

NHS BLOOD AND TRANSPLANT

CARDIOTHORACIC HEART ADVISORY GROUP

**SUMMARY OF CUSUM MONITORING OF OUTCOMES FOLLOWING
HEART TRANSPLANTATION**

RECENT SIGNALS

- 1 There have been no recent signals on the CUSUM charts for real-time monthly monitoring of 30-day outcomes.
- 2 However, there have been two new signals on recent CUSUM charts produced for the annual UKTCA audit report which also monitors 90-day patient mortality. The adult lung transplant programme at Harefield signalled in April 2012 and the adult heart transplant programme at Newcastle signalled in September 2012.
- 3 CUSUM charts monitoring 90-day mortality are only produced annually, therefore signals identified by these charts may relate to events which occurred some time ago. As a result signals identified by the monitoring of 90-day outcomes are excluded from the formal 'Response to signals' protocol, designed for real-time monitoring. Nevertheless, both centres have been notified of these signals and are conducting internal investigations.
- 4 These new signals have highlighted an issue not previously seen, whereby the additional 90-day CUSUM charts have identified signals not present in the 30-day monitoring and consequently not considered for timely investigation. The issue is only relevant to cardiothoracic transplantation as it is the only organ group for which CUSUM charts are produced for two different measures of short term patient mortality.
- 5 For this reason, it is proposed that the most appropriate short term measure of patient mortality is reviewed and that real-time monthly CUSUM charts monitor a single outcome measure which is replicated in the annual audit report.

COMPARING CUSUM CHARTS FOR 30- AND 90-DAY MORTALITY

- 6 The properties of the CUSUM charts have been revisited to assess performance in terms of expected numbers of false alarms and timely detection of significant changes for the two outcome measures. Under the current chart threshold these two measures would be similar when comparing monitoring against 30- or 90-day expected mortality rates.
- 7 Currently, additional data collection is conducted via telephone each month for patients whose 30-day vital status is unknown on the UK Transplant Registry. If 90-day monitoring is preferred over 30-day

monitoring, this data collection will be changed to occur at the later timepoint, which will require some internal administrative changes at NHSBT.

- 8 Expected mortality rates are based on transplants performed between 2008 and 2011, with more recent transplants given greater weight. Expected 30- and 90-day adult and paediatric mortality rates are presented in **Table 1**. Note that patient mortality following heart transplantation is monitored against the national expected rate. Centre rates have been presented for information only.

Table 1 Expected mortality rates following adult and paediatric heart transplantation, 2008 to 2011		
Transplant centre	Expected patient mortality (%)	
	30-day	90-day
Adult heart		
Newcastle	16.2	20.4
Papworth	9.1	10.1
Harefield	23.8	32.7
Birmingham	12.1	14.7
Manchester	10.7	10.7
Glasgow	30.3	30.3
National	14.3	16.8
Paediatric heart		
Newcastle	2.5	7.5
GOSH	5.3	7.4
National	4.0	7.4

ACTION

- 9 Members are asked to consider the monitoring of 30- and 90-day patient mortality following heart transplantation and to advise which is the most clinically appropriate short-term measure for CUSUM monitoring.