



# HQIP

Healthcare Quality  
Improvement Partnership

# Guide for Patients in Understanding Clinical Audit Reports

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Healthcare Quality Quest

*Clinical audit tool to promote quality for better health services*



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## 1 Introduction to the guide

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### 1.1 Who the guide is for

This guide is for:

- patients and other people who use healthcare services
- patients' and service users' families and carers
- members of the public
- members of Local Involvement Networks (LINks) or Oversight Scrutiny Committees
- others who are interested in understanding the findings of clinical audits.

### 1.2 How it is intended to help

This guide is intended to help you to know:

- what clinical audit is and what it is intended to do
- what a report on a clinical audit includes
- what a clinical audit shows about the quality of patient care
- differences between reports on local and national clinical audits
- ways that clinical audit data are summarised as numbers
- ways that clinical audit data are presented in charts and graphs.

You should feel confident that you understand a report on a clinical audit and that you can ask your local healthcare organisation or a national organisation if you have any questions about a report.

## 2 Understanding clinical audit — what improving quality is about

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### 2.1 What clinical audit is intended to do

Clinical audit is carried out to improve the quality of patient care. It is about checking that patients are treated the right way and get the right care. Clinical staff and managers have to take action to improve care, if a clinical audit shows the need to improve.

Before a clinical audit on a particular subject is started, the group that wants to do the audit has to think about who should be involved in the audit process, and then invite those people to take part. In a local healthcare organisation, the people involved in a clinical audit may include clinical staff who provide the care covered by the audit subject, managers, other staff who may be affected by the audit and patients or their representatives.

When a clinical audit is done at a regional or national level, representatives of clinical staff, managers, others affected by the audit and patients or their representatives are involved.

## 2.2 The clinical audit process

The important stages in the clinical audit process are described in the box.

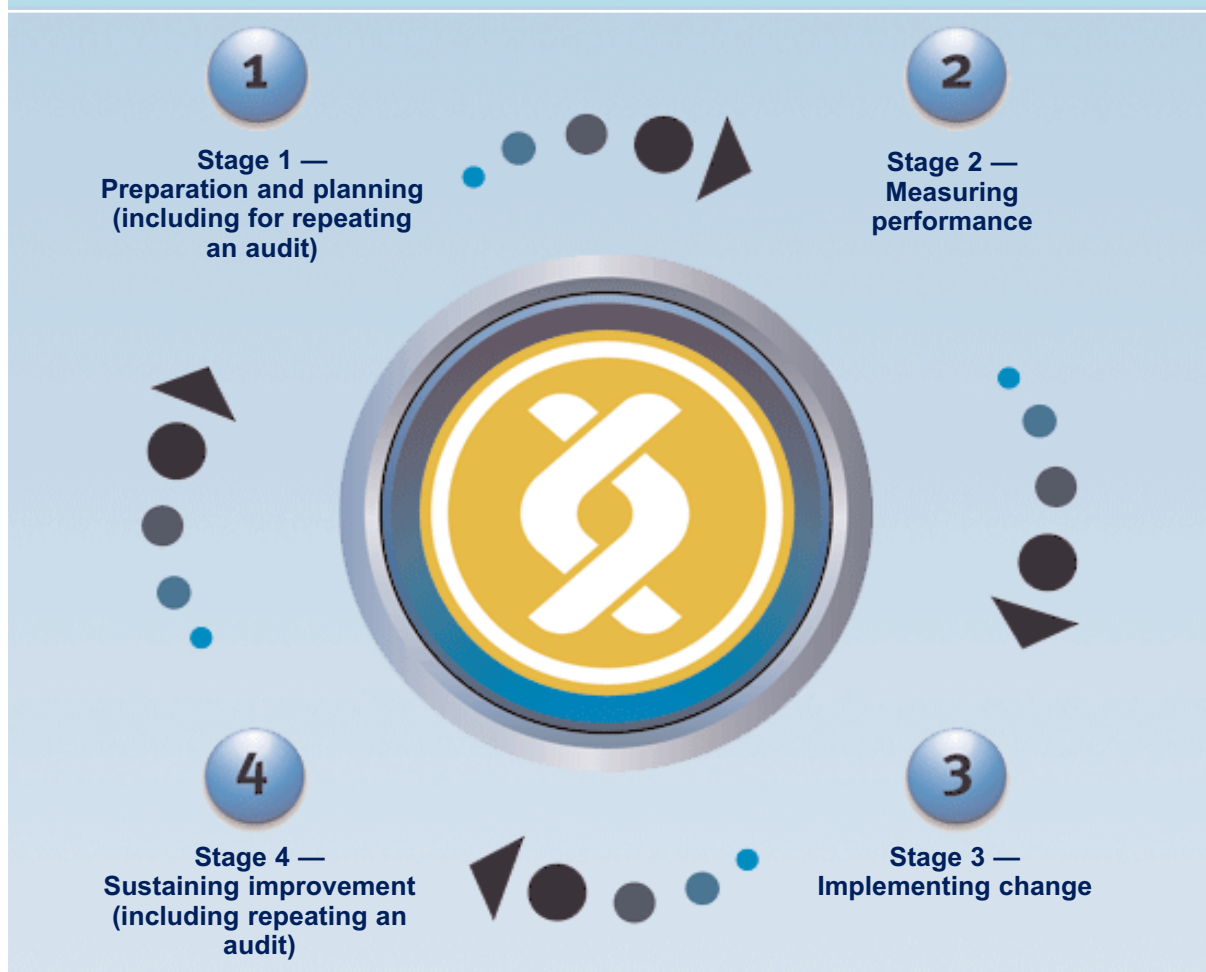
### Key stages in a clinical audit

The group that is doing an audit:

- Agrees on **why** the group members want to do the audit and exactly which **types of patients** they want to include in the audit
- Agrees on the **standards** of patient care and defines the standards very precisely so that the actual quality of care can be **measured accurately**
- Goes through electronic or paper patient records or asks patients or carers directly to **collect information** about whether or not the standards are being met
- Analyses the data gathered to **see how many patients are getting care according to the standards**
- Decides **if the quality of care is acceptable or not**
- *If* the quality of care is acceptable, lets the staff know they are doing a good job
- *If* the quality of care is not acceptable, finds out what the problems are and takes action to improve the quality of care. Then the group collects information again to see if the action has resulted in more patients getting the right care.

The clinical audit process is illustrated in the diagram.

### The clinical audit process



See *Clinical Audit — An Introduction for Patients* at [www.hqip.org.uk](http://www.hqip.org.uk).

### 3 Types of clinical audits

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There are three types of clinical audits. They are usually referred to as **national**, **regional** (or multi-site) and **local** clinical audits. **National clinical audits** include those that are funded by the National Clinical Audit and Patient Outcomes Programme (NCAPOP) that is managed by HQIP or other national clinical audits that have separate funding. **Regional** clinical audits tend to be led by regional clinical groups. **Local** clinical audits are led by clinical staff working in an individual healthcare organisation.

The key features of each of the types of audits are in the box.

Type of clinical audit	Key features of the clinical audit
National <sup>1</sup>	<ul style="list-style-type: none"><li>• The <b>subject</b> of the clinical audit is <b>highly important nationally</b>.</li><li>• The audit is intended to <b>include all NHS organisations</b> in England that treat patients for the condition that is the subject of the audit.</li><li>• The audit is designed to <b>measure current clinical practice in comparison to national clinical guidelines and/or patient outcomes</b>.</li><li>• <b>Individual NHS organisations are expected to study their clinical performance in comparison to the national findings</b> of the audit, <b>and make improvements</b> in their practice as needed.</li><li>• <b>Relevant national professional bodies</b>, such as Royal Colleges, support the audit.</li><li>• Relevant national voluntary organisations that <b>represent patients' interests</b> usually are involved in the audit.</li></ul>
Regional or multi-site	<ul style="list-style-type: none"><li>• The <b>subject</b> of the clinical audit is <b>highly important regionally</b>.</li><li>• The audit is intended to <b>include all NHS organisations</b> in a region that treat patients for the condition that is the subject of the audit.</li><li>• The audit is designed to <b>measure current clinical practice in comparison to national or regional clinical guidelines and/or patient outcomes</b>.</li><li>• <b>Individual NHS organisations are expected to study their clinical performance in comparison to the regional findings</b> of the audit, <b>and make improvements</b> in their practice as needed.</li><li>• <b>Relevant regional professional groups</b> support the audit.</li><li>• Relevant <b>patient representatives</b> may be involved in the audit.</li></ul>

Type of clinical audit	Key features of the clinical audit
Local (clinical service or organisation)	<ul style="list-style-type: none"> <li>• The <b>subject</b> of the clinical audit is <b>highly important</b> in the clinical service doing the audit or the healthcare organisation.</li> <li>• The audit is intended to <b>include a reasonable number</b> of patients cared for locally for the condition that is the subject of the audit.</li> <li>• The audit is designed to <b>measure current clinical practice in comparison to national, regional or local clinical guidelines or standards and/or patient outcomes</b>.</li> <li>• <b>The clinical service or organisation is expected to study their clinical performance in comparison to the guidelines or standards</b> used in the audit, <b>and make improvements</b> in their practice as needed.</li> <li>• <b>Relevant local clinical staff and managers</b> support the audit.</li> <li>• Relevant <b>patient representatives</b> may be involved in the audit.</li> </ul>

Clinical audits also may be carried out across different organisations in the same locality, in order to measure and improve the quality of care provided to patients who are cared for by the different organisations. This type of clinical audit is called **interface audit**. See *Guide to Facilitating Clinical Audit across Different Care Settings* at [www.hqip.org.uk](http://www.hqip.org.uk) for more information about interface clinical audits.

## 4 What to expect in a report on a clinical audit

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### 4.1 What the report should be about

The report of a clinical audit should help you learn about, understand, and perhaps, question a clinical audit. The report should tell you all of the following:

- **what** the clinical audit is about
- **why** the audit was done
- the **standards** that were used
- **how** it was done
- **what was learned** about the quality of patient care
- **what was done** about the findings
- **how successful actions** taken on the findings **have been** in achieving improvements.

The contents of a report on a clinical audit are explained in the box on the next page.



Question	Part of the report
<p><b>What the clinical audit is about</b></p> <ul style="list-style-type: none"> <li>• <b>Background</b></li> <li>• <b>Patient involvement</b></li> </ul>	<p>The <b>title</b> of the clinical audit—preferably explaining the subject of the audit as completely as possible</p> <p>A brief explanation of the subject and why it was important to carry out an audit on the subject</p> <p>A brief description of how patients or their representatives were involved in the audit, if they were</p>
<p><b>Why</b> the clinical audit was done</p>	<p>The <b>aim(s)</b> and/or specific <b>objective(s)</b> of the audit to confirm that the present quality of care meets standards or to make improvements in care if needed</p>
<p>The <b>standards</b> that were used</p>	<p>Exactly <b>what care</b> should have been given to patients <b>and</b> the <b>percentage of patients</b> that should get that care</p>
<p><b>How</b> it was done</p>	<p>Normally, this section explains:</p> <ul style="list-style-type: none"> <li>• the group of patients included in the audit and how the patients were selected</li> <li>• how the data needed were collected.</li> </ul> <p>This information may be in a section of the report called <b>methodology</b>.</p>
<p><b>What was learned</b> about the quality of patient care</p>	<p>The <b>percentages of patients that had the right care</b> from the data collected. Sometimes audit findings are shown using other statistics.</p> <p>Depending on the type of audit, if the findings show that care provided to patients wasn't consistent with the standards used, the final report also should show the <b>percentages of patients that had the right care after changes in practice</b> were made.</p> <p>The <b>findings</b> section also describes:</p> <ul style="list-style-type: none"> <li>• whether or not the findings of the first data collection showed <b>acceptable quality</b> of care or service, and <b>if not, why not</b></li> <li>• <b>problems</b> identified by the audit findings</li> <li>• <b>causes</b> of any problems and how the causes of the problems were identified.</li> </ul>
<p><b>What was done</b> about the findings</p>	<p>The report should describe <b>improvements</b> needed and the <b>actions</b> taken to achieve the improvements. If the group doing the audit does not have the authority to take action, the report may describe the <b>actions</b> that are <b>recommended</b>.</p>
<p><b>How successful actions</b> taken <b>have been</b></p>	<p>A final report on a clinical audit should include evidence that actions taken resulted in needed improvements.</p>

For more information on what's included in a clinical audit report, see *Template for Clinical Audit Report* at [www.hqip.org.uk](http://www.hqip.org.uk).

## 4.2 Types of clinical audit reports

Clinical audit reports vary according to the type of clinical audit. Key features of reports are in the box.

Type of clinical audit	Key features of the clinical audit report
<b>National and regional</b>	<ul style="list-style-type: none"><li>• The report is usually issued <b>annually</b> and includes findings from the previous year's data collection.</li><li>• The clinical audit <b>findings</b> represent the quality of care provided <b>at national (or regional) level</b>.</li><li>• The findings include many <b>details that help individual healthcare organisations interpret the findings</b> and see how their performance compares with the performance of other organisations.</li><li>• The organisations that carry out national clinical audits cannot direct individual healthcare organisations to take specific actions to make improvements. Therefore, the report tends to provide <b>recommendations for action</b> to be followed up at local level by each organisation participating in the audit.</li><li>• <b>It may not be possible to see the effect of actions taken</b> to achieve improvements in the quality of patient care until the next report is issued, and findings are compared from year to year.</li></ul>
<b>Local</b>	<ul style="list-style-type: none"><li>• A presentation or a report may be provided at various stages in the clinical audit, for example:<ul style="list-style-type: none"><li>– after data have been collected to present the findings to those involved in the audit</li><li>– after those involved have analysed the findings, identified any problems in care and their causes, and decided on actions that need to be taken (which may be called recommendations for action)</li><li>– after actions have been taken and data have been collected again to show whether or not improvements are achieved.</li></ul></li><li>• Clinical audit reports can be called <b>preliminary or interim</b> until all the stages of the clinical audit have been completed and there is evidence that the quality of care meets the standards in the clinical audit.</li><li>• Reports on <b>local clinical audits may be updated</b> several times to reflect what happened after action was taken to achieve improvement and the collection of data was repeated to find out if the quality of care has improved.</li></ul>

Reports for national clinical audits that are part of the NCAPOP are available at [www.hqip.org.uk](http://www.hqip.org.uk). Reports on local clinical audits can be obtained from the clinical audit department at your local healthcare organisation.

### 4.3 How clinical audit reports are used

Clinical staff, healthcare organisations and patients want to know about the quality of care being delivered and want to know that improvements in patient care are being made as needed. Clinical audit reports can be used for many purposes, including to:

- demonstrate the quality of care currently provided to patients
- show that the organisation is committed to improving the quality of patient care
- share with people who weren't involved in the clinical audit what has been achieved
- help clinical staff reflect on how an audit was done and learn how to do future clinical audits in better ways
- provide assurance to the organisation's board that the organisation is meeting its obligations relating to the quality of patient care.

## 5 How to interpret clinical audit reports

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### 5.1 Reports on local clinical audits

Reports on local clinical audits usually include the following:

- if **standards** set in the clinical audit **are being met**, that is, if patients are getting the right care
- **reasons for shortcomings** in care
- **actions** to address the shortcomings **and evidence of the effectiveness** of the actions **in improving patient care**.

People doing clinical audits use statistical techniques to summarise and present the data to turn the data into **information you can interpret**.

In local clinical audits, the findings are usually shown by the **percentage of patients** included in an audit **whose care was consistent with the standards** used in the audit.

#### Example of a finding in a local clinical audit

Suppose a team decided to measure if plans for care at home following discharge from the hospital are discussed and agreed with patients. The team decides that there should be notes in a patient's record to confirm the discussion and agreement. If the team learned that 87 out of 100 patients in the audit had plans discussed and agreed, the finding might be presented as follows.

Standard	Frequency (percentage)	Actual percentage
The plans for care at home following discharge from the hospital are discussed and agreed with the patient	100%	87%

The percentage shown also means that 13 out of 100 patients did not have discharge plans discussed and agreed.

## 5.2 Reports on national clinical audits

National clinical audits involve making **comparisons about the quality** of patient care **among the healthcare organisations** participating in the audit. Therefore, reports on national clinical audits tend to have more information about the similarities and differences in practice among organisations.

## 5.3 Ways clinical audit findings are summarised

There are many ways that clinical audit data can be summarised to show you how similar—or dissimilar—the findings were for the patients, events or situations in an audit.

### 5.3.1 Averages across data

Three ways used frequently to present clinical audit data are:<sup>2-6</sup>

- mode
- median
- mean

These methods can be used to report the findings in both local and national clinical audits. The terms are explained in the box.

Method	Meaning
<b>Mode</b>	In a set of data, the number that occurs <b>most frequently</b>
<b>Median</b>	In a set of data, the <b>middle</b> number, which is found by arranging the numbers in order of size going from lowest to highest and then finding the middle number
<b>Mean</b>	The arithmetic <b>average</b> , found by adding all the numbers and dividing by the total number of numbers
<b>Example</b>	<p>One aspect of care that might be important in a clinical audit is length of stay in hospital in days. If an audit included 15 patients, the number of days patients stayed in hospital could be reported three ways, as the mode, median or mean.</p> <p>3, 4, <b>5, 5, 5, 5</b>, 6, 6, 8, 8, 10, 10, 10, 32, 33</p> <p><b>5 = Mode</b></p> <p>3, 4, 5, 5, 5, 5, 6, <b>6</b>, 8, 8, 10, 10, 10, 32, 33</p> <p><b>6 = Median</b></p> <p><math>3 + 4 + 5 + 5 + 5 + 5 + 6 + 6 + 8 + 8 + 10 + 10 + 10 + 32 + 33 = 150</math></p> <p>There are 15 numbers.</p> <p><math>\frac{150}{15} = 10 = \text{Mean}</math></p> <p>The example shows that the mean is affected by a few extreme numbers so it is not always the fairest way to show what is happening 'on average' to patients.</p>

### 5.3.2 Spread across data

Two ways to show the spread across clinical audit data are:<sup>2-6</sup>

- percentiles and quartiles (sometimes called quantiles)
- standard deviation.

The terms are explained in the box.

Method	Meaning			
<b>Percentiles and quartiles</b>	<p>Dividing a string of numbers, that are arranged in rank order, into equal groups</p> <p>When the numbers are divided into quarters, the quarters are called <b>quartiles (Q)</b>.</p> <p>When they are divided into hundredths, the groups are called <b>percentiles</b>.</p> <p>The <b>interquartile range</b> is the middle 50% of the array of numbers between Q1 and Q3.</p>			
<b>Example</b>	<p>If the quartiles were calculated for the lengths of stay, they would show the effect of the very long stays.</p> <p style="text-align: center;"><b>Illustration</b></p> <p style="text-align: center;">3, 4, 5, 5, 5, 5, 6, 6, 8, 8, 10, 10, 10, 32, 33</p> <table style="margin-left: auto; margin-right: auto;"><tr><td style="text-align: center;"> ----- ----- ----- ----- </td></tr><tr><td style="text-align: center;">5                      6                      10</td></tr><tr><td style="text-align: center;">Q1                      Q2                      Q3</td></tr></table> <p style="text-align: center;"><b>5 = Q1 = 25th percentile = 25% of the numbers are below the number at Q1.</b></p> <p style="text-align: center;"><b>6 = Q2 = median = 50th percentile = 50% of the numbers are below the number at Q2.</b></p> <p style="text-align: center;"><b>10 = Q3 = 75th percentile = 75% of the numbers are below the number at Q3.</b></p> <p style="text-align: center;"><b>The interquartile range = 5 to 10, the middle 50% of the length of stay.</b></p> <p>25% of the patients stayed 5 days or less and half the patients stayed 6 days or less. However, there is then a gap in the days of stay. 75% of the patients stayed 10 days or less and 100% of the patients stayed 33 days or less.</p>	----- ----- ----- -----	5                      6                      10	Q1                      Q2                      Q3
----- ----- ----- -----				
5                      6                      10				
Q1                      Q2                      Q3				

Method	Meaning
<b>Standard deviation (SD)</b>	In a string of numbers, the <b>average deviation of numbers from the mean</b> . It shows how spread out the numbers are.
	The <b>smaller</b> the standard deviation, the <b>more alike</b> the data are.
	The <b>larger</b> the standard deviation, the <b>more spread out</b> and dissimilar the data are.
<b>Example</b>	
Suppose that a national clinical audit shows that the mean age of patients in the audit was 73 years and the <b>standard deviation</b> (average deviation from the mean) was 10 years. In your local NHS organisation, however, suppose that the mean age of patients in the audit was 58 years. This difference would show that the patients treated in your local NHS organisation were dissimilar in age to the patients treated at a national level. Therefore, depending on what the clinical audit is about, the findings of the national audit may not be applicable to your local organisation.	

## 5.4 Ways clinical audit data are displayed

There are many ways for organising and presenting data, including:<sup>2-8</sup>

- table
- bar chart and histogram
- graph (frequency polygon)
- box and whisker diagram
- funnel plot.

Tables, bar charts, histograms and graphs are used to report the findings in both local and national clinical audits. Box and whisker diagrams and funnel plots are used more frequently in reports of national clinical audits.

These ways of displaying data are described in the boxes that follow. The method is explained and an example is given. The examples are taken from two of the reports of national clinical audits.<sup>9-10</sup>

Display	Meaning	Key points
<b>Table</b>	<p><b>Organisation and presentation of data into clearly labelled columns and rows</b></p> <p><b>Each</b> column and row may have totals to help in interpreting the data.</p>	Data in each cell show the <b>frequency of occurrence</b> of each thing being counted or measured, usually shown as a number or a percentage.

### Example

In the National Sentinel Stroke Audit,<sup>9</sup> data on meeting 8 standards were collected and reported. The table shows the differences in care for patients who were admitted to stroke units and patients who were not. The percentage of patients whose care met the standards was higher for patients admitted to a stroke unit than for those who weren't.

Percentage of patients who had care according to the standards, for applicable patients		
Measure	Percentage (%) among patients admitted to a stroke unit (8390 patients)	Percentage (%) among patients not admitted to a stroke unit (2967 patients)
1. Screened for swallowing disorders within first 24 hours of admission	78	50
2. Brain scan within 24 hours of stroke	64	59
3. Commenced aspirin by 48 hours after stroke	87	79
4. Physiotherapy assessment within first 72 hours of admission	88	65
5. Assessment by an Occupational Therapist within 4 working days of admission	70	42
6. Weighed at least once during admission	79	46
7. Mood assessed by discharge	72	36
8. Rehabilitation goals agreed by the multidisciplinary team	91	57

Display	Meaning	Key points
<b>Bar chart and histogram</b>	<p><b>Diagrams</b> that have a <b>series of bars</b>. The bars can either stand up or go from side to side.</p> <p>Words that explain what each bar stands for are along the bottom or up the side of the diagram.</p> <p>The height (or length) of each bar represents a number or percentage.</p>	<p>A <b>bar chart</b> has spaces between the bars because <b>bars are for separate things that cannot run onto each other</b>, such as medical specialties or types of therapy.</p> <p>A <b>histogram</b> is a bar chart that does not have spaces between the bars. This is because <b>bars are for things that can run onto each other</b>, such as age, time, weight or blood pressure.</p>

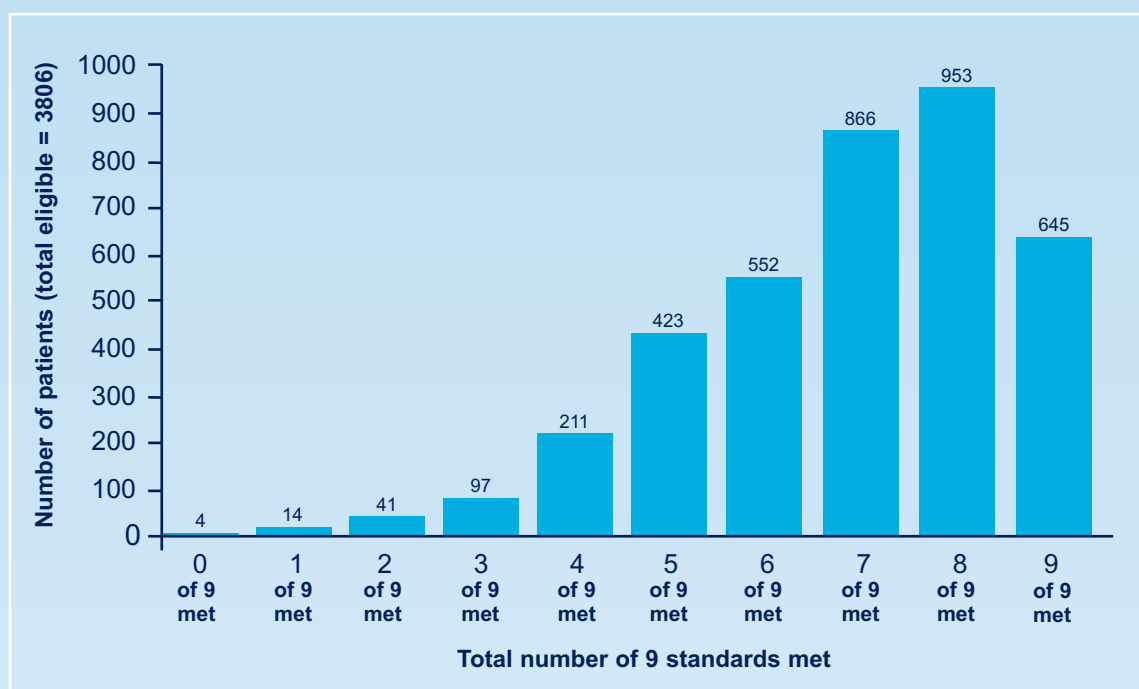
### Example

In the National Sentinel Stroke Audit,<sup>9</sup> an additional standard is that patients who have a stroke should spend 90% of their hospital stay in a stroke unit.

Over 2006-2008, there were 3806 patients who should have had care that met the 8 standards in the table on page 11 plus the standard on stay in a stroke unit.


The bar chart shows the number of patients whose care met only one of the standards measures, the number of patients whose care met two of the standards and so on. The bar chart shows that only 645 of 3806 patients or 17% had care that was consistent with **all** of the standards.

**Bar chart of the number of standards met for 3806 patients for 2006 to 2008**





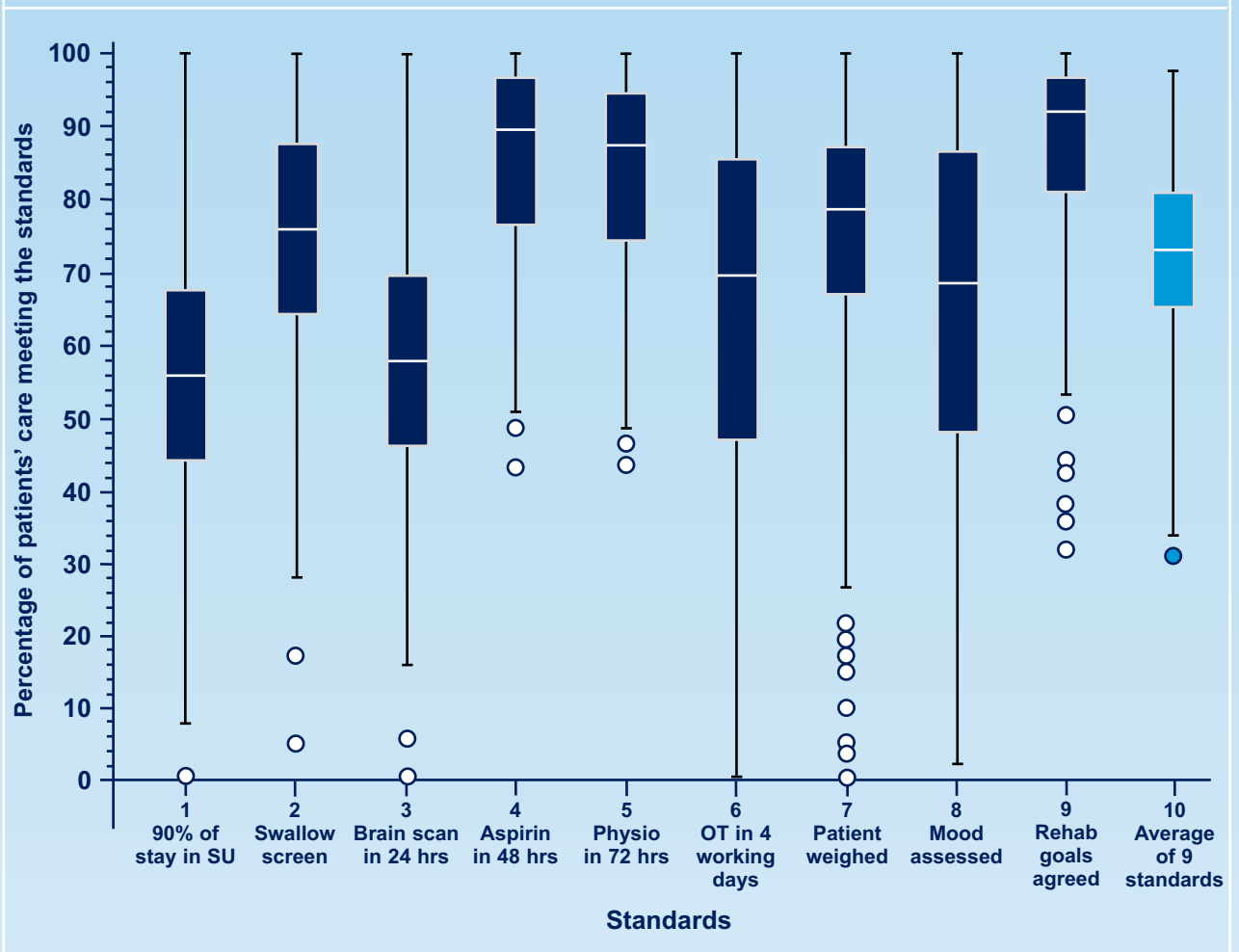
Display	Meaning	Key points																																																																																																																																																																																																																														
<b>Graph</b> (also called frequency polygon)	A <b>curve that connects</b> numbers that are in <b>the middle of the tops of each bar in a histogram</b>	Dots that are in the middle of the top of each bar in a histogram are connected into lines between the bars.																																																																																																																																																																																																																														
<b>Example</b>																																																																																																																																																																																																																																
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The graph shows the number of admissions per month for three years, 2006–2008. The admissions are shown for age groups of children: less than 1 year old, 1 to 4 years, 5 to 10 years and 11 to 15 years. The graph shows that the most frequent age of children each month over time was children less than 1 year old. Also, for this group, there is a pattern in the data: Admissions start to rise in October and stay high through January. The data for the other age groups show no such patterns and are much lower in frequency.																																																																																																																																																																																																																																
<p><b>Graph of the number of admissions by month and age for 2006 to 2008</b></p> <table border="1"> <caption>Approximate data from the graph</caption> <thead> <tr> <th>Year</th> <th>Month</th> <th>&lt;1</th> <th>&lt;1-4</th> <th>5-10</th> <th>11-15</th> </tr> </thead> <tbody> <tr><td>2006</td><td>1</td><td>670</td><td>300</td><td>160</td><td>150</td></tr> <tr><td>2006</td><td>2</td><td>560</td><td>290</td><td>170</td><td>140</td></tr> <tr><td>2006</td><td>3</td><td>580</td><td>310</td><td>160</td><td>150</td></tr> <tr><td>2006</td><td>4</td><td>530</td><td>310</td><td>150</td><td>140</td></tr> <tr><td>2006</td><td>5</td><td>560</td><td>310</td><td>150</td><td>140</td></tr> <tr><td>2006</td><td>6</td><td>540</td><td>280</td><td>150</td><td>140</td></tr> <tr><td>2006</td><td>7</td><td>500</td><td>280</td><td>160</td><td>150</td></tr> <tr><td>2006</td><td>8</td><td>520</td><td>260</td><td>150</td><td>140</td></tr> <tr><td>2006</td><td>9</td><td>520</td><td>260</td><td>150</td><td>140</td></tr> <tr><td>2006</td><td>10</td><td>510</td><td>300</td><td>180</td><td>180</td></tr> <tr><td>2006</td><td>11</td><td>590</td><td>290</td><td>160</td><td>160</td></tr> <tr><td>2006</td><td>12</td><td>680</td><td>280</td><td>130</td><td>130</td></tr> <tr><td>2007</td><td>1</td><td>670</td><td>310</td><td>140</td><td>140</td></tr> <tr><td>2007</td><td>2</td><td>530</td><td>310</td><td>140</td><td>140</td></tr> <tr><td>2007</td><td>3</td><td>540</td><td>360</td><td>160</td><td>180</td></tr> <tr><td>2007</td><td>4</td><td>580</td><td>330</td><td>160</td><td>180</td></tr> <tr><td>2007</td><td>5</td><td>610</td><td>360</td><td>170</td><td>190</td></tr> <tr><td>2007</td><td>6</td><td>520</td><td>360</td><td>180</td><td>180</td></tr> <tr><td>2007</td><td>7</td><td>610</td><td>330</td><td>180</td><td>180</td></tr> <tr><td>2007</td><td>8</td><td>570</td><td>320</td><td>180</td><td>180</td></tr> <tr><td>2007</td><td>9</td><td>550</td><td>310</td><td>160</td><td>160</td></tr> <tr><td>2007</td><td>10</td><td>630</td><td>360</td><td>180</td><td>220</td></tr> <tr><td>2007</td><td>11</td><td>710</td><td>370</td><td>170</td><td>180</td></tr> <tr><td>2007</td><td>12</td><td>740</td><td>310</td><td>160</td><td>160</td></tr> <tr><td>2008</td><td>1</td><td>700</td><td>370</td><td>180</td><td>180</td></tr> <tr><td>2008</td><td>2</td><td>520</td><td>310</td><td>180</td><td>180</td></tr> <tr><td>2008</td><td>3</td><td>580</td><td>330</td><td>180</td><td>180</td></tr> <tr><td>2008</td><td>4</td><td>570</td><td>350</td><td>190</td><td>180</td></tr> <tr><td>2008</td><td>5</td><td>600</td><td>340</td><td>190</td><td>190</td></tr> <tr><td>2008</td><td>6</td><td>580</td><td>330</td><td>200</td><td>180</td></tr> <tr><td>2008</td><td>7</td><td>620</td><td>340</td><td>190</td><td>180</td></tr> <tr><td>2008</td><td>8</td><td>590</td><td>330</td><td>180</td><td>180</td></tr> <tr><td>2008</td><td>9</td><td>580</td><td>330</td><td>180</td><td>180</td></tr> <tr><td>2008</td><td>10</td><td>670</td><td>370</td><td>190</td><td>200</td></tr> <tr><td>2008</td><td>11</td><td>730</td><td>330</td><td>160</td><td>140</td></tr> <tr><td>2008</td><td>12</td><td>780</td><td>350</td><td>150</td><td>150</td></tr> </tbody> </table>			Year	Month	<1	<1-4	5-10	11-15	2006	1	670	300	160	150	2006	2	560	290	170	140	2006	3	580	310	160	150	2006	4	530	310	150	140	2006	5	560	310	150	140	2006	6	540	280	150	140	2006	7	500	280	160	150	2006	8	520	260	150	140	2006	9	520	260	150	140	2006	10	510	300	180	180	2006	11	590	290	160	160	2006	12	680	280	130	130	2007	1	670	310	140	140	2007	2	530	310	140	140	2007	3	540	360	160	180	2007	4	580	330	160	180	2007	5	610	360	170	190	2007	6	520	360	180	180	2007	7	610	330	180	180	2007	8	570	320	180	180	2007	9	550	310	160	160	2007	10	630	360	180	220	2007	11	710	370	170	180	2007	12	740	310	160	160	2008	1	700	370	180	180	2008	2	520	310	180	180	2008	3	580	330	180	180	2008	4	570	350	190	180	2008	5	600	340	190	190	2008	6	580	330	200	180	2008	7	620	340	190	180	2008	8	590	330	180	180	2008	9	580	330	180	180	2008	10	670	370	190	200	2008	11	730	330	160	140	2008	12	780	350	150	150
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Display	Meaning	Key points
<p><b>Box and whisker diagram (also called box plot)</b></p>	<p>A <b>diagram</b> that shows <b>how the numbers collected ‘cluster’ in comparison to the extreme ends of the numbers. It shows the range and quartiles of the data.</b></p> <p>The diagram includes the:</p> <ul style="list-style-type: none"> <li>• range (the whiskers)</li> <li>• median</li> <li>• a box that shows the inter-quartile range and consists of the numbers from the first quartile to the third quartile.</li> </ul> <p>The diagram <b>can show the presence of more extreme values at one end of a range</b> than the other. If extreme values occur at one end of a range for a group of data, it is known as <b>‘skewness’</b>.</p> <p>The minimum and maximum levels for the whiskers can be set to show the lowest and highest values in a range. They also can be set statistically to show outliers, which are <b>data points</b> that are <b>very extreme in comparison to</b> the rest of the data. The outliers are shown as circles.</p>	 <ul style="list-style-type: none"> <li>○ <b>Circle</b> = outlier</li> <li><b>Whisker</b> = maximum or the highest value excluding outliers</li> <li><b>Box end</b> = 75th percentile — 25% of data are greater in value</li> <li><b>Line</b> = median = 50th percentile — 50% of data are greater in value</li> <li><b>Whole box</b> = interquartile range — the middle 50% of values</li> <li><b>Box end</b> = 25th percentile — 25% of data are less in value</li> <li><b>Whisker</b> = minimum or the least value excluding outliers</li> <li>○ <b>Circle</b> = outlier</li> </ul>
<p><b>Example</b></p>	<p>In the National Sentinel Stroke Audit,<sup>9</sup> data on meeting all 9 standards were collected. A box and whisker diagram was used to show the variation in meeting the 9 standards among the participating hospitals.</p> <p>Look for the following in the diagram:</p> <ul style="list-style-type: none"> <li>• Are some boxes higher than others? This tells you that there is better care for some standards than for others.</li> <li>• Are some boxes bigger (longer?) than others? Longer boxes means the data were not as clustered, that is, not as alike.</li> <li>• Are some whiskers longer than others? Longer whiskers means the data were not as clustered, that is, not as alike.</li> <li>• Are there any circles? Circles mean outliers which are data that are very different from all the other data.</li> </ul> <p>Looking at the example, the diagram shows you that the height of the boxes varies for the 9 individual standards. The middle 50% of the hospitals did better on some standards, such as aspirin being given within 48 hours, than on others, such as a brain scan being done in 48 hours.</p>	

The boxes are smaller for some standards, such as the goals for rehabilitation being agreed, and larger for other standards, such as the patient's mood being assessed. The smaller boxes tell you the middle 50% of the hospitals were more alike for how well they provided care and the larger boxes tell you there was much more variation in how well care was provided.

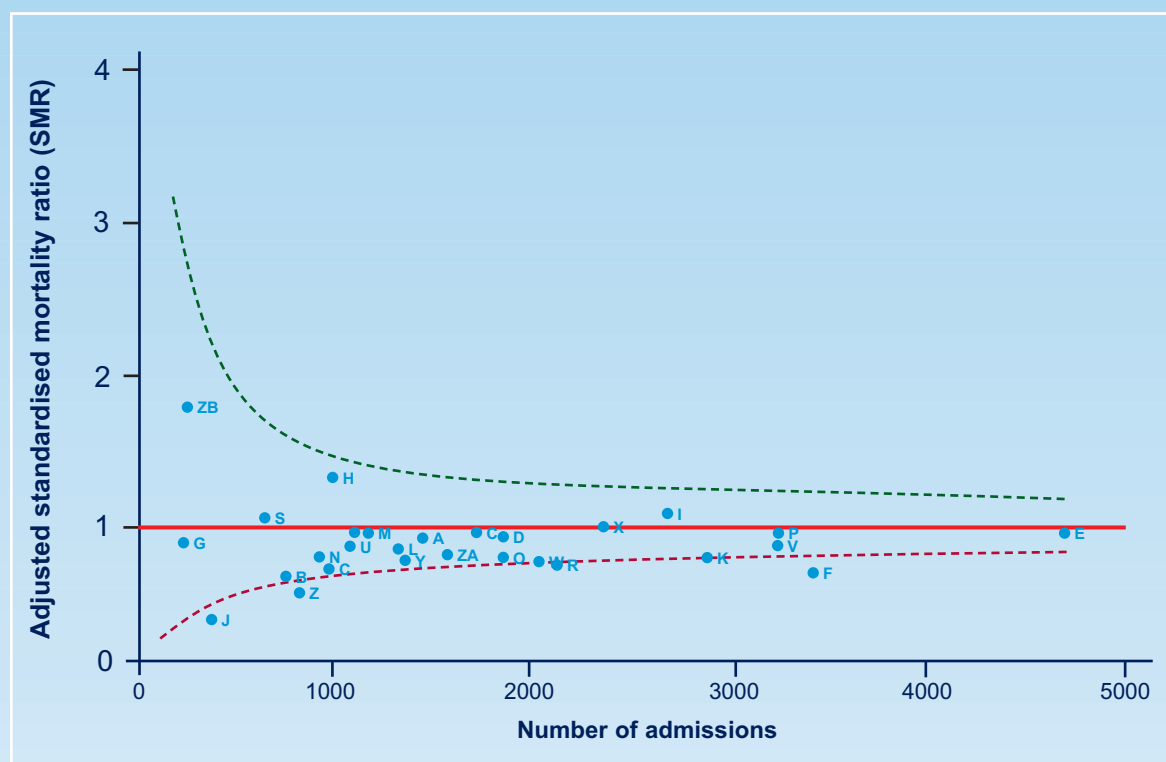
The whiskers have been set to allow for outliers. They show you that there were more outliers for some standards, such as the patient being weighed, than for others. In summary, the diagram tells you that the hospitals were consistently better at meeting some standards than others.

**Box and whisker diagram of hospital variation for compliance with each of 9 standards**



Display	Meaning	Key points
<b>Funnel plot</b>	<p>A <b>diagram that shows where numbers fit in comparison to a line that indicates the target level and dotted lines that indicate control limits.</b></p> <p>Control limits serve as boundaries for data. Any <b>data points</b> that fall <b>above the upper boundary or below the lower boundary</b> are considered <b>outliers</b>. The chance of dots being outside the limits due to chance alone is very small, so something 'special' is happening.</p> <p>The control limits shown as dotted lines form a funnel shape because the space between the dotted lines gets smaller as the sample size gets bigger.</p> <p><b>Funnel plots help to identify any outliers and data points that are 'in control', that is, are within the control limit boundaries.</b></p>	<p>The centre line is usually but not always the mean.</p> <p>The control limits are often set at 95% or 99% using statistics to decide where the boundaries are drawn. For example, if the limit is set at 99% and <b>a data point is outside the lower or upper boundary</b>, then you can be 99% sure that there is something different about that point. There is a <b>'special cause'</b> for the point that should be investigated.</p> <p>There will be <b>variation</b> in the data plotted <b>within the funnel</b>. However, the variation <b>occurs at random</b> and has <b>no particular cause</b>.</p>
<b>Example</b>	<p>In the National Paediatric Intensive Care Audit,<sup>10</sup> data were collected on the number of children admitted and the number of children who died during 2006 to 2008. A risk-adjusted standardised mortality ratio (SMR) was calculated for each NHS organisation in the clinical audit. Risk-adjusted SMR is a way of comparing the actual number of deaths that happened with the number that would be expected based on available statistics. The method involves making statistical corrections in data about patients who died for things such as patient age and the number of clinical diagnoses or problems or conditions that each patient has. The SMR allows for more precise—and fairer—comparison among hospitals.</p> <p>A funnel plot was created. The SMRs are plotted up the side of the diagram and the number of admissions are plotted along the bottom of the diagram. For a funnel plot, look to see where the dots sit in relation to the center line and how far away from the center line the dots are and if there are any dots above or below the control limits.</p> <p>In this example, higher mortality rates show as points above the central line that represents a target number. Lower mortality rates show as points below the central line. Those points below the lower control limit (Hospitals J, Z and F) indicate unusually low mortality.</p> <p>When dots occur outside the control limits, it is important to consider why this is happening. For example, are the hospitals that much better at providing care, are the patients different in some way, or were the data collected and reported correctly?</p>	

**Funnel plot of PICU standardised mortality ratio adjusted by the Paediatric Index of Mortality by NHS trust for 2006–2008 with 99.9% control limits**



### 5.5 Terms used to describe clinical audit data

When you read national clinical audit reports, you may come across terms that are used to help clinical staff interpret clinical audit data. Some of these terms and what they are about are in the box.

Term	Explanation
<b>Significant</b>	In statistics, the likelihood that the findings of a clinical audit using a sample provide a true picture of what is happening. If the chance is very small that the findings of a clinical audit are due purely to chance, the findings are said to be 'statistically significant'.
<b>Confidence intervals (levels)</b>	A confidence interval is the range of values within which, given the data you have, you can have a stated level of confidence the underlying quality of care lies. Statisticians commonly use a 95% confidence interval, meaning that there is only a one in 20 chance that the quality of care is outside the range. <sup>11</sup>
<b>Normal distribution</b>	The normal distribution is often used to describe data points that tend to cluster around the mean, with data spread out equally on both sides of the middle of the curve. Another name for normal distribution is the bell-shaped curve.

Term	Explanation
<b>Risk adjustment</b>	A way of adjusting data about quality of care to account for differences in patient ages and the number and types of conditions patient in the group being measured have. Risk adjusted data give a fairer picture of what is actually happening to patients.

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## Further reading

Healthcare Quality Improvement Partnership. *Criteria and indicators of best practice in clinical audit*. Available from: [www.hqip.org.uk](http://www.hqip.org.uk). Last accessed 6 April 2010.