



# Indicators of hospital performance published by the Care Quality Commission and Dr. Foster Research

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Social and General Statistics

This note examines measures of hospital standards and patient safety published by the Care Quality Commission (CQC) and Dr. Foster Research Limited and critically appraises the methodology underpinning their assessments. Concerns have been raised about the lack of consistency between the CQC and Dr. Foster ratings; in the final section, a comparison is made between the two, and some explanations for the discrepancies are offered.

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## 1 CQC performance ratings

In its published NHS Performance Ratings (previously called the *Annual Health Check*), the CQC assesses NHS organisations against the two broad criteria of 'overall quality' and 'financial management'.

'Financial management' is a primarily measure of the organisation's financial probity. For non-foundation NHS Trusts, the measure is based on the Audit Commission's assessment of statutory audits conducted during the year, and for foundation trusts, it is based on financial risk ratings compiled by Monitor, the independent regulator of foundation trusts; since the focus of this note is on the quality of clinical services, this indicator will not be considered further.

'Overall quality' is a measure of the organisation's success in meeting national care quality standards, and how they are progressing towards national targets. It is a single assessment (Excellent, Good, Fair or Weak) based on a composite of underlying indicators. For acute trusts, these are split as follows:

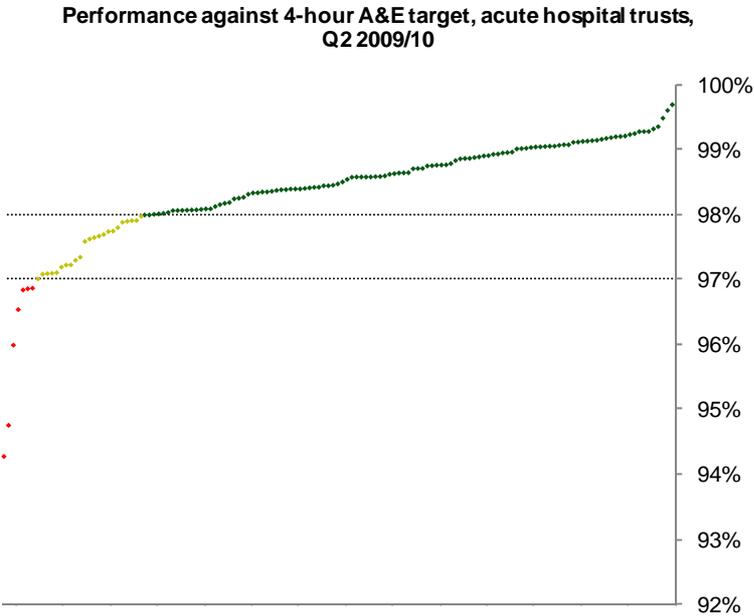
- Core standards (44 indicators, – these measure success against Government's core standards for NHS healthcare)
- Existing commitments (10 indicators, – these measure success against targets set by Government in the 2003-06 planning round)
- National priorities (12 indicators, CQC-assessed) – these measure success against targets set by Government in the 2008-11 planning round

A list of the 66 indicators used to assess acute trust performance can be found in Appendix A. The process of measuring achievement against the indicators, and the derivation of the overall quality assessment from them is quite involved. However, the key principles are:

- Core standards are self-assessed by NHS Trusts' boards: they confirm whether or not they have reasonable assurance that the indicator standard has been met.
- Existing commitments and national priority indicators are assessed using data collected by the CQC<sup>1</sup>. Against each, the trust is given a categorical assessment (e.g. "achieved", "underachieved" etc.) with achievement thresholds taking the form of targets. For instance, a Trust is deemed to have "achieved" on the A&E indicator if at least 98% of patients are dealt with (admitted or discharged) in four hours; to have underachieved if the figure lies between 97% and 98%; and to have not met the target if the figure is below 97%.
- Each indicator is given equal weight in determining achievement against national priorities

The indicators underpinning the CQC assessment, then, are purely categorical. This permits achievement criteria to be framed in terms of standards, targets and priorities, but at the expense of finer detail. In particular, it could be argued that the approach conceals exceptionally good (or poor) performance, and exaggerates difference at the margins.

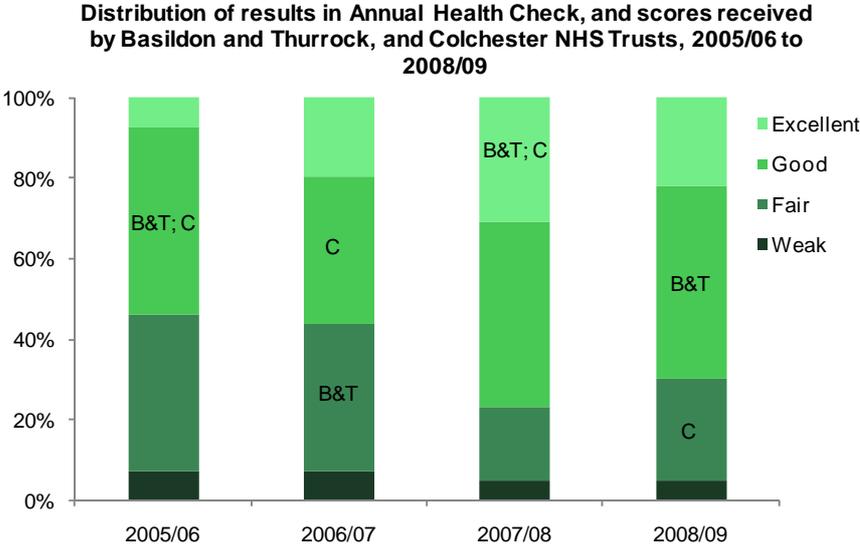
For instance, a trust dealing with 100% of A&E patients in under four hours (rather than 98% of patients), or seeing 98% within *three* (rather than four) hours fares no better in the CQC's assessment than one just achieving the specified target. Moreover, Trusts near the margins, with very similar standards, may be placed in different categories. The chart on the right shows how acute trusts might be classified by the CQC on the A&E indicator, based on performance data from July to September 2009: green points signify trusts which would be deemed to have 'achieved', yellow 'underachieved', and red 'not met'. At the margins of the target threshold, Trusts with very similar scores (e.g. South Devon NHS Trust, which scored 98% and Royal Bolton Hospital NHS Trust, which scored 97.98%) receive different ratings; meanwhile, no extra account is taken of very high performance (a trust scoring 99.68% receives the same rating as one with 98%), or very low (a trust with 94.27% receives the same rating as one with 96.87%).



The overall quality rating is a composite of these categorical indicators, and at the margins it can be determined by performance against any single one of them. Thus, variation between trusts with the same rating may be concealed, whilst variation between differently rated trusts may be exaggerated.

<sup>1</sup> Much of the data used by the CQC comes from existing, mandatory data collections; data is also commissioned from the Department of Health, the Health and Social Care Information Centre, and the Royal Colleges.

The chart below shows the distribution of results among acute and specialist trusts for the overall quality indicator in each Annual Health Check since 2005/06. For topicality<sup>2</sup>, the score received by Basildon and Thurrock (B&T) and Colchester (C) NHS Trusts is also shown; for instance, in 2008/09, Colchester was assessed as 'Fair' and Basildon and Thurrock as 'Good'; in 2007/08, both were assessed as 'Excellent'.



## 2 Hospital standardised mortality ratios

The Hospital Standardised Mortality Ratio (HSMR) is a comparison of the observed number of deaths in a particular hospital with the number of deaths that might be expected, having taken into account risk factors such as age, diagnoses and the presence of other diseases (i.e. the hospital's case mix). The expected number of deaths is calculated from national level data, and the HSMR is a measure of risk *relative to this national 'average'*.

For instance, a HSMR of 100 represents a death rate commensurate with what is observed nationally, taking into account that hospital's case mix; a HSMR exceeding 100 represents an excess risk of death in the hospital in question.

Both Dr Foster Intelligence and the CQC use HSMRs<sup>3</sup> as indicators of the quality of hospital performance. The key assumption underpinning this link between quality and mortality is that, once account has been taken of the 'case mix' of individual hospitals, any remaining differences in mortality rates, relative to the national average, can be attributed to quality of care.

The accuracy of the HSMR as a measure of care quality is thus reliant on the inclusion of all relevant factors influencing the risk of in-hospital death, and the accuracy and consistency of data for these at trust level. For instance, if age is not accounted for, then hospitals that treat an older-than-average mix of patients will have higher HSMRs, even if their care quality is

<sup>2</sup> The chairmen of both trusts were sacked by Monitor, the independent regulator of Foundation Trusts, shortly before the publication of the Dr. Foster 2009 Hospital Guide (see, for instance [http://news.bbc.co.uk/1/hi/health/8382584.stm])

<sup>3</sup> The CQC refers to its own mortality ratios as simply a 'standardised mortality ratio', and the Dr. Foster measures as 'hospital standardised mortality ratios', reflecting the fact that the CQC's focus tends to be on mortality 'outliers' for specific conditions or procedures, and Dr Foster uses ratios for all cases; in this note, "HSMR" is used for both. The CQC does not generally publish its HSMRs, but uses them to inform ongoing monitoring, and follows up significantly high ratios with the Trusts concerned.

consistent with the national average. The standardisation process is intended to account for such factors, so that the only systematic explanation for higher mortality is poorer care quality.

The following adjustments ('standardisations') are made in calculating the Dr Foster HSMR:-

- Sex
- Age on admission (in five-year bands up to 90+)
- Admission method (emergency or elective)
- Level of socio-economic deprivation in a patient's area of residence
- Other medical conditions (known as co-morbidities)
- Number of previous emergency admissions
- Financial year of discharge
- Primary diagnosis

The adjustments made by the CQC are less thorough. It standardises for:-

- Sex
- Age
- Admission method
- Healthcare resource group of diagnosis
- Calendar quarter

Even if all hospitals were to deliver identical levels of care quality, there would still remain some residual variation in their standardised mortality ratios, due to non-systematic factors that might broadly be described as 'plays of chance'. Taking these into account gives rise to a range of values within which the HSMR might reasonably be expected to fall, if care quality is consistent with the national average. In a statistical context, trusts with HSMRs that lie outside of this range are said to exhibit *significantly different* HSMRs (and hence deliver significantly different care quality) from the national average. In its 2009 Hospital Guide, Dr. Foster identified 27 hospital trusts with significantly high, and 32 with significantly low HSMRs.

There is some controversy about the validity of the HSMR as an indicator of care quality, or of the number of preventable deaths in an organisation. In particular, the relationship between HSMRs and hospital standards may be confounded by:

- Systematic differences in clinical coding practices between hospitals: for example hospitals which under-record patients' co-morbidities (relative to the average) will appear in the data to have lower-risk cases than they actually deal with in practice. Their expected number of deaths will be lower than it should be, and their HSMR will be higher than it should be.
- Systematic differences in care after discharge from hospital: since the HSMR takes into account deaths occurring after hospital discharge, it may also be influenced by factors not under the control of hospital trusts (e.g. community care).
- Deficiency in the methods used to calculate the HSMR: the factors used in case-mix adjustment may affect risk differently in different hospitals, but it is assumed in the model that these factors have a constant relationship with the expected number of deaths.
- If an acute trust has managerial responsibility for a hospice, it is possible that the deaths occurring there are included in the Dr. Foster figures, thus raising the HSMR

inappropriately. This concern has been raised by the chief executive of Westminster PCT and other doctors in the BMJ.

Ultimately, any or all of these factors could bias the estimate of expected deaths in an organisation, and hence the HSMR itself. These problems were identified by Mohammed et al (BMJ 2009;338:b780); the [responses to their article](#) give further insight into the current debate.

Finally, Dr. Foster's HSMRs are regularly rebased, so that a HSMR of 100 reflects a recent national average. This allows trusts' performance to be assessed in relation to *current* overall standards, but the rebasing process disguises improvement (or worsening) in mortality rates in individual trusts *over time*, unless this is in excess of what occurs nationally. For the 2008/09 guide, HSMRs were rebased from 2007/08 levels, while over the same period hospital mortality fell nationally by 7 per cent. This means that, for example, even if a Trust with a 2007/08 HSMR of 120 reduced its case-mix adjusted mortality over the year by 5%, its HSMR would still rise to 122 for 2008/09.

### 3 Dr Foster patient safety score

In its 2009 *Hospital Guide*, Dr. Foster published 'quality accounts'<sup>4</sup> for each NHS hospital trust. These assessed performance across three domains:

- Patient safety (12 indicators, mostly related to mortality rates and patient safety incidents reported to the National Patient Safety Agency)
- Clinical effectiveness (18 indicators, assessing levels of clinical best practice and emergency readmissions following treatment)
- Patient experience (8 indicators, three from the national patient survey and others assessing provision of palliative and end-of-life care etc.)

The patient safety score, which has been the most publicised indicator in the media and is the chief focus of the *Hospital Guide*,<sup>5</sup> is based on the indicators contained in the patient safety domain. These are listed in Appendix B. The derivation of the score is rather technical, and is described briefly below:

- i. Each indicator in the patient safety domain consists of a set of 147 numerical values, one for each NHS trust. These numbers are standardised<sup>6</sup> and constrained, so that they all lie between -3 and 3 with a mean of zero.
- ii. The standardised numbers (known as the z-scores) measure the extent to which the indicator score for each trust differs from the average across all trusts. The general principle of interpretation is that 'high is bad', so a positive (negative) z-score for, say, heart attack mortality indicates a higher (lower) rate than the average for all trusts
- iii. The patient safety score for a given trust is then derived by taking an average of all its z-scores<sup>7</sup>.
- iv. The final z-score is subjected to statistical techniques to take account of the uncertainty surrounding some of the indicator estimates (for instance, the fact that hospital mortality is subject to chance as well as care quality), and a ranking (out of

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<sup>4</sup> The term is borrowed from the *Health Act* 2009, which obliges all NHS organisations in England to publish Quality Accounts from 1<sup>st</sup> April 2010 containing information on their clinical effectiveness, patients' safety and other outcomes.

<sup>5</sup> See for instance, [The Observer 'safety scandal' report](#). It is on this indicator that 12 NHS Trusts were judged to be 'significantly underperforming'

<sup>6</sup> The standard score is calculated by subtracting the score for a trust from the mean across all trusts, and dividing by the standard deviation.

<sup>7</sup> Again, this final score is standardised to produce an overall z-score

147) is obtained. This is then rescaled to lie between 0 and 100 to obtain the patient safety score.

The score, therefore, is better understood as a ranking of performance *relative to* other NHS trusts, not a measure of overall performance. That is, the top-placed trust will always score 100 and the bottom-placed trust will always score zero<sup>8</sup>.

Because of the uncertainty attached to some indicators, it is often inappropriate to make distinctions between trusts with similar scores. For this reason, Dr. Foster has also assigned each trust a patient safety banding, which is based on the probability that a trust is significantly underperforming, or outperforming, relative to the average. The methodology is described briefly on its website (see Section 5).

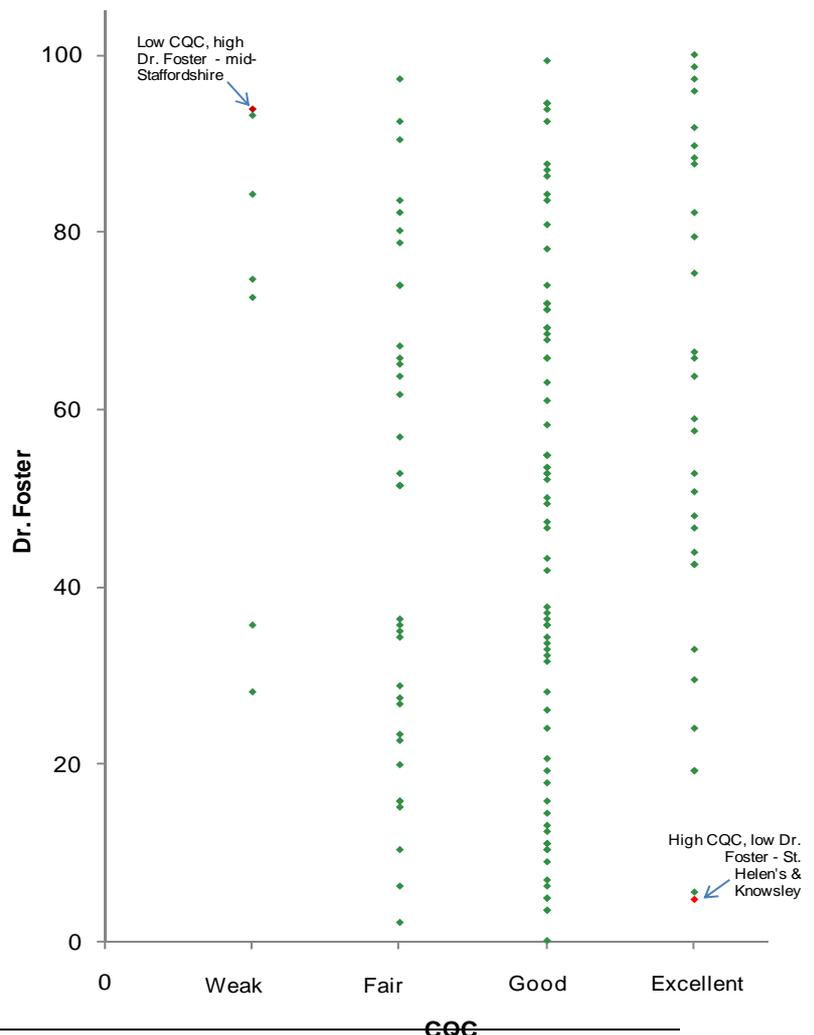
Like the HSMR, and the safety score, the banding is also a relative performance measure, and the designation of trusts as high or low-performing is to some extent a matter of construction; that is, it is highly likely a certain number of trusts will fall in to the bottom and top bands, and hence be identified as underperforming or outstanding, every year.

It would appear (though this is not explicitly stated in Dr. Foster's description of its methodology), that each indicator is assigned equal weight within the patient safety score, so that in determining performance, HSMRs from emergency admissions are equally important as speed of reporting of safety incidents, which in turn carry the same influence as stroke mortality.

#### 4 Comparing Dr. Foster and CQC indicators of performance

The expansion of the choice agenda has increased the necessity for comprehensible and authoritative information on healthcare providers to inform prospective patients' decisions. As a result, concerns have been raised about the lack of consistency between Dr. Foster's ratings of hospital trusts and assessments by the Care Quality Commission. In particular, of the twelve trusts falling in to the lowest band in the Dr. Foster assessment, eight were assessed as 'excellent' or 'good' for overall quality by the CQC in its 2008/09 Performance Ratings. The general absence of correlation between the two is illustrated in the chart to the right. If the two assessments were consistent, we would expect to see a clustering of points at the bottom left (weak on both indicators) and top right (strong on both indicators)

Scatterplot of Dr. Foster patient safety against CQC overall quality scores, NHS acute trusts



<sup>8</sup> More generally, the  $n^{\text{th}}$  placed trust will score  $100 \times (n/146)$ , where trusts are ranked in reverse order, and joint rankings are averaged.

on both indicators). Although there is a small cluster of high-performing trusts in the top right<sup>9</sup>, the distribution of Dr. Foster scores is quite even with respect to each of the CQC assessments, implying independence between the two measures<sup>10</sup>.

One of the reasons cited for inconsistency is that the CQC and Dr. Foster measure different things. This is indeed the case; as a comparison of Appendices A and B shows, they do not share any underlying indicators apart from incident reporting. However, there are also some more fundamental differences in approach:

Firstly, whereas the CQC assesses levels of compliance with pre-defined standards and targets, Dr. Foster measures performance in relation to a moving target (i.e. the national average). Thus whilst it is conceivable that all trusts might achieve 'excellent' for overall quality from CQC, it is by construction impossible that all trusts could achieve significantly low HSMRs, or a top-band patient safety score.

Secondly, the Dr. Foster HSMR and patient safety scores relate exclusively to in-hospital patient safety, whereas the CQC assessment contains a broader set of indicators, some of which are only indirectly relevant to this.

Finally, HSMRs are outcome measures, the CQC indicators are broadly process measures, whilst the patient safety score combines assessments of both process and outcome. To the extent that the processes under consideration by CQC are not reflected in the outcomes (i.e. mortality rates and safety incidents) measured by Dr. Foster, the two measures will not coincide.

## 5 Related internet links

### 5.1 CQC

Performance indicators 2008/09 (see Appendices A, B and C for a full description of indicators and compliance thresholds):

[http://www.cqc.org.uk/\\_db/\\_documents/0809\\_NHS\\_ratings\\_overview\\_document\\_161009\\_200910164847.pdf](http://www.cqc.org.uk/_db/_documents/0809_NHS_ratings_overview_document_161009_200910164847.pdf)

Spreadsheet of ratings for NHS organizations against all relevant indicators:

[http://www.cqc.org.uk/\\_db/\\_downloads/0809\\_Complete\\_dataset\\_for\\_annual\\_health\\_check\\_rating\\_\(04-11-09\).xls](http://www.cqc.org.uk/_db/_downloads/0809_Complete_dataset_for_annual_health_check_rating_(04-11-09).xls)

Scoring methodology:

- *Core standards*  
[http://www.cqc.org.uk/\\_db/\\_documents/2008\\_09\\_scoring\\_methodology\\_for\\_core\\_standards\\_200910160400.pdf](http://www.cqc.org.uk/_db/_documents/2008_09_scoring_methodology_for_core_standards_200910160400.pdf)
- *Existing commitments and national priorities*  
[http://www.cqc.org.uk/\\_db/\\_documents/2008\\_09\\_scoring\\_methodology\\_for\\_existing\\_commitments\\_and\\_national\\_priorities\\_200910160652.pdf](http://www.cqc.org.uk/_db/_documents/2008_09_scoring_methodology_for_existing_commitments_and_national_priorities_200910160652.pdf)

### 5.2 Dr. Foster

Patient safety scores and quality accounts:

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<sup>9</sup> The four trusts in the top right-hand corner are UCL Hospitals, Guy's and St. Thomas', Chelsea and Westminster, and South Tees.

<sup>10</sup> Note that there is a similar lack of evidence here for the proposition that the Dr. Foster scores *contradict* the CQC ratings.

<http://www.drfosterhealth.co.uk/quality-accounts/>

Hospital Guide 2009:

<http://www.drfosterhealth.co.uk/docs/hospital-guide-2009.pdf>

Description of methodology:

<http://www.drfosterhealth.co.uk/quality-accounts/methodology.aspx>

**Indicators used by CQC to assess performance of acute and specialist hospital trusts**

<b>Core standards</b>	<b>Existing national targets</b>	<b>National priorities</b>
C01a - incidents - reporting and learning	Total time in A&E: four hours or less	Infant health: smoking & breastfeeding
C01b - safety alerts	Waiting times for rapid access chest pain clinic	Experience of patients
C02 - safeguarding children	Revascularisation waiting times	Incidence of C. difficile
C03 - NICE interventional procedures	Cancelled operations	Incidence of MRSA
C04a - infection control	Time to reperfusion	Stroke care
C04b - safe use of medical devices	Delayed transfers of care	18 Week referral to treatment times
C04c - decontamination	Inpatient waiting times	Maternity HES: data quality
C04d - medicines management	Outpatient waiting times	All cancers: one month diagnosis to treatment
C04e - clinical waste	Access to GUM clinics	All cancers: two week referral to appointment
C05a - NICE technology appraisals	Data quality on ethnic group	All cancers: two month referral to treatment
C05b - clinical supervision		Participation in heart disease audits
C05c - updating clinical skills		Engagement in clinical audits
C05d - clinical audit and review		NHS staff satisfaction
C06 - partnership		
C07a and c - governance		
C07b - honesty, probity		
C07e - discrimination		
C08a - whistle-blowing		
C08b - personal development		
C09 - records management		
C10a - employment checks		
C10b - professional codes of conduct		
C11a - recruitment and training		
C11b - mandatory training		
C11c - professional development		
C12 - research governance		
C13a - dignity and respect		
C13b - consent		
C13c - confidentiality of information		
C14a - complaints procedure		
C14b - complainants discrimination		
C14c - complaints response		
C15a - food provision		
C15b - food needs		
C16 - accessible information		
C17 - patient and public involvement		
C18 - equity, choice		
C20a - safe, secure environment		
C20b - privacy and confidentiality		
C21 - clean, well designed environment		
C22a and c - public health partnerships		
C22b - local health needs		
C23 - public health cycle		
C24 - emergency preparedness		

Source: CQC NHS Performance Ratings 2008/09 Appendices A, B, C

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**Indicators used by Dr. Foster to calculate patient safety score<sup>1</sup>**

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**HSMR (all admissions)**

**HSMR (non-elective)**

**SMR (stroke)**

**SMR (heart attack)**

**SMR (broken hip)**

**Mortality from low risk conditions (<0.5% mortality)**

**National patient safety agency - alert compliance**

**National reporting and learning system - consistency of reports**

**National reporting and learning system - speed of reports**

**National reporting and learning system - number of reports**

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**Infection control**

- Employment of antibiotic pharmacist?
- Screening for infection prior to admission?
- Decolonisation for patients identified with MRSA?
- Dedicated isolation ward?
- Isolation of patients with C difficile?

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**Commitment to safety**

- Publicly named member of board responsible for safety?
- Patient safety on monthly agenda at Trust board meetings?  
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Number and type of safety incidents?
- Does the Trust board have definitions for...
  - Serious untoward incidents?
  - Implementation of health safety alerts
  - Healthcare associated infections data?
  - Never events
- Investigations into patient safety incidents and any changes resulting from these  
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How many staff are trained to be open with patients about safety incidents?  
How many acute inpatients have a track and trigger warning system in place for their stay?

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<sup>1</sup> Each emboldened indicator appears to be given equal weight in the overall score