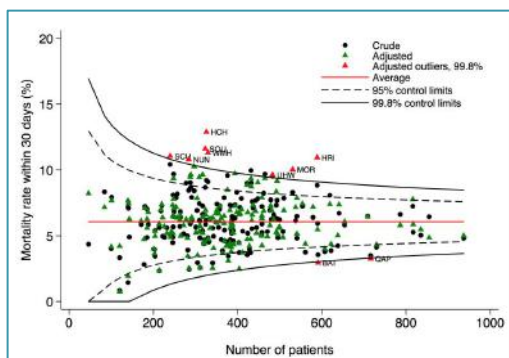


# NHFD 2020 – real-time 30-day mortality outlier run-charts

## Background

Like other national clinical audits, the NHFD previously identified outliers for 30-day mortality as part of its annual reporting cycle. This means that the annual report published at the end of 2019 included an analysis of mortality during 2018, and that individual hospitals were contacted to be alerted to their potential outlier status an average of 12 months after the relevant patients had died.



Before being reported in the annual ‘funnel plot’ hospitals’ crude mortality data needed to be case-mix adjusted so that it could be compared fairly with other hospitals which might have a different profile of patient age, function or comorbidity (ref. Tsang).

This casemix adjustment inevitably delayed the outlier process. It also meant that each year some hospitals would be identified as potential outliers simply because they had submitted incomplete or incorrect casemix data; particularly in terms of patients’ ASA grade, mobility or previous residence.

The longstanding availability of NHFD run-charts means that the findings of this mortality analysis should not have come as a surprise to the units identified as outliers in the funnel plot, since their crude mortality figures have been available to them for the previous year.

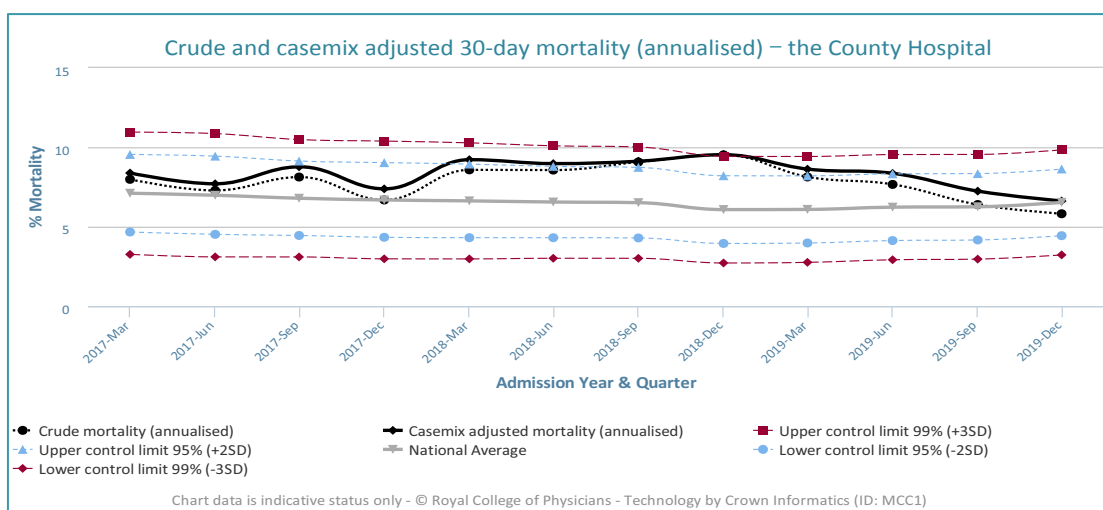
However, it was difficult for local teams to know whether a mortality run-chart that is above the national average is significantly abnormal. The number of cases that a particular unit admits will affect how far from average their run-chart needs to be for it to cross the 99.8% (3SD) confidence limit that is used to identify outliers. We have developed a new approach to address this problem.

## Casemix-adjusted mortality run-charts

Working with the University of Oxford’s Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences (NDORMS), the NHFD have developed a completely new approach to identification of mortality outliers.

Our new case-mix adjusted mortality run charts will be updated quarterly, a few months in arrears to allow linkage to independent Office of National Statistics (ONS) mortality data.

The new charts include a case-mix adjusted mortality line alongside the usual crude mortality line, and include control limits, to give teams an immediate sense of how far from average their local figures lie.

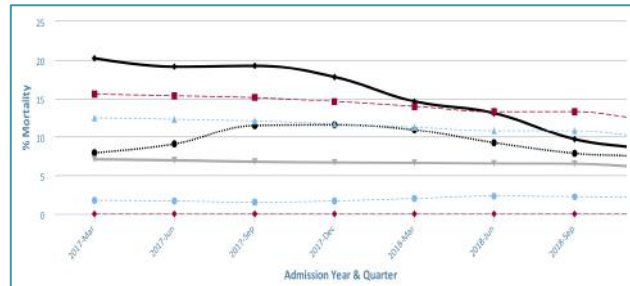


## How do the new run charts work?

### Reviewing the quality of your casemix data

The difference between crude and adjusted lines reflects the impact of adjustment on the basis of the casemix data that has been submitted by that unit. A significant difference should alert local teams to potential issues with their data quality and completeness – allowing them to correct this.

In this example, the case-mix adjusted line (unbroken) starts off well above the observed crude mortality line (broken). This potentially indicates 'outlier status', but actually suggests that the local team should review the quality of the data they were providing. When this team did so, data quality improved, the two lines converged, and the run-chart accurately profiled mortality a little above average.



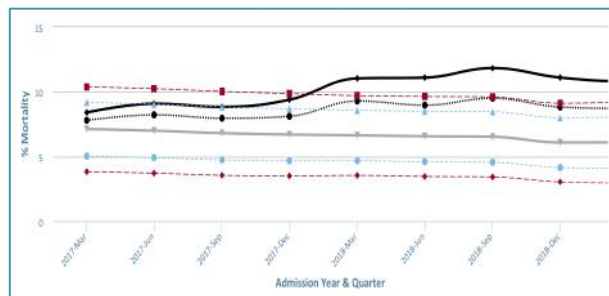
- **Look at how far apart your crude and casemix adjusted lines are – if they are very different then review the quality of the casemix data you are submitting**

### Monitoring your casemix adjusted mortality

If a unit's case-mix adjusted mortality moves outside the control limits, local teams can see this and respond immediately, rather than waiting for up to a year for the results of an annual funnel plot outlier analysis the following summer.

This example shows a unit with a younger and fitter population than average, and a casemix adjusted line that consistently lies above their crude mortality run chart.

Their crude mortality run-chart (broken line) provided little warning of how high casemix adjusted mortality was, until it was calculated using a funnel plot a year later.



The new run-chart would have drawn attention to the increased mortality a year sooner and would have provided the local team with a means of monitoring the effectiveness of their response to this, until this could successfully bring their figures back towards the mean.

- **Use your quarterly casemix adjusted mortality to warn of increasing mortality, and to monitor the effectiveness of quality improvement work to improve outcome**

### Use your run chart to monitor performance in real time

The charts are designed to inform discussion in governance meetings, which will need to pay attention to the collection and submission of accurate data, and then to monitor the picture this paints of their performance.

This example shows a unit with average crude mortality, serving a slightly fitter than average population. The unit appears to have struggled in 2018 when it ran into problems with its crude and casemix adjusted mortality (and perhaps its data quality) but seems to be starting to address these issues by the end of that year.

