not assessed	
Contraindicated	208	40	3		251 (57)
Requires discussion	40	99	16	4	159 (36)
Transplantable	1	11	9	2	23 (5)
Not assessed	4				4 (1)
Total	253 (58)	150 (34)	28 (6)	6 (1)	437 (100)

TABLE II—Distribution of kidney and corneal scores within and between specialties (percentages given in parentheses)

	Kidney scores						Cornea scores					
	Kidney specialists		Transplant coordinators		Intensive care specialists		Corneal surgeon	Transplant coordinators		Intensive care specialists		
	KI (1)	KI (2)	TC (1)	TC (2)	IC (1)	IC (2)	CO	TC (1)	TC (2)	IC (1)	IC (2)	
Contraindicated	251 (57)	253 (58)	201 (46)	289 (66)	309 (71)	361 (83)	72 (16)	52 (12)	89 (20)	199 (46)	265 (61)	
Requires discussion	159 (36)	150 (34)	163 (37)	136 (31)	93 (21)	53 (12)	147 (34)	14 (3)	164 (38)	64 (15)	47 (11)	
Transplantable	23 (5)	28 (6)	64 (15)	7 (2)	32 (7)	15 (3)	209 (48)	369 (84)	179 (41)	171 (39)	117 (27)	
Not assessed	4 (1)	6 (1)	9 (2)	5 (1)	3 (1)	8 (2)	9 (2)	2 (1)	5 (1)	3 (1)	8 (2)	

TABLE III—Cases seriously disputed by transplant coordinators (kidney scores)

Serial No	Sex	Age (years)	Cause of death code	TC (1)	TC (2)	General medical contraindications
928892	M	24	2	3	1	Multiple trauma, prolonged intractable hypotension
928856	M	27	2	3	1	Poor cardiac output, murder case
916665	M	14	4	3	1	Spina bifida
917347	M	39	5	3	1	After myocardial infarction, cardiac arrest, severe hypotension, anuria
921909	F	62	3	3	1	Acute renal failure
921910	M	59	3	3	1	Renal failure, inotropic support
921920	M	17	2	3	1	Major haemorrhage, unable to resuscitate
931243	M	51	1	3	1	Acute renal failure
922206	F	63	5	3	1	Chronic liver disease
913456	M	31	2	3	1	Fever 38.5°C, septicaemia
930736	M	11	4	3	1	Meningococcal septicaemia and meningitis
904900	F	35	1	3	1	After cardiac surgery, low output state

TABLE IV—Cases seriously disputed by intensive care specialists (kidney scores)

Serial No	Sex	Age (years)	Cause of death code	IC (1)	IC (2)	General medical contraindications
932649	M	66	1	3	1	Emphysema, hypotension
912803	M	71	1	3	1	Age
920550	M	0	5	3	1	Age (3 days)
908812	M	68	1	3	1	Hypertension, age
910777	F	75	2	3	1	Old age
901577	M	74	2	3	1	Age
917764	M	70	2	3	1	Age
905669	F	51	3	1	3	Large space occupying lesion
929437	F	50	1	1	3	Ischaemic heart disease, old age

amount of information given. Examples are the following reasons: (a) with respect to hypotension it would be important to know how long this lasted and whether it had been corrected; (b) donors who have had bacterial meningitis are used for liver donation but only if an adequate period of antibiotic therapy has been carried out; (c) renal failure is not in itself a contraindication to liver donation provided liver function and other parameters are satisfactory; (d) diabetes would not in itself preclude transplantation of the liver. Many of the factors mentioned would be considered as contraindications for an elective patient who could wait for an ideal donor, but in emergency fulminant cases where the options are either transplantation or death a less than perfect donor would certainly be considered, and I am sure that some of these would have fitted into that category."

Discussion

Given only a minimal description of the alleged general medical contraindication together with the patient's sex, age, and cause of death, specialists were asked to score the suitability of specific organs for transplantation. They did not have recourse to case notes, to additional investigations, or to discussion with intensive care unit staff to elicit further information as in practice they would have. The scoring exercise was therefore artificial but still relevant in the sense that a précis of the patient's contraindication could be expected to summarise the most salient feature(s) of the patient's condition which the recorder

believed obviated transplantation. The boxes show absolute contraindications to corneal donation and to solid organ donation in general and additional absolute contraindications for particular solid organs.

There is no upper age limit for eye donors, and postmortem times of up to 24 hours before eye retrieval are acceptable provided that corneas and the corneal endothelium are examined carefully before transplantation. If in doubt the operator should always retrieve the eyes unless this is potentially hazardous and contact the United Kingdom Transplant Support Service to arrange immediate transportation of the eyes to either Bristol or Manchester eye bank. With respect to solid organ donation there is no rigid upper age limit for donors, but it is unusual for organs to be suitable beyond the following age limits: heart or lungs, or both, 60 years, liver 60 years, kidneys 75 years.

DIFFERENT APPROACHES

Scoring was done independently by all 10 raters. Scores by CO and LI were informally peer reviewed by a departmental colleague before being forwarded for analysis. Though we refrain from drawing too strong

Donor medical contraindications: corneas

- **Infections**
 - Acquired immunodeficiency syndrome (AIDS) and donors in high risk groups, even if HIV antibody negative
 - Active viral hepatitis (A, B, or C)
 - Viral seropositivity: HIV, HBsAg, hepatitis C virus
 - Active viral encephalitis or encephalitis of unknown origin
 - Creutzfeldt-Jakob disease
 - Recipients of human pituitary growth hormone
 - Rabies
 - Congenital rubella
 - Reye's syndrome
 - Progressive multifocal leucoencephalopathy
 - Subacute sclerosing panencephalitis (measles)
 - Septicaemia (unless eyes, are sent to Bristol or Manchester eye bank for storage by organ culture)
- **Unknown aetiology and neurological disorders**
 - Death from unknown cause (unless postmortem examination is pending and eyes are sent to Bristol or Manchester for storage by organ culture)
 - Central nervous system diseases of unknown aetiology
- **Malignancies**
 - Leukaemia, lymphoma
- **Intrinsic eye disease**
 - Ocular inflammation
 - Congenital or acquired disorders of the eye that would preclude successful graft outcome
 - Retinoblastoma
 - Malignant tumours of the anterior segment
 - Previous intraocular surgery

conclusions, the scoring exercise served to highlight dilemmas.

Different approaches to scoring were clearly evident. Whereas discordant scores between renal physician and renal surgeon were essentially discordant at random and the disagreements minor with only four exceptions, the two cardiothoracic specialists approached the scoring exercise differently from each other. In only one out of their 301 minor disagreements (contraindicated/requires discussion) on heart or lung scores did TC (1) code "requires discussion." Neither cardiothoracic surgeon considered any patient as having transplantable heart or lungs, however, and so there were no major disagreements between them.

Comparison of the scores assigned by the two transplant coordinators illustrates systematic bias across all organs with TC (1) always the more liberal scorer, whereas TC (2) consistently assigned scores which accorded with, or were rather more restrictive than, those of the individual corneal, renal, liver, and cardiothoracic specialist. This phenomenon represents good calibration between the decisions of the transplant coordinator TC (2) and transplant surgeons.

There was systematic bias also between intensive care specialists, one of the pair, IC (1), scoring more liberally across all organs. For corneas, as for kidneys, the intensive care specialists used the designation "contraindicated" more frequently than did the corneal surgeon (about three times as often) or renal surgeon.

SERIOUS DISAGREEMENTS

It is instructive to focus on the general medical contraindications which gave rise to serious disagreements. In respect of kidneys the intensive care specialists disagreed about whether older age contraindicated renal transplantation; and whereas the renal specialists designated suitable as donors children with viral illnesses and patients with muscular dystrophy other raters considered these conditions as contraindications to renal transplantation. Intensive care specialists disagreed about whether renal failure was a contraindication to heart and lung transplantation; and whereas the cardiothoracic surgeons judged alcoholism and meningitis to be contraindications other raters scored patients with these conditions as having transplantable cardiothoracic organs.

Diabetes did not obviate liver transplantation according to the liver surgeon but was scored as a contraindication by the second transplant coordinator. Renal failure in elderly patients (ages 67 and 68), muscular dystrophy, and meningococcal meningitis were rated as contraindications by the liver specialist whereas patients with these conditions were scored as transplantable by intensive care specialists and transplant coordinators respectively. Whereas the corneal surgeon scored as transplantable the corneas of patients who were elderly, had current or previous malignancy—except for leukaemia, lymphoma, and brain lesions—or had multiorgan failure intensive care specialists were more reticent. Important contraindications to corneal transplantation were leukaemia, lymphoma, brain lesions, neurological disease, senile dementia of transmissible cause, septicaemia (but see commentary by CO), and drug abuse. In 71 patients (16%) there was complete consensus that transplantation of all solid organs was contraindicated for reasons such as previous malignancy, septicaemia, infection with hepatitis B virus or HIV, or old age, particularly age over 80.

Donor medical contraindications: solid organs

Absolute contraindications to all solid organ donation:

- Major systemic sepsis
- History of malignancy, except primary brain tumour
- Viral seropositivity: HIV, HBsAg, hepatitis C virus
- HIV high risk category, even if HIV antibody negative
- Certain rare infectious diseases such as Creutzfeldt-Jakob, rabies, and recipients of human pituitary growth hormone

Additional absolute contraindications for particular organs:

Kidneys

- (i) Established chronic renal insufficiency

Liver

- (i) Established liver disease
- (ii) Liver-based inborn error of metabolism
- (iii) History of alcoholism

Heart

- (i) Established cardiac disease
- (ii) Previous cardiac surgery
- (iii) Prolonged cardiac arrest
- (iv) Myocardial infarction
- (v) Irreversible poor cardiac output

Lungs

- (i) Established lung disease
- (ii) Previous lung surgery
- (iii) Bronchopneumonia
- (iv) Irreversible poor gas exchange

(Unilateral lung trauma does not preclude use of the contralateral lung)

An elaboration of this study would be the use of realistic paper patients for professional training about suitability for transplantation in focused areas—such as bacterial versus viral meningitis, donation of extrarenal organs in the context of renal failure, muscular dystrophies, previous malignancy in the context of corneal donation, and children with viral illnesses.

SCALE OF LACK OF CONSENSUS

All 437 confirmed brain stem dead patients whom we studied were listed as having a general medical contraindication to organ donation, yet transplant surgeons considered that the kidneys were transplantable in 6% of cases, the liver in 1%, and the corneas in 48%. In no case did the cardiothoracic surgeons consider that heart or lungs were transplantable. Corneas apart, it is reassuring that among confirmed brain stem dead patients with a so called general medical contraindication to organ transplantation few transplantable solid organs were missed.

The United Kingdom Transplant Support Service may be contacted on 0272 (Bristol) 507777.

¹ Gore SM, Cable DJ, Holland AJ. Organ donation from intensive care units in England and Wales: two year confidential audit of deaths in intensive care. *BMJ* 1992;304:349-55.

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