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## Background

The publication of three cases of 'reversal' of brain death in North America has prompted renewed discussion about the criteria for brain death.<sup>1,2</sup> In two of these cases brain death testing occurred at 7 and 6 hours respectively, from the onset of coma.<sup>1</sup> One clinical criticism is that this is a relatively short duration of observation, given the clinical circumstances.<sup>3</sup>

## Method

To benchmark UK practice, the time to brain stem death testing from the onset of coma, defined as onset of fixed and dilated pupils, was investigated by NHS Blood and Transplant utilising the UK Transplant Registry. Deceased donors after brain death (DBD) who donated at least one solid organ in the UK have been included, if both times were reported. This represents approximately 40% of brain stem death tests carried out in the UK. Timing data were only available for brain stem dead individuals who progressed to organ donation.

## Results

Results for 1880 brain stem death tests, between 1st September 2007 and 31st August 2011, were available for analysis. The median time between fixed and dilated pupils and first brain stem death tests was 18 hours 15 minutes and the distribution is displayed in Figure 1.

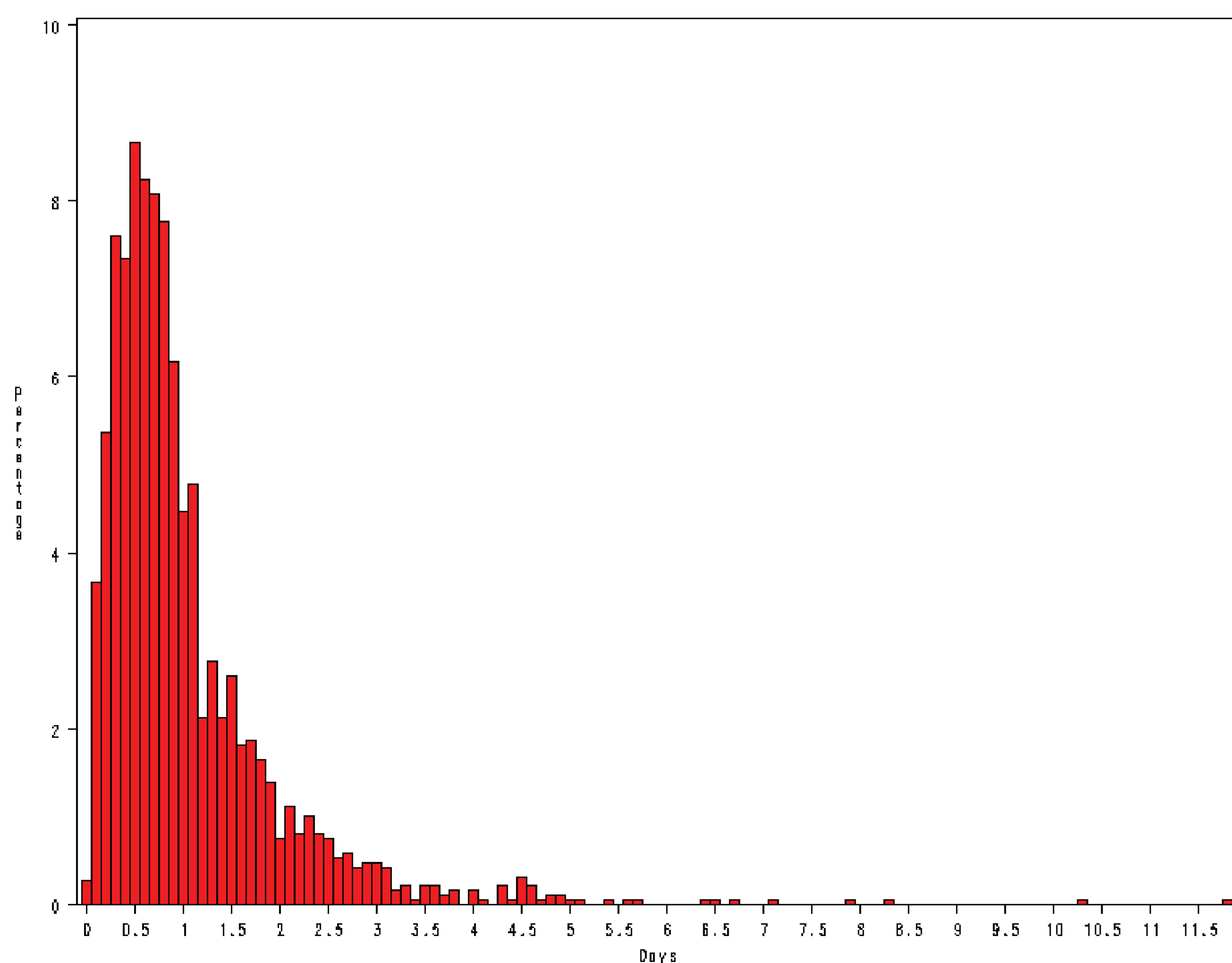


Figure 1. Time between fixed and dilated pupils and first brain stem death tests; 1 September 2007 – 31 August 2011

Cumulatively, 1.7% of tests were performed within 2.5 hours, 7.34% within 5 hours and 14.47% within 7.5 hours, as shown in Table 1.

Time period	N	%	Cumulative N	Cumulative %
<2.5 hours	32	1.70	32	1.70
2.5 - <5.0 hours	106	5.64	138	7.34
5.0 - <7.5 hours	134	7.13	272	14.47
7.5 - <10.0 hours	141	7.50	413	21.97
10.0 - <12.5 hours	145	7.71	558	29.68
12.5 - <15.0 hours	183	9.73	741	39.41
15.0 - <17.5 hours	152	8.09	893	47.50
17.5 - <20.0 hours	154	8.19	1047	55.69
20.0+ hours	833	44.31	1880	100.00

Table 1. Time between fixed and dilated pupils and first brain stem death tests; 1 September 2007 – 31 August 2011.

## Discussion

The UK criteria for diagnosing death using neurological criteria have no mandated minimum time period for observation before testing, following the onset of coma.<sup>3</sup> None-the-less, an unofficial 6 hours is usually suggested. Results from this investigation demonstrate that in a significant number of cases, UK clinicians are using a short period of observation. This should inform education.

## References

1. Roberts DJ, MacCulloch KA, Versnick EJ, Hall RI. Should ancillary brain blood flow analyses play a larger role in the neurological determination of death? *Can J Anaesth* 2010; 57: 927–35.
2. Webb AC, Samuels OB. Reversible brain death after cardiopulmonary arrest and induced hypothermia. *Crit Care Med* 2011; 39: 1538–42.
3. Academy of Medical Royal Colleges. A Code of Practice for the Diagnosis and Confirmation of Death. London: Academy of Medical Royal Colleges, 2008.