



Causes of renal allograft failure in the United Kingdom: trends in UK Renal Registry and NHS Blood and Transplant data from 2000 – 2013

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Renal allograft survival

- Most patients outlive their allografts
 - 840 recipients return to dialysis each year in the UK
 - According to UKRR, graft failure is the 5th most common reason to start dialysis
- Substantial progress in improving graft survival in the first year post-transplantation, but little corresponding improvement in outcomes beyond that

Incomplete or erroneous understanding of the causes of longer term graft loss is a significant barrier to progress



Identifying Specific Causes of Kidney Allograft Loss

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W. K. Kremers^d, H. Amer^a, J. M. Gloor^a
and F. G. Cosio^{a,*}

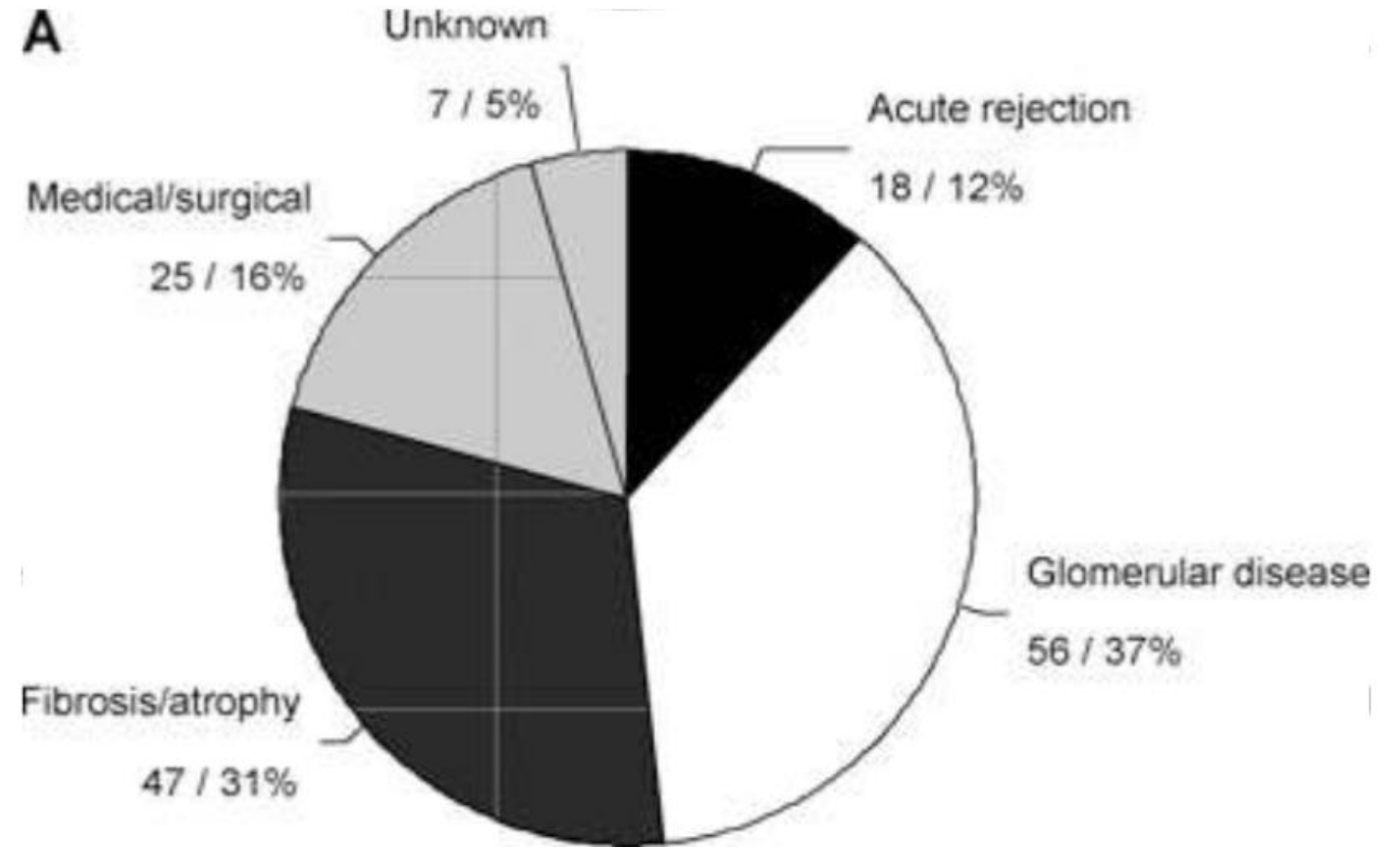
1317 recipients

Median 50 months f/u

25% of grafts lost

- 10.4% DWFG

- 2.9% PNF



Methods

Study population

- Incident renal allograft recipients from 1 January 2000 to 31 December 2013
 - ≥ 18 years at time of transplant
 - Single organ
 - First transplant
 - Centre reporting to UKRR

Dataset

- Data provided by UKRR and NHSBT



Cause of graft failure categories

Original NHSBT cause of failure categories
Hyperacute rejection
Rejection while taking immunosuppressive drug(s)
Rejection after stopping all immunosuppressive drug(s)
Recurrent primary renal disease
Vascular or ureteric operative problems
Vascular (arterial or venous) thrombosis
Infection of graft
Removal of functioning graft
Non-viable kidney
Recipient died, graft still functioning at time of death
Other
Missing



Cause of graft failure categories

Original NHSBT cause of failure categories	Number
Hyperacute rejection	21
Rejection while taking immunosuppressive drug(s)	1090
Rejection after stopping all immunosuppressive drug(s)	53
Recurrent primary renal disease	186
Vascular or ureteric operative problems	239
Vascular (arterial or venous) thrombosis	178
Infection of graft	90
Removal of functioning graft	26
Non-viable kidney	144
Recipient died, graft still functioning at time of death	2200
Other	604
Missing	558

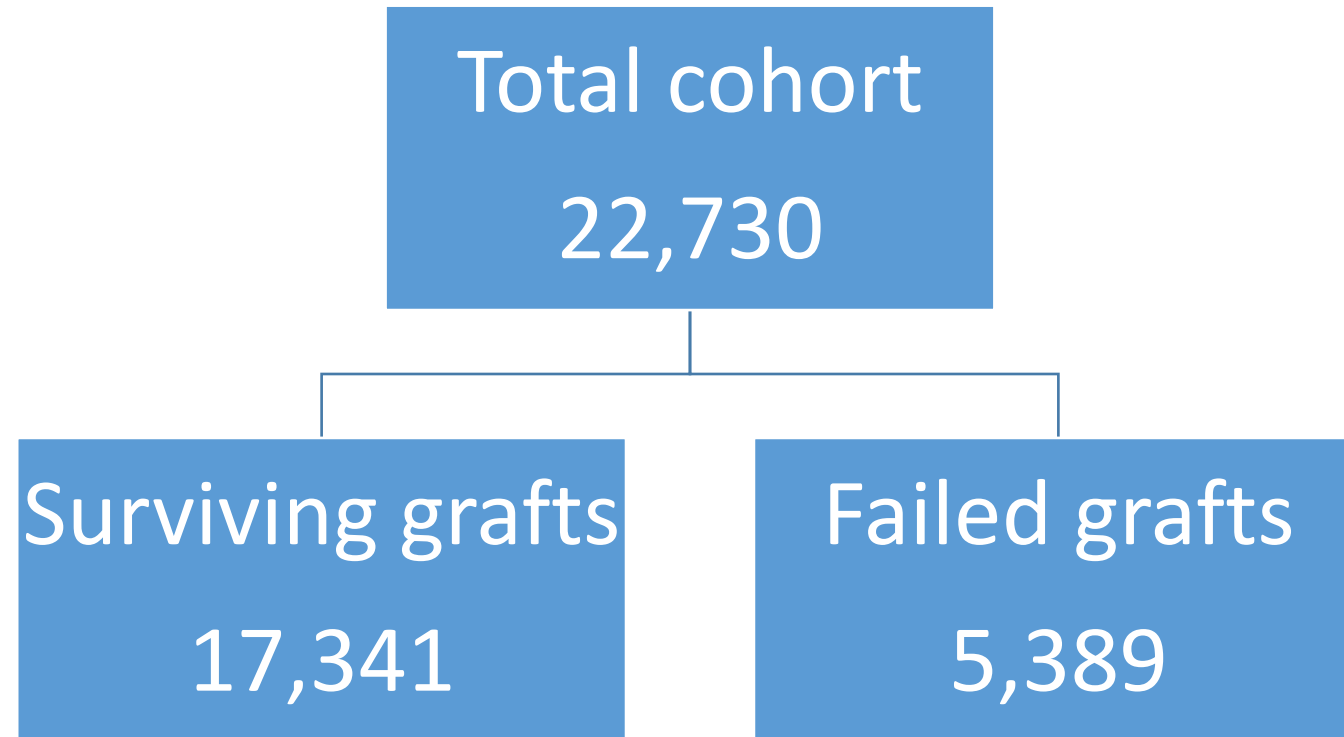


Cause of graft failure categories

Original NHSBT cause of failure categories	New cause of graft failure categories
Hyperacute rejection	Alloimmune pathology
Rejection while taking immunosuppressive drug(s)	
Rejection after stopping all immunosuppressive drug(s)	
Recurrent primary renal disease	Recurrent primary disease
Vascular or ureteric operative problems	Surgical cause Thrombosis Vascular or ureteric operative problems
Vascular (arterial or venous) thrombosis	
Infection of graft	Infection of graft
Removal of functioning graft	Removal of functioning graft
Non-viable kidney	Non-viable kidney
Recipient died, graft still functioning at time of death	Death with a functioning graft
Other	Other
Missing	Missing



Results



Patient demographics	Total	Surviving	Failed
		% or median (IQR) or mean (SD)	% or median (IQR) or mean (SD)
Age at transplantation			
<40 years	6,585	30.1	25.4
40–54 years	8,473	39.3	30.8
≥55 years	7,672	30.6	43.8
<i>Overall (mean [SD])</i>	22,730	47.3 (13.3)	50.7 (14.4)
Pre-transplant modality			
<i>Haemodialysis</i>	12,406	52.6	60.9
<i>Peritoneal dialysis</i>	6,226	27.0	28.6
<i>Pre-emptive transplant</i>	4,063	20.2	10.4
<i>Unknown</i>	35	0.2	0.2
Time on dialysis			
<1 year	8,070	38.8	24.8
1–3 years	7,252	31.3	33.9
>3 years	7,408	29.9	41.3
<i>Overall (median [IQR])</i>	22,730	1.6 (0.3–3.5)	2.4 (1.0–4.5)
Donor type			
<i>DBD</i>	10,824	44.0	59.3
<i>DCD</i>	4,423	19.7	18.6
<i>Live</i>	7,483	36.3	22.2

Patient demographics	Total	Surviving	Failed
		% or median (IQR) or mean (SD)	% or median (IQR) or mean (SD)
Recipient sex			
<i>Male</i>	13,978	61.3	62.3
<i>Female</i>	8,752	38.8	37.7
Recipient ethnicity			
<i>Asian</i>	2,268	10.1	9.7
<i>Black</i>	1,273	5.5	5.9
<i>Other</i>	469	2.2	1.5
<i>White</i>	18,714	82.2	82.9
Primary renal disease			
<i>Diabetes</i>	3,266	13.5	17.3
<i>Glomerulonephritis</i>	4,970	22.0	21.5
<i>Hypertension</i>	1,317	5.5	6.8
<i>Missing</i>	633	2.8	2.6
<i>Other (high risk)</i>	1,339	5.8	6.2
<i>Other (low risk)</i>	2,098	9.5	8.3
<i>Polycystic disease</i>	3,326	15.7	11.2
<i>Pyelonephritis</i>	2,259	9.9	10.0
<i>Renal vascular disease</i>	291	1.2	1.6
<i>Uncertain</i>	3,231	14.1	14.6
HLA mismatch			
<i>0 0 0</i>	2,535	11.2	11.1
<i>ODR & 0/1B</i>	6,120	25.9	30.4
<i>ODR & 2B or 1DR & 0/1B</i>	9,606	42.5	41.6
<i>1DR & 2B or 2DR</i>	4,460	20.5	17.0



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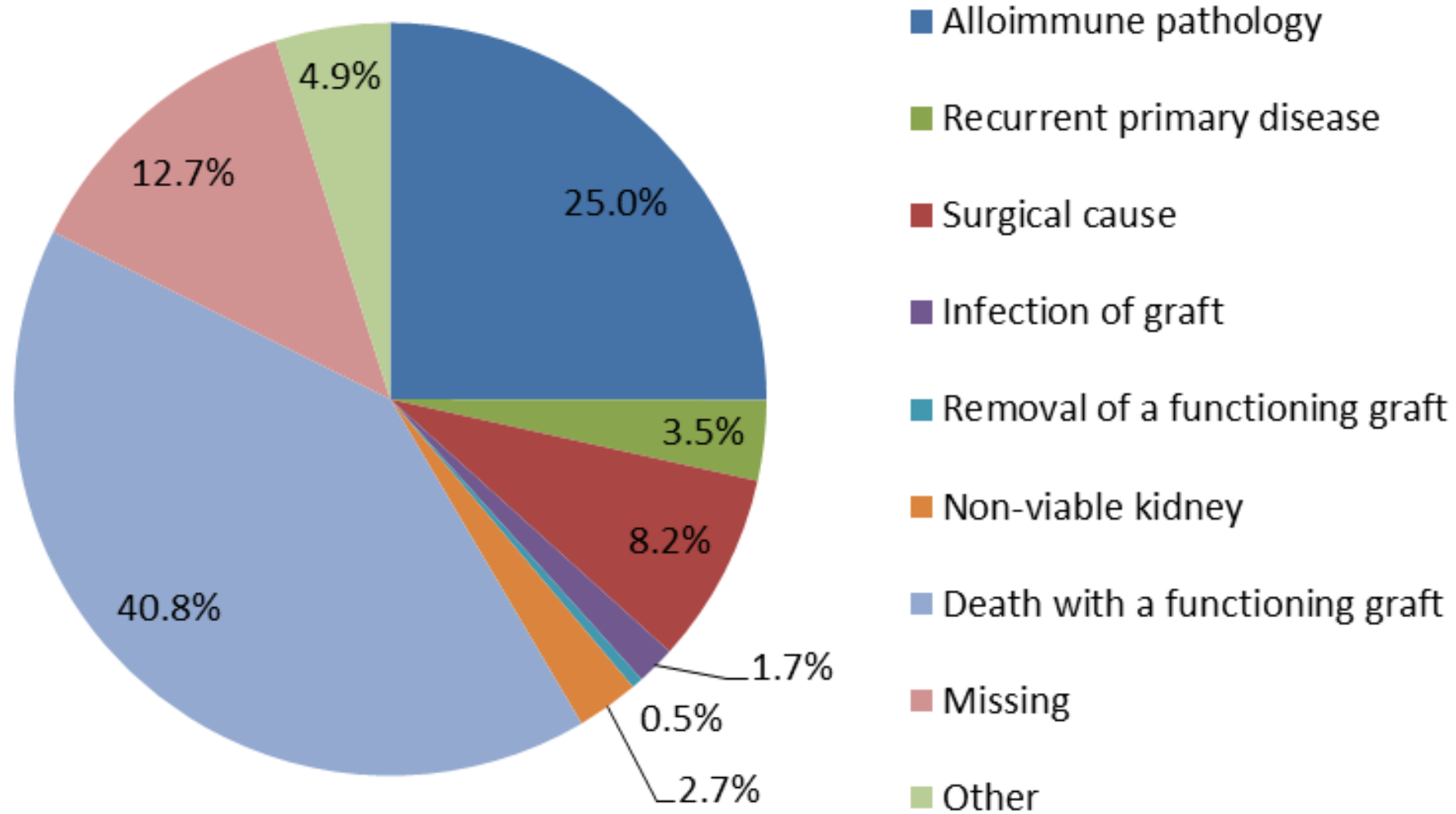


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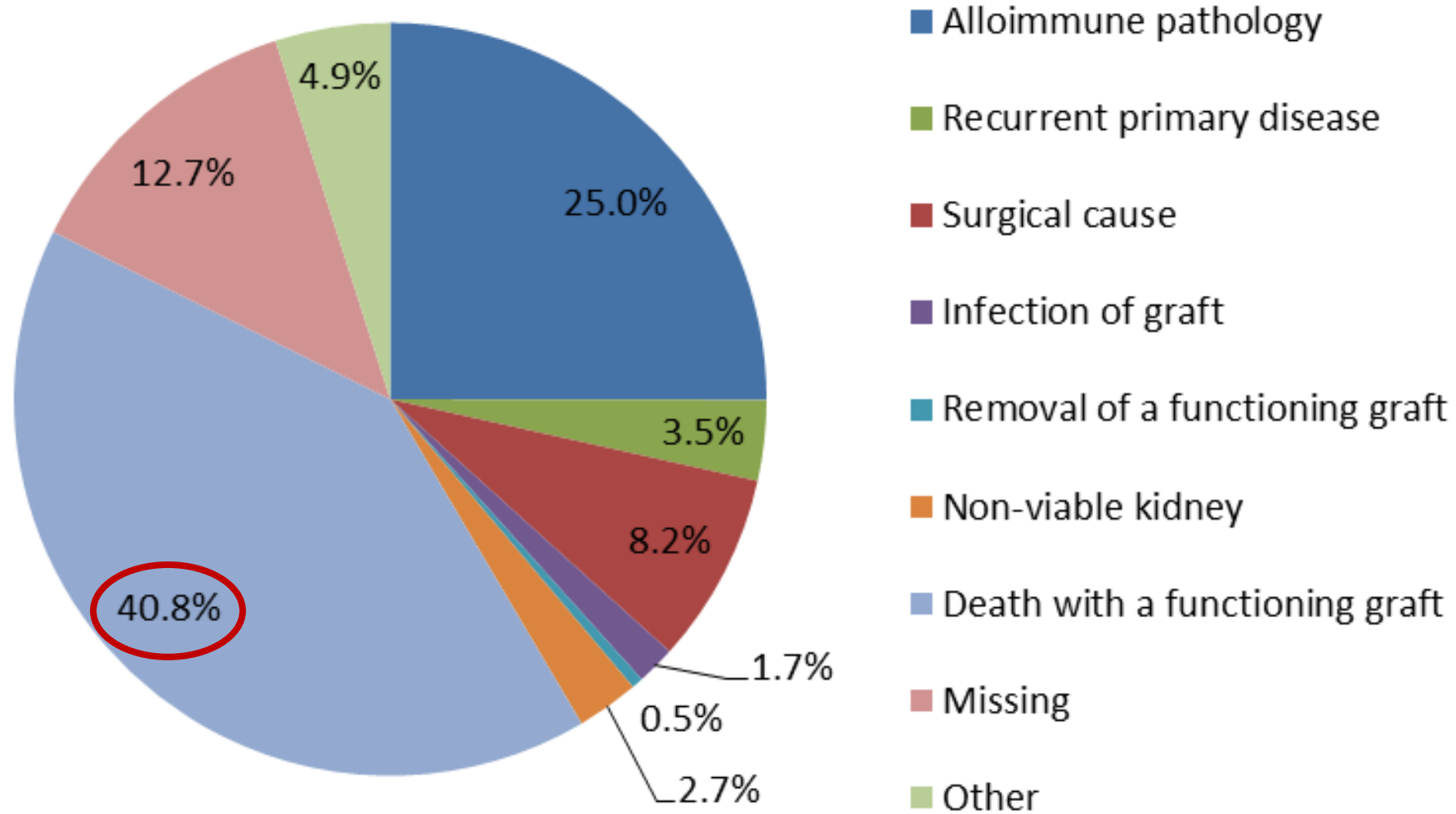
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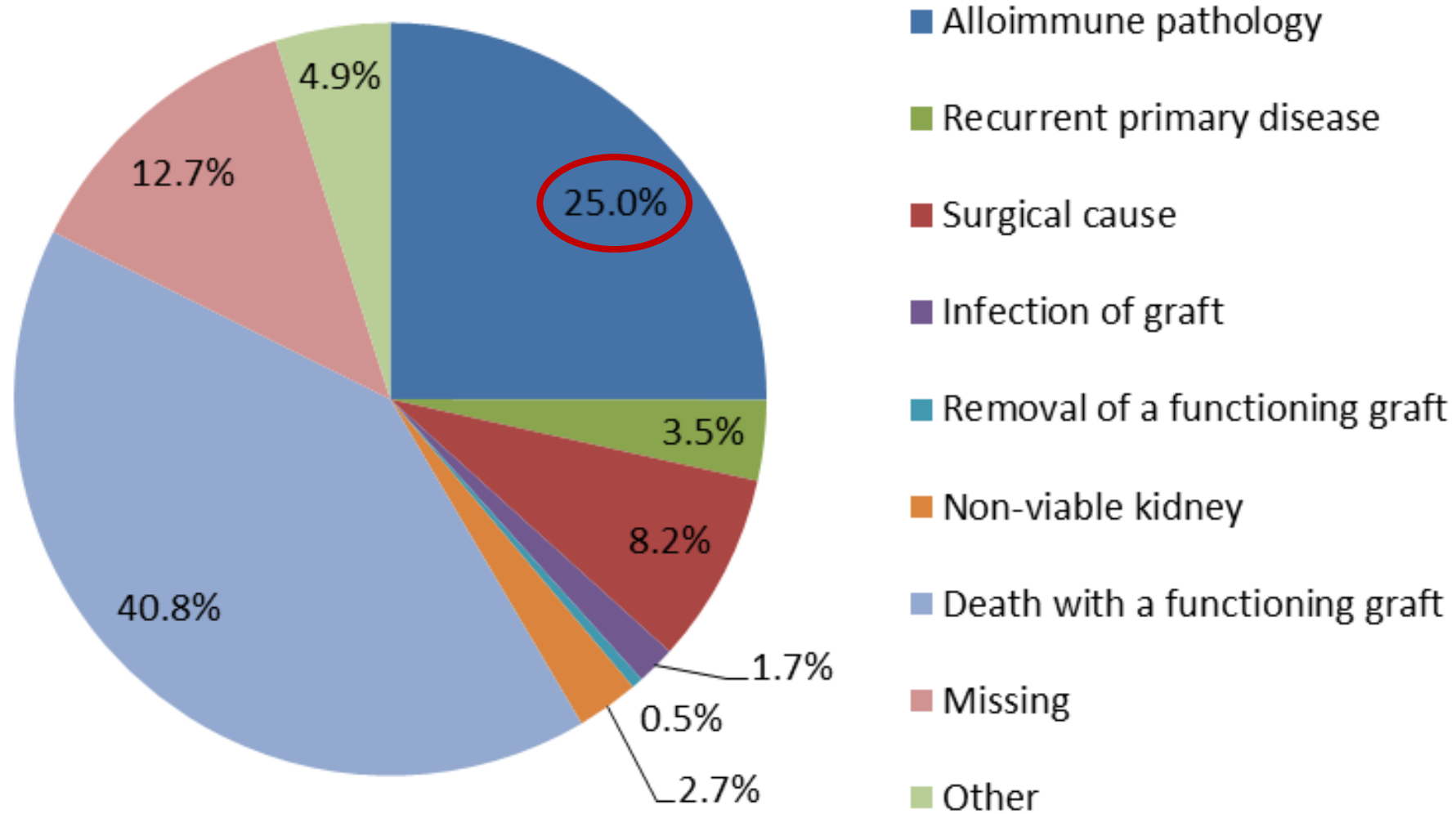
Causes of graft failure



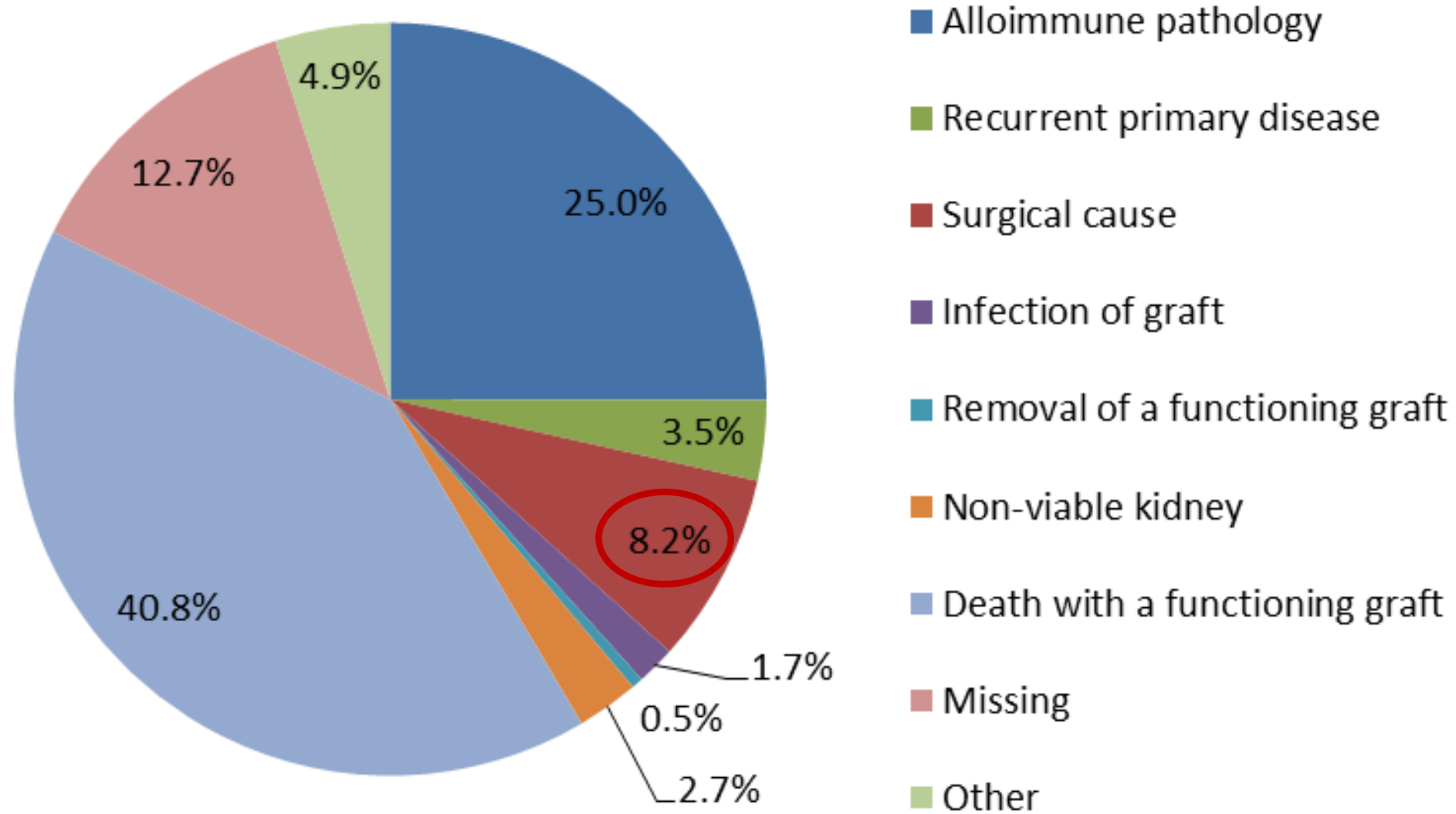
Causes of graft failure



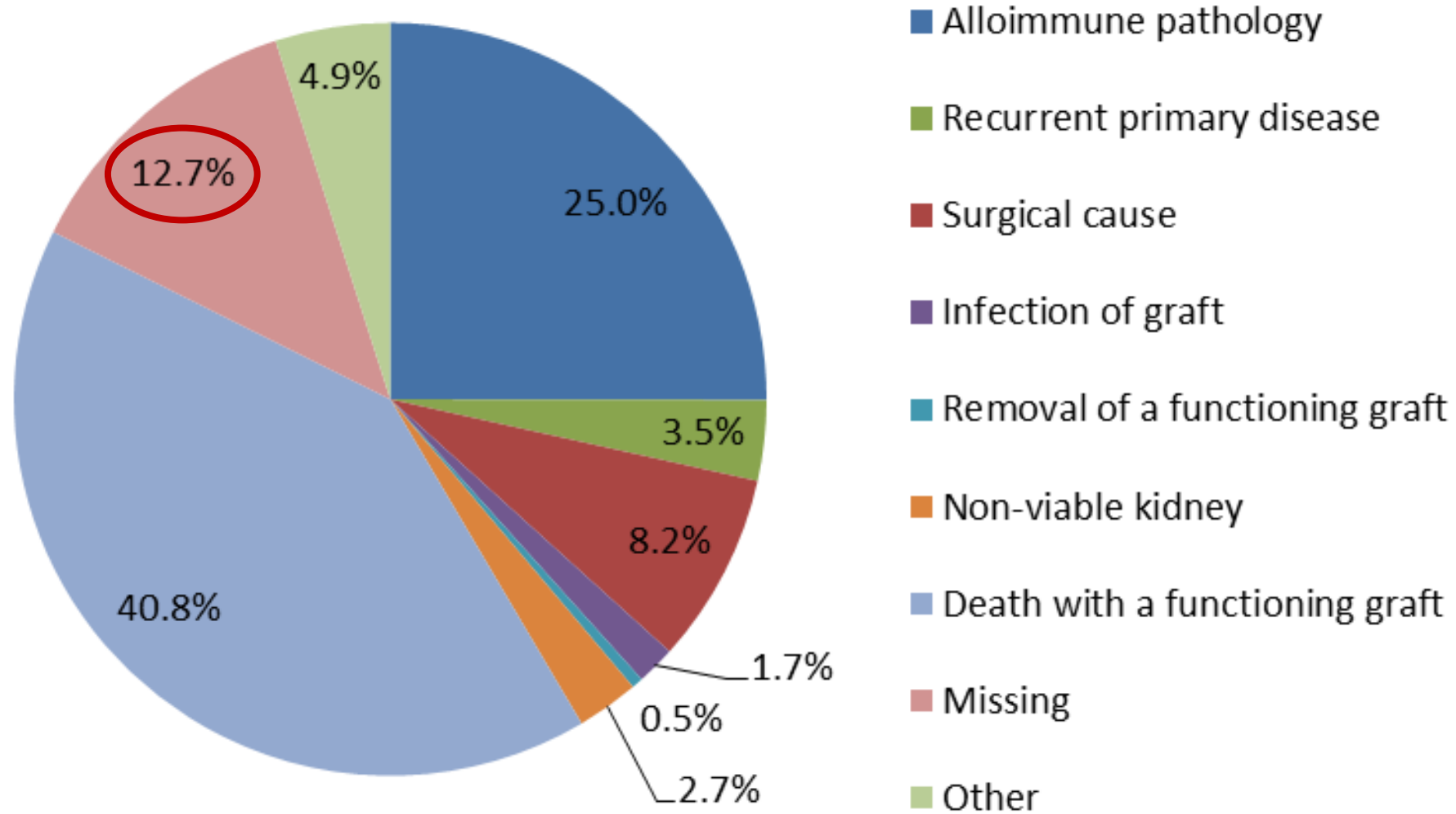
Causes of graft failure



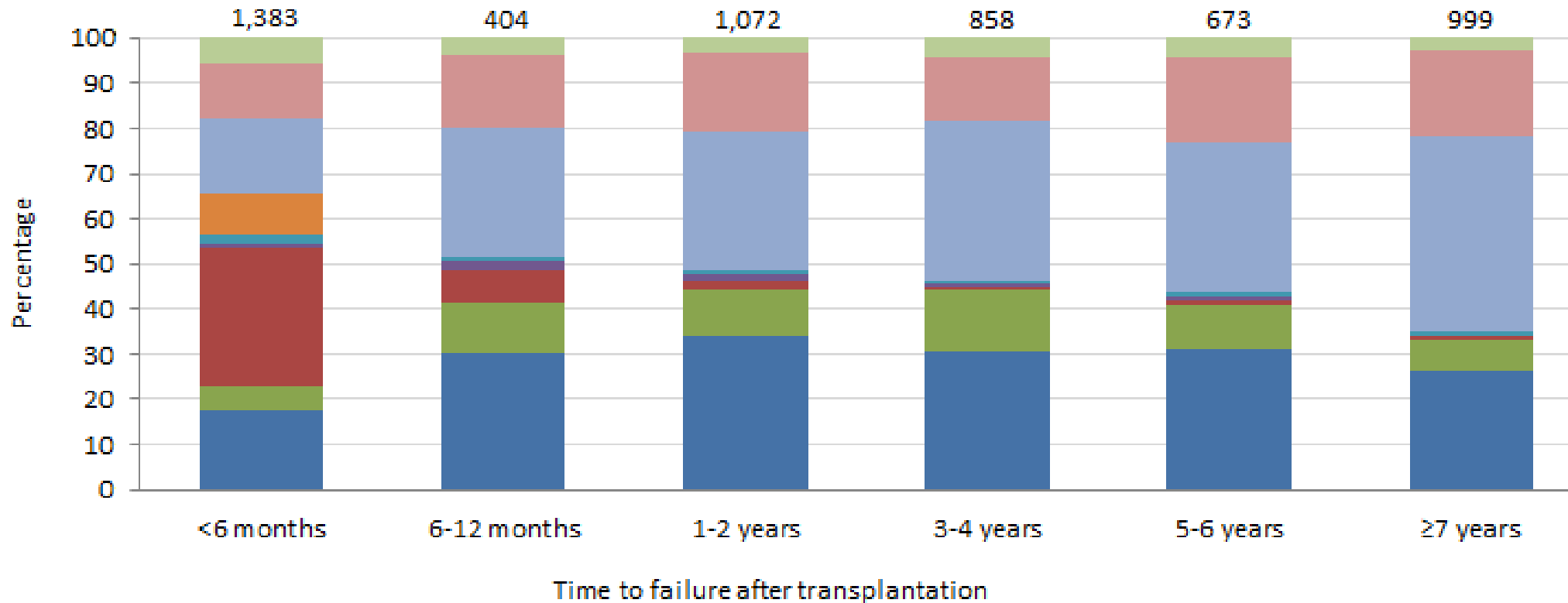
Causes of graft failure



Causes of graft failure



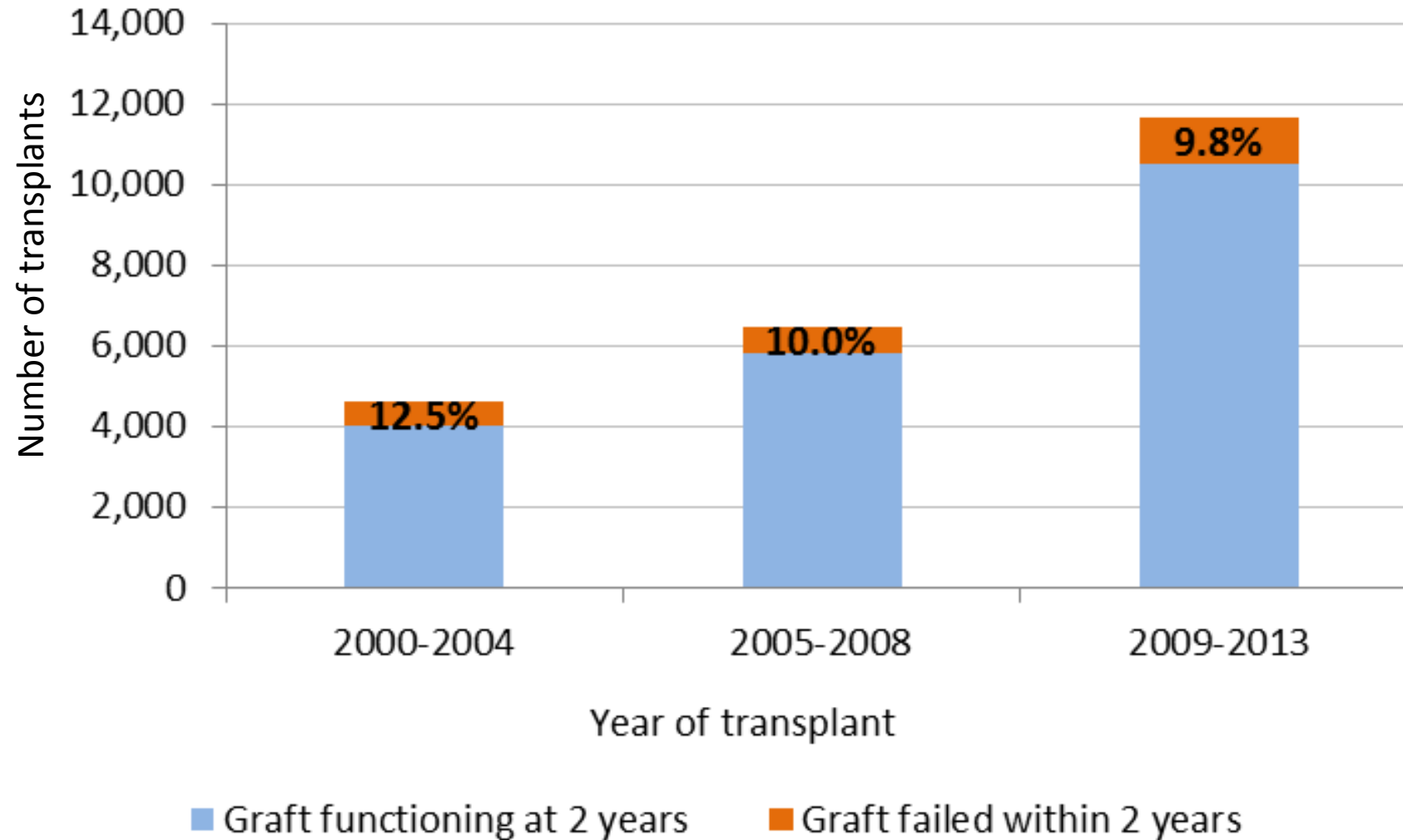
Causes of graft failure according to time post-transplant



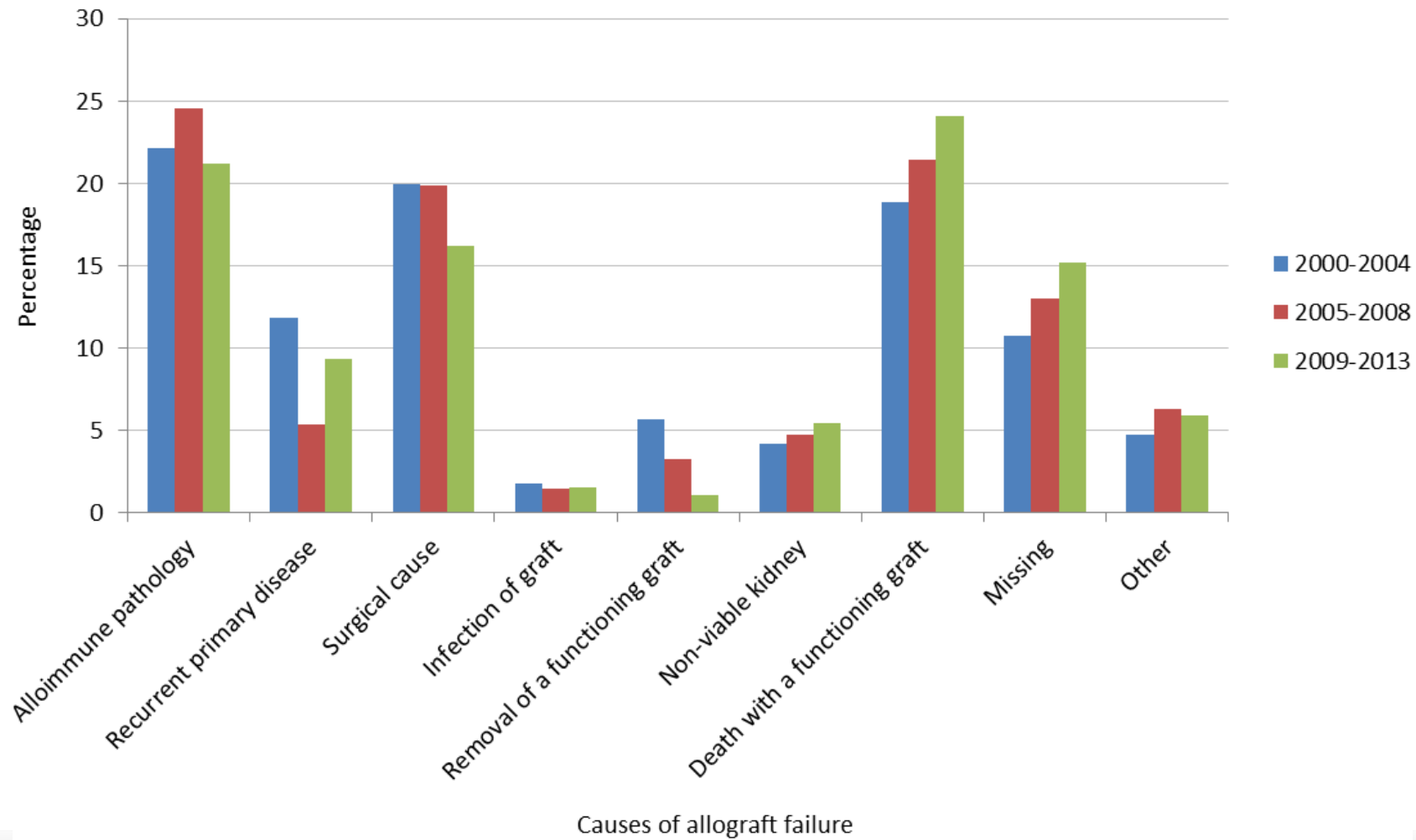
- Alloimmune pathology
- Infection of graft
- Death with a functioning graft
- Recurrent primary disease
- Removal of a functioning graft
- Missing
- Surgical cause
- Non-viable kidney
- Other



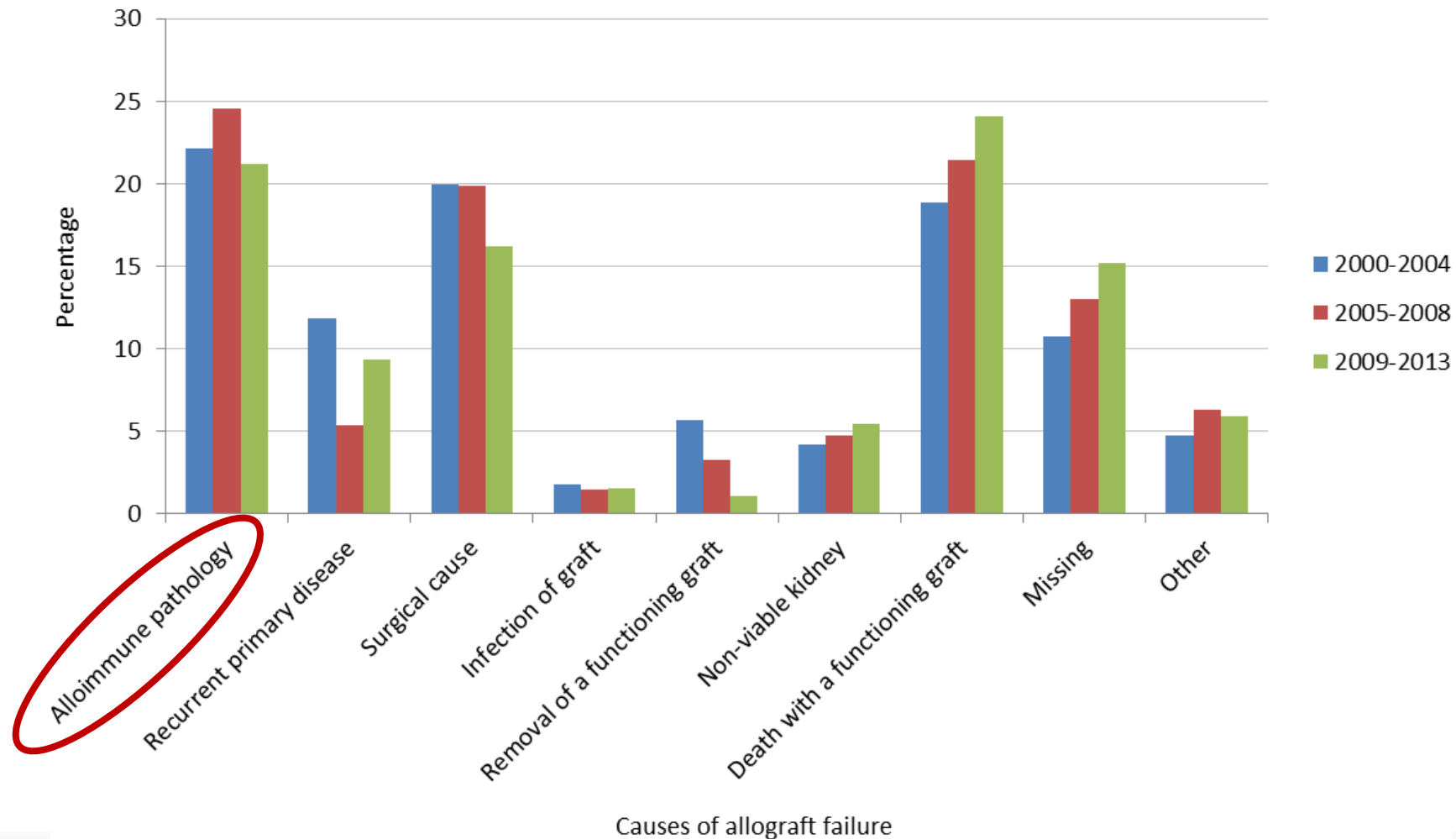
Comparing different transplant eras



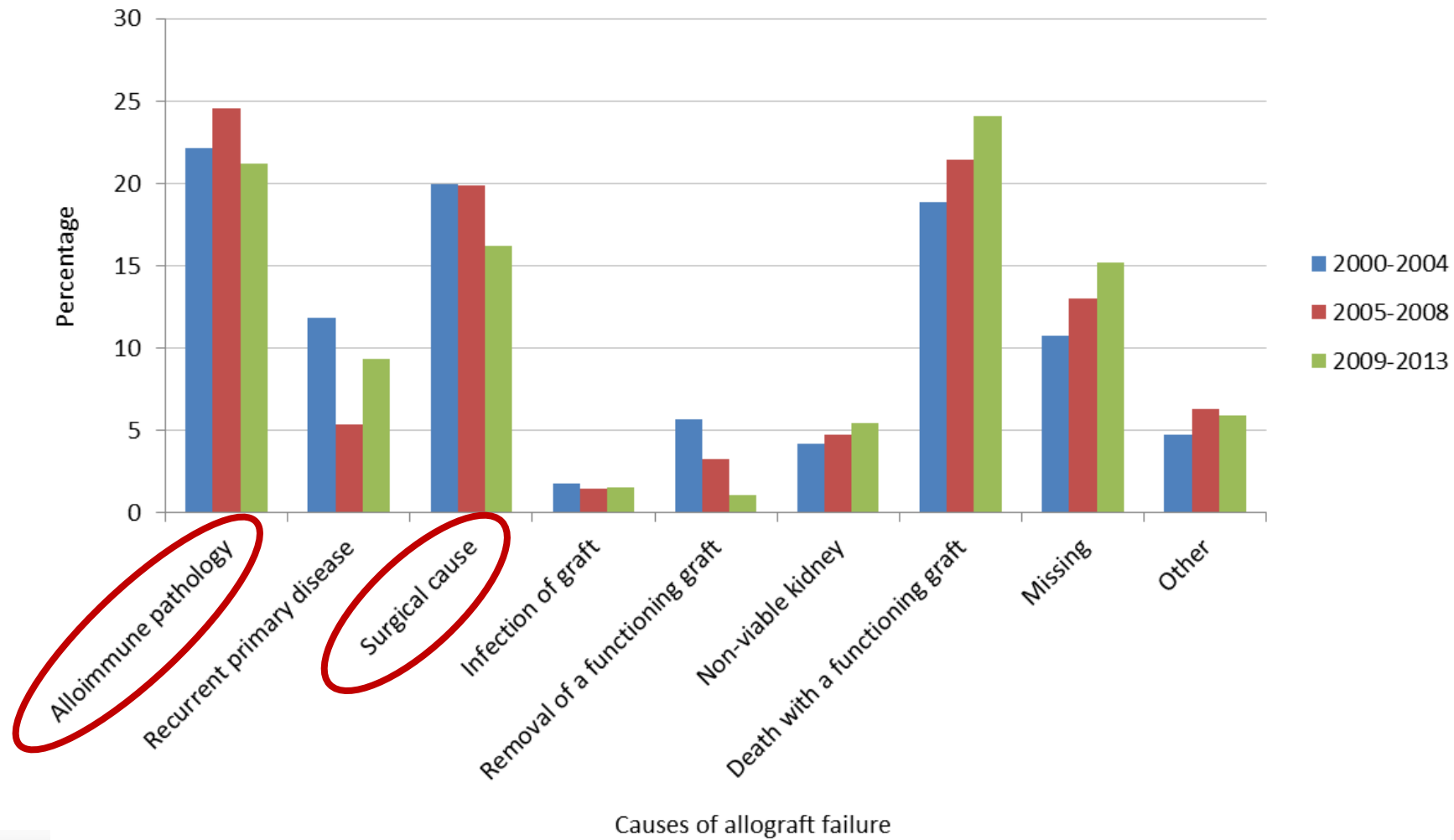
Causes of graft failure have changed over time



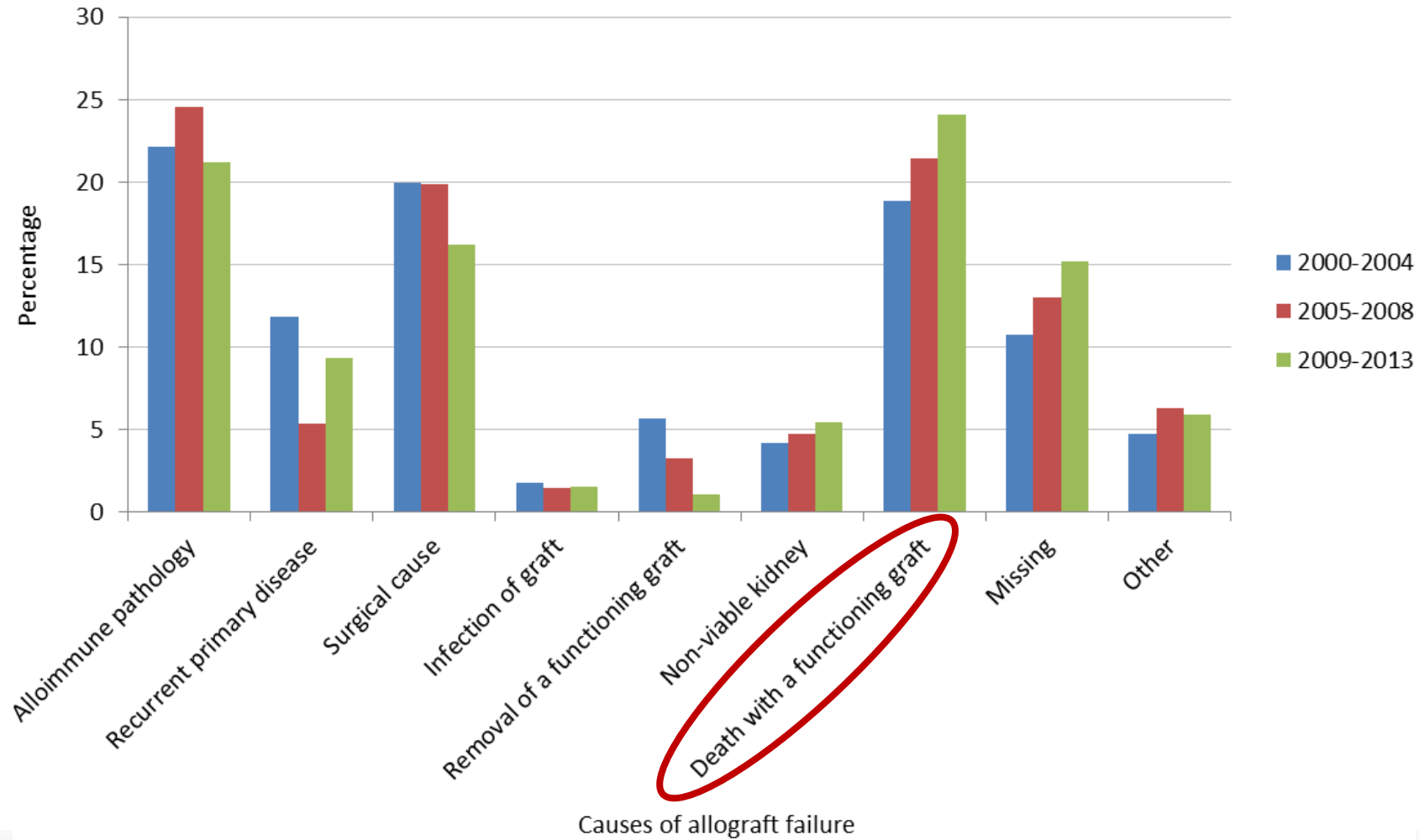
Causes of graft failure have changed over time



Causes of graft failure have changed over time



Causes of graft failure have changed over time



Limitations

- Data reliant on coding by individual clinical teams
- No biopsy data available
- Coding list has not kept pace with developments in understanding pathology
- Does not allow for multifactorial graft loss



Summary

- Largest cohort of renal allograft losses reported worldwide
- First such study from the UK

- Fewer early graft losses in the most recent cohort of patients
- Fewer allograft failures due to alloimmune and surgical causes
- Death with a functioning graft remains the leading cause of allograft failure >6 months following transplantation

- **Highlights the need to revise and update cause of graft failure codes**



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