Effective Sample Size

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The 2011-2016 ANZDATA individual hospital reports (Dialysis and Transplantation) include improved methodology for comparing hospitals. This document provides further explanation of the 'effective sample size', which is used as the x-axis for the funnel plots. Please see the '2016 Individual Hospital Report Methodology Changes' document for more details on the other changes.

The effective sample size is defined as a measure of the variability of the log-SMRs (logarithm of the standardised mortality ratios) for each centre relative to the total variability of all log-SMRs (Kasza et al., 2013). This is a novel use of the term in the statistical literature. It is used as the x-axis for the funnel plots to give smooth curves for the contour lines. This is necessary because the standard error of the ratios of observed to expected events are estimated using bootstrapped samples.

While the effective sample size reflects the size of the hospital and the homogeneity of the patients within that hospital, the strongest relationship is between the effective sample size and the observed number of events at the hospital. As the number of observed events increases, the log-SMR is able to be estimated more precisely, and the 'effective sample size' increases. Figures 1, 2 and 3 below show the relationships between the effective sample size and the observed number of events for dialysis mortality, graft failure and transplant mortality respectively. The R^2 values for these relationships are 0.97, 0.96 and 0.88 respectively, indicating that the observed number of events explain a very high amount of the variation in the effective sample size. For example, Centre A had 639 dialysis patients, 110 deaths and an effective sample size of 477. Whereas Centre B had fewer patients (576) but their effective sample size was greater (511) as a result of having more deaths (127).

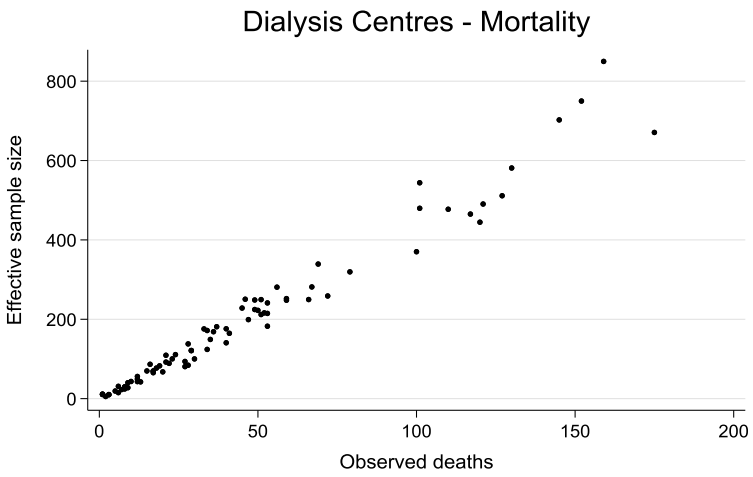

Figure 1: Effective sample size against observed deaths for dialysis centres

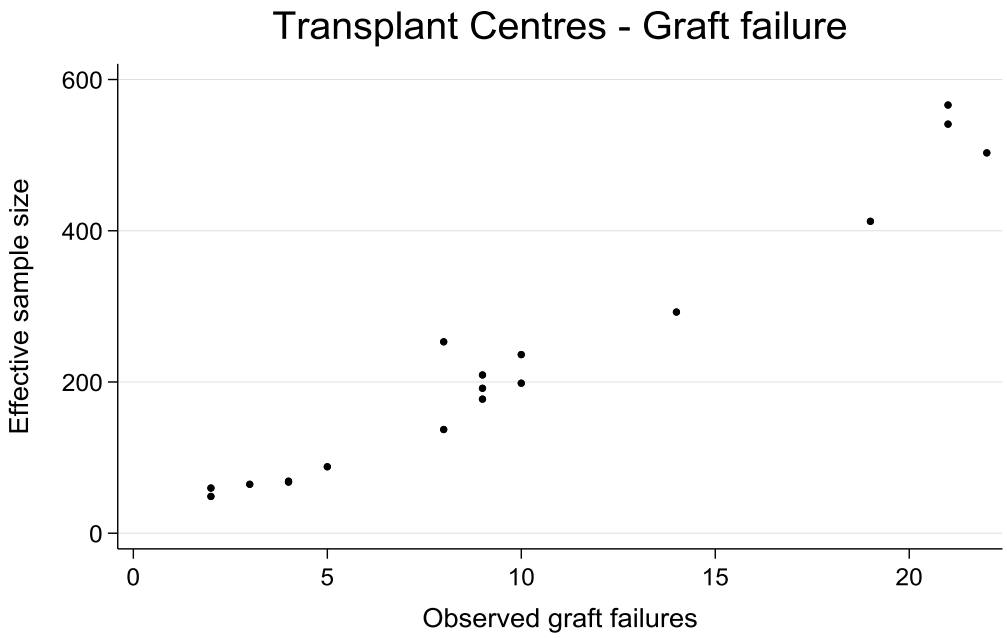

Figure 2: Effective sample size against observed graft failures for transplant centres

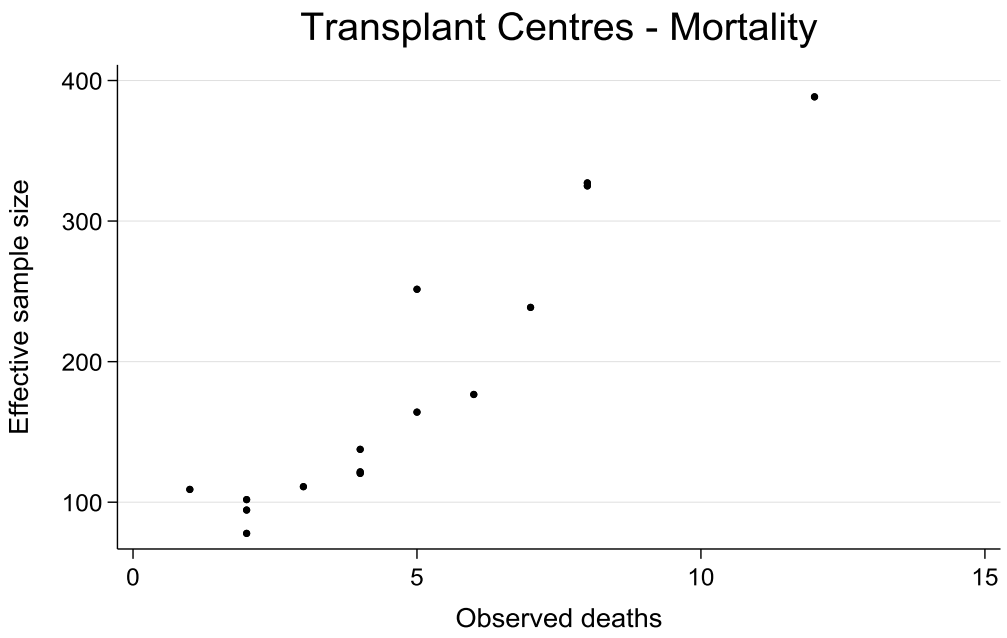

Figure 3: Effective sample size against observed deaths for transplant centres

References

Kasza J, Moran JL, Solomon PJ, et al. Evaluating the performance of Australian and New Zealand intensive care units in 2009 and 2010. Statistics in Medicine 2013; 32(21):3720-36.