Overview

- HSCIC & Clinical Indicators
- Metrics & Indicators
- Summary Hospital-level Mortality Indicator
  - Background
  - Estimating the risk of mortality
  - Uses of the indicator
- Questions
HSCIC and Clinical Indicators?

- HSCIC is the national provider of information, data and IT systems for commissioners, analysts and clinicians in health and social care
- Clinical Indicators programme is responsible for:
  - Development of methodologies;
  - Technical construction;
  - Assurance; and
  - Dissemination of indicators
What is a Metric?

- A metric is a measure of a known attribute
  - eg a speedometer in a car dashboard
  - eg within clinical care, a blood pressure reading

- Metrics, whether based on physical instruments or questionnaires, need rigorous testing and calibration plus precision in use
What is an Indicator?

- An indicator describes how a measure is expected to be used to judge quality
- Includes clear statements about the intended goal / objective;
- Whether it is expected to be used in isolation or in combination with other measures or indicators;
- Any thresholds or standards which are expected to be applied
  - E.g. a gauge to show whether speed is within legal limits in a car dashboard
  - E.g. within clinical care, the proportion of patients with controlled high blood pressure
- An indicator may act as an alert to an issue that needs further investigation
So what is the difference between an indicator and a metric?

• Metric – number of emergency readmissions to an acute hospital trust following an appendectomy

• Indicator – rate of readmissions

• Consider the context and may need to take into account
  • whether the readmissions are avoidable
  • co-morbidities
  • whether a certain number are acceptable
  • casemix of patients
SHMI

Summary Hospital-level Mortality Indicator (SHMI) reports on mortality at trust level across the NHS in England.

Covers all deaths reported of patients admitted to non-specialist acute NHS trusts who either die while in hospital or within 30 days of discharge.

Indicates whether a trust’s mortality ratio is as expected, higher than expected or lower than expected.

Produced and published as a quarterly official statistic since October 2011.
Why are we producing SHMI?

National review of hospital summary mortality ratios (HSMR)

Review commissioned because of concerns about
- different indicators in use,
- the lack of consistency and
- lack of clarity about the way some were being calculated

Review looked at both technical & audience/use issues

Following the recommendations from this review, the Department of Health committed to implementing the SHMI as the single mortality indicator which could be adopted across the NHS
How the SHMI was developed

A steering group to define the high-level requirements

A detailed independent statistical modeling and analysis exercise carried out by ScHARR, University of Sheffield

An expert technical group to agree on the specifications

HSCIC commissioned to lead the continued development and improvement of the SHMI, working with a range of stakeholders as well as publishing on a quarterly basis

Quarterly meetings of technical group who act as expert peer reviewers, and review through the Indicator Assurance Process
## Overview and background

### Data sets used
- HES inpatients
- ONS mortality
- Linking HES to ONS deaths data creates a richer dataset

### Exclusion criteria
- Specialist hospitals
- Mental health trusts
- Community trusts
- Day cases
- Regular attenders – day and night
- Stillbirths

### Contextual indicators
- Palliative care
- Admission method
- In and out of hospital deaths
- Social deprivation
Calculation of SHMI

\[ \text{SHMI} = \frac{\text{Observed Deaths}}{\text{Expected Deaths}} \]

- the number of patients who die following treatment at the trust
- the number of patients who would be expected to die on the basis of average England figures, given the characteristics of the patients treated there
- calculated using logistic regression
Calculation of risk

- Risk adjusted based on patient characteristics:
  - Diagnosis group
  - Age
  - Gender
  - Comorbidities
  - Admission method
Example patient risks 1

• 75 year old man, planned abdominal hernia operation, with chronic pulmonary disease
• 0.5% risk of mortality

• If a hospital trust treated 1,000 similar patients we would expect 5 to die
90 year old lady, emergency admission for cardiac arrest, underlying liver disease

If a hospital trust treated 1,000 similar patients we would expect 850 to die

Example patient risks 2

- Man 75-79, cardiac emerg = 57%
- Liver disease +3%
- Female +6%
- 90 and older +19%
Calculation of expected deaths

Patient_1 Risk

Patient_2 Risk

Expected Deaths

Patient .. Risk
Calculation of observed deaths

HES = In hospital deaths

HES + ONS = Out of hospital deaths

Observed Deaths = In hospital deaths + Out of hospital deaths
• Baseline SHMI value is 1 (observed = expected)

• Providers who do not conform to the national baseline (with associated control limits) are indicating special cause variation

• This variation has not been explained by the baseline model, many possibilities for reasons why, but this warrants a follow-up
Summary Hospital-level Mortality Indicator (SHMI) - Deaths associated with hospitalisation, England, October 2013 - September 2014

Provider: RTH - OXFORD UNIVERSITY HOSPITALS NHS TRUST
Data covering period: October 2013 - September 2014
Link to publication: www.hscic.gov.uk/pubs/shmiokt13sep14
Number of spells: 111,762
Expected number of deaths: 3,158
Observed deaths: 3,144
SHMI banding: as expected
SHMI value: 0.996
Control limits adjusted for over-dispersion
95\% upper: 1.109
95\% lower: 0.902
Variable Life-Adjusted Display (VLAD) charts are for:
- a single trust
- a single diagnosis group

For each patient observed outcome (0 for survived and 1 for died) is subtracted from the risk of dying and this is plotted cumulatively.

A downward trend indicates a run of more deaths than expected.
An upward trend indicates a run of fewer deaths than expected.
Comparison of control charts

<table>
<thead>
<tr>
<th>Funnel Plot</th>
<th>VLAD Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Snapshot of calculated outcome over reporting period</td>
<td>• Cumulative display of longitudinal data over time</td>
</tr>
<tr>
<td>• Identification of outliers</td>
<td>• Detect changes in a series of outcomes</td>
</tr>
<tr>
<td>• Comparison of overall SHMI value for trust with national baseline</td>
<td>• At diagnosis group level</td>
</tr>
</tbody>
</table>
Investigating alerts from control charts

Pyramid of investigation

- Individual
- Process of care
- Structure / resource
- Patient case-mix
- Data

How SHMI can / cannot be used

What it is intended to be

- Indication
- Used with other more detailed indicators
- Smoke alarm/trigger for further investigation

What it is NOT intended to be

- League table
- Direct measure/comparison
- A definitive judgement
Developments

| Measures of comorbidity | • SHMI uses Charlson comorbidity index  
| | • Carrying out research into using the Elixhauser index, which includes more conditions  
| | • Investigating calibrating the weights of the comorbidity index on SHMI data |

| Weekend Mortality | • Significant public interest in seven-day services  
| | • Investigating how best to compare mortality by day of the week |

| Understanding use of SHMI | • Want to develop understanding of how SHMI is used by trusts  
| | • Volunteers for case studies welcome! |
Questions?