Detection and management of mortality outliers for the National Hip Fracture Database (NHFD)

Outlier policy for NHFD annual report 2020

Title	Detection and management of mortality outliers for National Hip Fracture Database (NHFD)
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Description	This document details the identification and management of significantly outlying organisations in the NHFD 30-day case-mix adjusted mortality funnel, which will be published in the NHFD annual report 2021.
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Definitions

BGS	British Geriatrics Society
BOA	British Orthopedic Association
CCG	Clinical Commissioning Group
CQID	Care Quality Improvement Department, RCP
CEO	Chief Executive Officer
CQC	Care Quality Commission
DARS	Data Access Review Service, NHS Digital
FFFAP	Falls and Fragility Fracture Audit Programme, RCP
HIW	Health Inspectorate Wales
HQIP	Healthcare Quality Improvement Partnership
MD	Medical Director
NDORMS	Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences
NHFD	National Hip Fracture Database
SD	Standard deviations
WDT	Workstream Delivery Team
WG	Welsh Government

DETECTION AND MANAGEMENT OF OUTLIERS

These recommendations apply to:

- comparisons of providers (hospitals) using batches of data collected over the defined period of monitoring (calendar year of report)
- the chosen key indicator, case-mix adjusted 30-day patient mortality

The webtool and database provider is Crown Informatics.
The statistical analysis is carried out by the subcontractor, Bristol University, Bristol NIHR Biomedical Research Centre.

1. Performance indicator

Case-mix adjusted 30-day mortality is the chosen key performance indicator (KPI) – a valid measure of a provider's quality of care in that there is a clear relationship between the indicator and quality of care. The cohort is all patients over 60 admitted with a fragility hip fracture in the calendar year preceding the year of the report release.

2. Identification of outliers

Outlier analysis will be performed for all patients over 60 who present with a hip fracture to any hospital in England and Wales.

Each hospital's crude mortality figures will be case-mix adjusted by our statistics providers (the Bristol NIHR Biomedical Research Centre at the University of Bristol) using our validated model.

Comparison of hospitals must take account of differences in the type of patients presenting to each in respect of key factors that have been shown to affect 30-day mortality: these are *age, sex, ASA grade, pre-fracture residence, pre-fracture mobility and fracture type.* This model has been rigorously tested with regard to its power of discrimination and its calibration [Tsang *et al.* 2017]. Details of the model are available on our website.

The results of this model will be displayed by Crown Informatics as case-mix adjusted run-charts on the NHFD website. These run-charts will display each hospital's crude and case-mix adjusted mortality against the national average and 95% (2SD) and 99.8% (3SD) control limits above and below this average.

- Each calendar quarter the NHFD will identify all hospitals in which mortality over the preceding 12 months is above the upper 99.8% (3SD) control limit.

- Hospitals will be 'flagged' the first time their mortality rises above this control limit. The clinical leads of such hospitals will be made aware of this position so that they can consider appropriate action, including examination of the quality of their data (see section 3, below).

- Hospitals which remain above this control limit for two or more successive quarters will be considered 'alarm' outliers. The clinical leads, CEOs and MDs of such hospitals will be notified, and they will be formally identified in the NHFD annual report as 'outliers for case-mix adjusted mortality'.

The run-charts will also identify hospitals with mortality above the upper 95% control limit, but these will not be formally managed as outliers since in any analysis of 170+ units some hospitals will fall outside such control limits by chance, simply as a result of expected statistical variation.

However, clinical leads in such units will be made aware of their position, as will those in units where good performance is indicated by significantly low case-mix adjusted 30-day mortality.

3. Data quality

Clinical leads in each hospital are responsible to the quality of the data they submit to the NHFD, and in reviewing this they will need to consider three aspects:

- **Case ascertainment**

The NHFD typically receives data on more cases than are captured by data sources such as HES and PEDW, so these cannot be used as a 'gold standard' as they are not as accurate as the NHFD in picking up such cases. Instead NHFD comment on the number of patients submitted in previous years, so that units can consider whether these might indicate any shortfall in data entry in the current year. So for the 2021 annual report, this will be the number of patients submitted in the 2020 calendar year compared to the number of patients submitted in the 2019 calendar year. Numbers of cases submitted to the NHFD during the COVID-19 pandemic remained comparable to previous years.

- **Data completeness.**

Missing data can compromise a hospital's benchmarking data and their income from best practice tariff. Missing case-mix data may also affect the adjustment model used during our mortality analysis and potentially lead to a hospital unnecessarily triggering an 'alarm' in respect of their mortality outlier status.

- **Data accuracy**

Inaccurate coding of data can have similar effects to those mentioned above; resulting in miscoding that, for example, falsely portrays a unit as having a population that is healthier than normal can again unnecessarily trigger an 'alarm' in respect of their mortality outlier status.

The run charts may help units to identify problems with the completeness and accuracy of their data. The presence of such factors will be highlighted if units see a large discrepancy between their crude and case-mix adjusted mortality run charts. Such findings should encourage teams to review their data quality.

4. Case-mix (risk) adjustment

Comparison of hospitals must take account of differences in the mix of patients between providers by adjusting for known factors associated with the performance indicator.
These are: *age, sex, ASA grade, pre-fracture residence, pre-fracture mobility and fracture type.*
Our case-mix adjusted analysis of 30-day mortality uses externally validated Civil Registration Data from NHS Digital, as described by Tsang et al 2017. Each year the case-mix adjustment process is refined and the model coefficients are updated to reflect changes in the data reported by hospitals.

5. Detection of a potential outlier

Statistically derived limits around a national reference of 30 day mortality line in the whole of the NHFD are used to define if a hospital is a potential outlier (more information is available on our website). Hospitals will be 'flagged' if their mortality moves to more than 3SDs from this line, and notified as an 'alarm' if they remain in this position for more than one successive quarter.

4. Management of a potential outlier

Management of potential outliers involves several teams:

- NHFD audit team: responsible for managing and running the audit nationally and informing participants of the outlier process, timeline and methodology

- NHFD clinical leads: responsible for assessment of data quality and direct communication with hospitals for outlier status notification

- Outlying hospital's NHFD lead clinician: clinician contact for NHFD in provider organisation

- Outlier hospital's medical director and chief executive.

The following table indicates the stages needed in managing a potential outlier, the actions that need to be taken, the people involved and the time scale. It aims to be both feasible for those involved, fair to hospitals identified as outliers and sufficiently rapid so as not to unduly delay the disclosure of comparative information to the public.

Hospital lead clinicians will be first notified when their unit moves to above 3SD in any quarter and if a site 'alarms' by remaining above 3SDs for two consecutive quarters, they will be notified of their formal 'outlier' status, along with the CEO and MD of the site, and this policy will be activated.

5. Involvement of the Care Quality Commission (CQC) and Welsh Government (WG)

The WG are responsible for assurance and determine their approach with the Health Inspectorate Wales (HIW). Along with CQC they are included in this policy as they will need to ensure that hospitals are engaging appropriately in the process. They will be notified if units become 'alarm' level outliers, by being copied into email correspondence from NHFD clinical leads to hospital lead clinicians and management, and the replies from hospitals detailing steps taken to rectify/improve performance. The run-chart on our website means that they will be able to see which units are outside both 2SD and 3SD control limits at any time.

The CQC and WG will not usually take regulatory action if organisations are responding appropriately to each stage of the outlier management process.

Stage	What action?	Who?
1	Data cut (max limit) extracted from database and sent to NHS-Digital	Crown
2	Data transferred to NDORMS via secure transfer mechanism	Crown
3	Case-mix adjusted mortality returned including: List of outliers (both high and low) with case-mix factors and national descriptor figures (mean/range) - as data quality check	Bristol University
4	Scrutiny of data handling, matching and analyses performed to determine which hospitals lie above the upper 99.8% (3SD) control limit for case-mix adjusted 30-day mortality in the year up to and including this calendar quarter. *NB. If this position is associated with poor data quality the unit will still be subject to the following analysis.* **a. Units moving above the 3SD limit for the first time** Such units will be 'flagged'. Their Clinical Lead will be informed of the position, and offered an explanatory, supportive discussion with an NHFD clinical lead. This position will be evident from their run-chart on the website, but does not constitute an 'alarm', and the unit will not trigger further action at this point. **b. Units still above the 3SD limit in another quarter**	NHFD WDT

	Such units are viewed as potential 'alarm' outliers: - *proceed to stage 5.*	
5	Healthcare provider Lead Clinician informed about potential 'alarm' status and an explanatory, supportive telephone discussion with NHFD clinical lead offered. Written notification including all relevant data and analyses is then made available to the healthcare provider's Lead Clinician, CEO and MD; formally asking that they identify any data errors or justifiable explanation(s).	NHFD clinical leads
6	Healthcare provider Lead Clinician to provide written response to NCAPOP provider team	Healthcare provider lead clinician
7	Review of Healthcare provider Lead Clinician's response to determine which of the following applies: **a. 'No case to answer'** In the unlikely event that a site identifies an error in NHFD analysis, corrections are applied, and outlier status is reconsidered. Data and results in NHFD records are revised including details of the healthcare provider's response. The healthcare provider's Lead Clinician, CEO and MD receive a written apology and outlier process is closed. **b. 'Poor data quality'** Provider accepts or identifies that the data they originally supplied contained inaccuracies as a result of a failing in local coding and/or data checking. Review in discussion with Bristol University indicates that accurate data would not indicate 'alarm' status. 'Alarm' outlier status is recorded in the NHFD annual report but qualified by statement that that *'this appears to be a reflection of poor data quality*'. - *proceed to stage 8.* **c. 'Case to answer'** **Either**, it is confirmed that the supplied data were inaccurate, but review in discussion with NDORMS indicates that accurate data would still indicate 'alarm' status. NHFD indicate in annual report that 'alarm' outlier status is *'in part a reflection of data quality'*. - *proceed to stage 8.* **Or**, it is confirmed that the originally supplied data were accurate, thus justifying the initial designation of 'alarm' outlier status. - *proceed to stage 8.*	NHFD clinical leads

8	Contact healthcare provider Lead Clinician prior to sending written notification confirmation of 'alarm' status to healthcare provider CEO, and copied to healthcare provider Lead Clinician and MD. All relevant data and statistical analyses, including previous response from their Lead Clinician are made available to CEO and MD, who are notified that the next NHFD annual report will identify their unit. HQIP, and CQC, NHSI (in England) or WG (in Wales) are notified of confirmed 'alarm' status.	NHFD clinical leads
9	Acknowledge receipt of the written notification confirming that a local investigation will be undertaken and copy in the CQC.	Healthcare provider CEO
10	If no acknowledgement received, a reminder letter should be sent to the healthcare provider CEO, copied to CQC and HQIP. If not received within 15 working days, CQC, NHSI or WG are notified of non-compliance in consultation with HQIP.	NHFD team
11	Once all site acknowledgements received, CQC and WG updated with list of outliers	NHFD team
12	Review of the progress/results of investigations undertaken by Outlier Provider	NHFD clinical leads
13	Once all action plans received, final detailed letters sent to CQC and WG regarding site action plan summary and run charts All outlier issues finally closed – either closed as adequate responses or escalated to HQIP as inadequate responses	NHFD team
14	Final draft of NHFD annual report including summary of that year's findings and list of 'outlier sites' (as defined in **7b** and **7c** above) is submitted to HQIP.	NHFD team
15	Annual report is published as per HQIP's SRP timeline.	NHFD team

Scope

This policy will be applied to the specific patient safety concern of 30-day mortality.

Other unusual findings identified by the NHFD annual report will be managed out with the scope of this policy by communication between the NHFD clinical leadership and the local lead clinician. The HQIP cause for Concern policy can be found here.

Process

Prepared on behalf of the NHFD team, NHFD Advisory Group and FFFAP Board by:

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