Heart Disease Indicators

(October 2013 – September 2014)

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**Introduction**

This report from the Information Services Division presents Heart Disease indicators from 1 October 2013 to 30 September 2014. These indicators have been chosen as they have the potential to inform improvements in the quality of care and patient experience.

The information contained in this publication is designed to be used as a resource by staff involved in the planning and delivery of services that treat these conditions in NHSScotland.

**Background**

In September 2011, Healthcare Improvement Scotland published *Heart Disease Improvement Programme National Overview*. This report identified 14 high level heart disease indicators that could be sourced from routinely collected data.

A separate set of heart disease indicators had also been devised as part of the *Medical Profiles Project*. There was considerable overlap between these two sets of indicators, so a small short-life working group, including specialists in cardiology, was formed to provide advice on developing a single set of indicators.

This publication reports on that set of 18 indicators that the short-life working group developed.

**In this report**

Information is provided on a range of cardiovascular-related conditions and procedures in Scotland, including:

- Congestive heart failure
- Heart attacks (also known as myocardial infarction)
- Angioplasty (also known as percutaneous coronary intervention).
- Coronary artery bypass graft

The measures used include:

- Mean and median length of stay in days.
- Proportion (%) of emergency readmissions within 30 days of discharge from hospital.
- Rate of mortality within 30 days of discharge from hospital following an emergency or urgent admission to hospital.
- Rate of in-hospital mortality following an emergency or urgent admission to hospital.
Overview of results

For 10 of the 18 indicators within this publication, the data points for all NHS Boards show variation that is within expected boundaries relative to the Scottish average.

The other 8 indicators contain data points for some NHS Boards that show variation outside the expected boundaries. These may be worthy of further consideration using local expert knowledge. Although there are some outliers, the majority of NHS Boards lie within the expected boundaries for these indicators.

The 8 indicators that show variation outside the expected boundaries relate to average length of stay (7 indicators) and emergency readmissions (1 indicator). These indicators do not take account of other conditions the patient may have, how severely ill they are or their personal circumstance. These may be factors that affect how long a patient must remain in hospital or why they need to be readmitted.

It is important to note that the indicators in this publication cannot be used alone as a basis for making reliable judgements about the quality of clinical care. Attempting to do so could easily lead to incorrect conclusions being drawn. Instead, the indicators serve as flags or pointers, drawing attention to areas worthy of further consideration. Local and expert knowledge is required to interpret the data meaningfully.

Key points

- During the period covered by the publication, there were 9,823 emergency or urgent inpatient admissions to hospital for a heart attack. The average length of stay for these patients was nine days, which is similar to the previous year.

- There were 1,561 emergency readmissions to hospital within 30 days of discharge following an emergency or urgent admission for a heart attack (17.7%).

- There were 932 deaths within 30 days of discharge following an emergency or urgent admission for a heart attack (10.1%).
Using this report

Funnel plots

Each of the indicators within this publication is presented in a type of chart called a funnel plot (see figure 0.1). This presents data in a way that allow comparisons to be made between each NHS Board and the average for Scotland (comparisons cannot be made between individual NHS Boards).

Data are plotted in relation to the Scottish average (horizontal blue line) and control limits (curved red lines).

The control limits on the funnel plot set the estimated range within which variation around the Scottish average is expected. The upper and lower control limits are set at three standard deviations from the average. The inner control limits are set at two standard deviations from the average. Standard deviation is a measure of the variation around the average.

Data points that are outside the control limits (sometimes called ‘outliers’) exhibit variation that is beyond that which would normally be expected. It is important not just to focus on the ‘outliers’ as variation may reflect a number of factors. It may be due to differences in the characteristics of the patient being cared for, the type of care, errors in the data or chance variation.

With local knowledge of clinical services, subtler patterns in the data can help to gain an understanding of how clinical services are provided.

Figure 0.1: Example funnel plot

More information about funnel plots and statistical process control methods and their use is available on the Quality Improvement Hub and the Association of Public Health Observatories (now part of Public Health England).

It may be helpful to use the accompanying tables alongside the funnel plots in order to gain better understanding of the information presented in the plots.
NHS Board of Residence

The information in this report is based on the health board of residence of the patient (using the 2006 NHS Board configuration). Only residents of Scotland are included in the analyses presented within the report.

Data sources and calculation

The indicators are derived from:

- Scottish Morbidity Record hospital discharge summary on inpatient and day-case activity in hospitals.
- National Records of Scotland death registration.

More information on data sources and the calculation of the indicators can be found in Appendix A1. Detailed definitions of each indicator can be found in Table A1.1.
Results and Commentary

1 Congestive heart failure

Congestive heart failure occurs when the heart cannot function as a pump as well as it should, which means that it cannot maintain sufficient blood flow to meet the requirements of the body.

This section examines the average length of stay (in days), emergency readmissions within 30 days of discharge, mortality within 30 days of discharge and in-hospital mortality for patients who had an emergency or urgent admission to hospital for congestive heart failure between October 2013 and September 2014.

1.1 Length of stay following emergency or urgent admission for congestive heart failure

Between October 2013 and September 2014, there were 3,129 emergency or urgent inpatient admissions to hospital in Scotland for congestive heart failure. The average length of stay for these admissions was 16.1 days and the median length of stay was 9 days.

At health board level, the average length of stay ranged from 9.2 days in NHS Western Isles to 41.0 days in NHS Shetland (figure 1.1 and table 1.1). For mainland health boards, the average length of stay ranged from 12.6 days in NHS Borders to 21.4 days in NHS Dumfries & Galloway. Two of the health boards, NHS Dumfries & Galloway and NHS Shetland, were above the upper control limits of the funnel plot (figure 1.1).

Figure 1.1: Average (mean) length of stay (days) following emergency or urgent admission to hospital for congestive heart failure, Scotland, October 2013 – September 2014.

Source: SMR01 dataset.
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
1.2 Emergency readmissions following emergency or urgent admission for congestive heart failure

In Scotland, there were 649 emergency readmissions to hospital within 30 days of discharge of an emergency or urgent admission to hospital for congestive heart failure between October 2013 and September 2014. The proportion of emergency readmissions within 30 days of discharge was 25.6%.

At health board level, the standardised\(^1\) emergency readmission proportion ranged from 20.0% in NHS Shetland to 29.9% in NHS Highland (figure 1.2 and table 1.2). The mainland health board with the lowest standardised readmission proportion was NHS Tayside (22.1%). No health boards were outside the control limits of the funnel plot (figure 1.2).

**Figure 1.2: Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital for congestive heart failure, standardised proportion (%), Scotland, October 2013 – September 2014.**

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation

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\(^1\) Standardisation adjusts for differences in the age, sex and deprivation composition of the population being compared. For more details, see the glossary entry for indirect standardisation.
1.3 Mortality within 30 days of discharge following emergency or urgent admission for congestive heart failure

In Scotland, there were a total of 634 deaths within 30 days of discharge following an emergency or urgent admission to hospital for congestive heart failure between October 2013 and September 2014. The proportion of mortality within 30 days of discharge was 23.4%.

The standardised proportion of mortality ranged from 12.9% in NHS Borders to 32.3% in NHS Dumfries & Galloway (figure 1.3 and table 1.3). No health boards were outside the control limits of the funnel plot (figure 1.3).

Figure 1.3: Mortality within 30 days of discharge following emergency or urgent initial admission to hospital for congestive heart failure, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset; National Records of Scotland death registrations
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
1.4 In-hospital mortality following emergency or urgent admission for congestive heart failure

In Scotland, there were a total of 487 deaths in hospital following an emergency or urgent admission to hospital for congestive heart failure between October 2013 and September 2014. The proportion of in-hospital mortality was 18.0%.

The standardised proportion of in-hospital mortality ranged from 0% in NHS Shetland (no deaths) to 24.7% in NHS Dumfries & Galloway (figure 1.4 and table 1.4). The mainland health board with the lowest standardised proportion was NHS Borders (10.1%). No health boards were outside the control limits of the funnel plot (figure 1.4).

**Figure 1.4:** In-hospital mortality following emergency or urgent admission to hospital for congestive heart failure, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset; National Records of Scotland death registrations
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
2 Heart attack

A heart attack occurs as a result of a sudden blockage of the blood supply to part of the heart. This is also known as a myocardial infarction (MI). There are two main subtypes of heart attack:

- ST segment elevation myocardial infarction (STEMI)
- Non-ST segment elevation myocardial infarction (NSTEMI)

The ST segment is measured by an electrocardiogram (ECG). It can indicate the amount of damage that has been caused to the heart. This section refers to heart attacks as a whole. STEMI and NSTEMI are discussed further in sections 3 and 4.

This section examines the average length of stay (in days), emergency readmissions within 30 days of discharge, mortality within 30 days of discharge and in-hospital mortality for patients who had an emergency or urgent admission to hospital for a heart attack between October 2013 and September 2014.

2.1 Length of stay following emergency or urgent admission for a heart attack

There were 9,823 emergency or urgent inpatient admissions to hospital for a heart attack in Scotland between October 2013 and September 2014. The average length of stay for these admissions was 9.0 days and the median length of stay was 5 days.

At health board level, the average length of stay ranged from 7.4 days in NHS Lothian to 15.6 days in NHS Shetland (figure 2.1 and table 2.1). The mainland health board with the longest average length of stay was NHS Dumfries & Galloway (11.3 days). Six health boards were shown as being outside the control limits of the funnel plot. NHS Shetland, NHS Western Isles, NHS Greater Glasgow & Clyde and NHS Dumfries & Galloway had an average length of stay above the upper control limits while NHS Fife and NHS Lothian had an average length of stay below the lower control limits (figure 2.1).

Figure 2.1: Average (mean) length of stay (days) following emergency or urgent admission to hospital for heart attack, Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
2.2 Emergency readmissions following emergency or urgent admission for a heart attack

In Scotland, there were 1,561 emergency readmissions to hospital within 30 days of discharge of an emergency or urgent admission to hospital for a heart attack between October 2013 and September 2014. The proportion of emergency readmissions within 30 days of discharge was 17.7%.

At health board level, the standardised emergency readmission proportion ranged from 7.3% in NHS Shetland to 22.8% in NHS Ayrshire & Arran (figure 2.2 and table 2.2). The mainland health board with the lowest standardised readmission proportion was NHS Grampian (13.3%). Two health boards were shown as being outside the control limits of the funnel plot. NHS Ayrshire & Arran had a standardised readmission proportion above the upper control limits while NHS Grampian’s was below the lower control limits (figure 2.2).

Figure 2.2: Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital for heart attack, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
2.3 Mortality within 30 days of discharge following emergency or urgent admission for a heart attack

In Scotland, there were a total of 932 deaths within 30 days of discharge of an emergency or urgent admission for a heart attack during the period October 2013 to September 2014. The proportion of mortality within 30 days of discharge was 10.1%.

At health board level, the standardised proportion of mortality ranged from 7.5% in NHS Highland to 16.5% in NHS Shetland (figure 2.3 and table 2.3). The mainland health board with the highest standardised proportion was NHS Tayside (12.1%). No health boards were outside the control limits of the funnel plot (figure 2.3).

Figure 2.3: Mortality within 30 days of discharge following emergency or urgent initial admission to hospital for heart attack, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset; National Records of Scotland death registrations
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
2.4 In-hospital mortality following emergency or urgent admission for a heart attack

In Scotland, there were a total of 786 deaths in hospital following an emergency or urgent admission to hospital for a heart attack between October 2013 and September 2014. The proportion of in-hospital mortality was 8.6%.

At health board level, the standardised proportion of in-hospital mortality ranged from 5.8% in NHS Highland to 12.0% in NHS Shetland (figure 2.4 and table 2.4). The mainland health board with the highest standardised proportion was NHS Ayrshire & Arran (10.7%). No health boards were outside the control limits of the funnel plot (figure 2.4).

Figure 2.4: In-hospital mortality following emergency or urgent admission to hospital for heart attack, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset; National Records of Scotland death registrations
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
3 ST segment elevation myocardial infarction (STEMI)

An ST segment elevation myocardial infarction (STEMI) occurs when there has been a long interruption to the blood supply to part of the heart. It is caused by a total blockage of the coronary artery and can cause extensive damage to the heart.

This section examines the average length of stay (in days) of patients who had an inpatient admission to hospital for a STEMI between October 2013 and September 2014. All types of admission are included in the analysis (emergency, urgent and elective admissions).

3.1 Length of stay following admission (emergency, urgent and elective) for a STEMI

In Scotland, there were 3,300 inpatient admissions to hospital for STEMI between October 2013 and September 2014. The average length of stay for hospital admissions was 6.2 days and the median length of stay was 3 days.

At health board level, the average length of stay ranged from 4.5 days in NHS Fife to 10.8 days in NHS Orkney (figure 3.1 and table 3.1). The mainland health board with the longest average length of stay was NHS Highland (7.9 days). Four health boards were shown as being outside the control limits of the funnel plot. NHS Highland and NHS Orkney had an average length of stay above the upper control limits while NHS Ayrshire & Arran and NHS Fife had an average length of stay below the lower control limits (figure 3.1).

Figure 3.1: Average (mean) length of stay (days) following admission to hospital (all types of admission) for STEMI, Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
4 Non-ST segment elevation myocardial infarction (NSTEMI)

A non-ST segment elevation myocardial infarction (NSTEMI) occurs when the blood supply to the heart is only partially blocked. It causes less damage to the heart than a STEMI but is still a serious medical emergency.

This section examines the average length of stay (in days) of patients who had an admission to hospital for an NSTEMI between October 2013 and September 2014. All types of admission are included in the analysis (emergency, urgent and elective admissions).

4.1 Length of stay following admission (emergency, urgent and elective) for an NSTEMI

In Scotland, there were 6,872 inpatient admissions to hospital for NSTEMI between October 2013 and September 2014. The average length of stay for hospital admissions was 9.5 days and the median length of stay was 5 days.

At health board level, the average length of stay ranged from 7.7 days in NHS Lothian to 16.5 days in NHS Shetland (figure 4.1 and table 4.1). The mainland health board with the highest average length of stay was NHS Dumfries & Galloway (11.7 days). Four health boards were shown as being outside the control limits of the funnel plot. NHS Dumfries & Galloway, NHS Grampian and NHS Shetland had an average length of stay above the upper control limits while NHS Lothian was below the lower control limits (figure 4.1).

Figure 4.1: Average (mean) length of stay (days) following admission to hospital (all types of admission) for NSTEMI, Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
5 Angioplasty

Angioplasty involves passing a thin, hollow tube into the coronary arteries from an artery in the groin or arm. A device on the tube is then used to unblock the artery, and stretch the artery walls so that blood and oxygen can flow to the heart muscle. A small tube (or stent) may be left inside the vessel to ensure that it stays open. An angioplasty has the advantage that it is generally regarded as a less invasive procedure than a coronary artery bypass graft (see section 6).

This section examines:

- the average length of stay (in days) and the proportion of emergency readmissions to hospital within 30 days of discharge following an emergency or urgent admission to hospital, between October 2013 and September 2014, where an angioplasty was performed.
- the average length of stay (in days) and the proportion of emergency readmissions to hospital within 30 days of discharge following an elective admission to hospital, between October 2013 and September 2014, where an angioplasty was performed.

5.1 Length of stay following emergency or urgent admission for an angioplasty

In Scotland, there were 4,491 emergency or urgent inpatient admissions to hospital between October 2013 and September 2014 where an angioplasty was performed. The average length of stay for these admissions was 6.2 days and the median length of stay was 4 days.

At health board level, the average length of stay ranged from 4.7 days in NHS Lothian to 19.2 days in NHS Shetland (figure 5.1 and table 5.1). The mainland health board with the highest average length of stay was NHS Dumfries and Galloway (9.3 days). Five health boards were shown as being outside the control limits of the funnel plot. NHS Dumfries & Galloway, NHS Greater Glasgow & Clyde and NHS Shetland had an average length of stay above the upper control limits while NHS Fife and NHS Lothian had an average length of stay below the lower control limits (figure 5.1).
Figure 5.1: Average (mean) length of stay (days) following emergency or urgent admission to hospital where angioplasty was performed, Scotland, October 2013 September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
5.2 Length of stay following elective admission for an angioplasty

In Scotland, there were 1,049 elective inpatient admissions to hospital between October 2013 and September 2014 where an angioplasty was performed. The average length for these admissions was 1.7 days and the median length of stay was 1 day.

At health board level, the average length of stay ranged from 1.0 days in NHS Lanarkshire to 2.6 days in NHS Greater Glasgow & Clyde (figure 5.2 and table 5.2). Four health boards were shown as being outside the control limits of the funnel plot. NHS Grampian and NHS Greater Glasgow & Clyde had an average length of stay above the upper control limits while NHS Lanarkshire and NHS Tayside had an average length of stay below the lower control limits.

**Figure 5.2: Average (mean) length of stay (days) following elective admission to hospital where angioplasty was performed, Scotland, October 2013 – September 2014.**

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
5.3 Emergency readmissions following emergency or urgent admission for an angioplasty

In Scotland, there were a total of 612 readmissions to hospital within 30 days of discharge following an emergency or urgent admission to hospital where angioplasty was performed between October 2013 and September 2014. The proportion of emergency readmissions within 30 days of discharge was 14.2%.

At health board level, the standardised emergency readmission proportion ranged from 10.7% in NHS Grampian to 19.9% in NHS Ayrshire & Arran (figure 5.3 and table 5.3). No health boards were outside the control limits of the funnel plot (figure 5.3).

Figure 5.3: Emergency readmissions to hospital within 30 days of discharge following emergency or urgent admission to hospital where angioplasty was performed, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
5.4 Emergency readmissions following elective admission for an angioplasty

In Scotland, there were a total of 208 readmissions to hospital within 30 days of discharge following an elective admission to hospital where angioplasty was performed between October 2013 and September 2014. The proportion of emergency readmissions within 30 days of discharge was 7.4%.

At health board level, the standardised emergency readmission proportion ranged from 0% in NHS Orkney and NHS Western Isles (no readmissions) to 10.4% in NHS Borders (figure 5.4 and table 5.4). The mainland health board with the lowest standardised readmission proportion was NHS Highland (3.4%). No health boards were outside the control limits of the funnel plot (figure 5.4).

**Figure 5.4: Emergency readmissions to hospital within 30 days of discharge following elective admission to hospital where angioplasty was performed, standardised proportion (%), Scotland, October 2013 – September 2014.**

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
6 Coronary artery bypass graft

A coronary artery bypass graft (CABG) is an operation in which a blood vessel from another part of the body is grafted to the coronary artery or arteries, to bypass narrowed sections and restore blood flow to the heart muscle. This usually involves a general anaesthetic and major open surgery.

This section examines:

- the average length of stay (in days) and the proportion of emergency readmissions to hospital within 30 days of discharge following an emergency or urgent admission to hospital, between October 2013 and September 2014, where a CABG was performed.
- the average length of stay (in days) and the proportion of emergency readmissions to hospital within 30 days of discharge following an elective admission to hospital, between October 2013 and September 2014, where a CABG was performed.

6.1 Length of stay following emergency or urgent admission for a CABG

In Scotland, there were 411 emergency or urgent inpatient admissions to hospital between October 2013 and September 2014 where a CABG was performed. The average length of stay for these admissions to hospital was 30.0 days and the median length of stay was 24 days.

At health board level, the average length of stay ranged from 25.3 days in NHS Highland to 39.7 days in NHS Lanarkshire (figure 6.1 and table 6.1). No health boards were shown as being outside the control limits of the funnel plot (figure 6.1).

Figure 6.1: Average (mean) length of stay (days) following emergency or urgent admission to hospital where a coronary artery bypass graft was performed, Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
6.2 Length of stay following elective admission for a CABG

In Scotland, there were 1,234 elective inpatient admissions to hospital between October 2013 and September 2014 where a CABG was performed. The average length of stay for these admissions to hospital was 11.5 days and the median length of stay was 9 days.

At health board level, the average length of stay ranged from 9.7 days in NHS Lanarkshire to 14.8 days in NHS Grampian (figure 6.2 and table 6.2). One health board, NHS Grampian, was shown as being above the upper control limits of the funnel plot (figure 6.2).

Figure 6.2: Average (mean) length of stay (days) following elective admission to hospital where a coronary artery bypass graft was performed, Scotland, October 2013 – September 2014.

Source: SMR01 dataset

1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is not adjusted for age, sex or deprivation
6.3 Emergency readmissions following emergency or urgent admission for a CABG

In Scotland, there were 60 emergency readmissions to hospital within 30 days of discharge following an emergency or urgent admission to hospital where a CABG was performed between October 2013 and September 2014. The proportion of emergency readmissions within 30 days of discharge was 15.6%.

At health board level, the standardised emergency readmission proportion ranged from 9.7% in NHS Fife to 25.6% in NHS Dumfries & Galloway (figure 6.3 and table 6.3). No health boards were outside the control limits of the funnel plot (figure 6.3).

Figure 6.3: Emergency readmissions to hospital within 30 days of discharge following emergency or urgent admission to hospital where a coronary artery bypass graft was performed, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
6.4 Emergency readmissions following elective admission for a CABG

In Scotland, there were 156 emergency readmissions to hospital within 30 days of discharge following an elective admission to hospital where a CABG was performed between October 2013 and September 2014. The proportion of emergency readmissions within 30 days of discharge was 12.9%.

At health board level, the standardised emergency readmission proportion ranged from 7.9% in NHS Forth Valley to 24.8% in NHS Shetland (figure 6.4 and table 6.4). The mainland health board with the highest standardised readmission proportion was NHS Lothian (15.5%). No health boards were outside the control limits of the funnel plot (figure 6.4).

Figure 6.4: Emergency readmissions to hospital within 30 days of discharge following elective admission to hospital where a coronary artery bypass graft was performed, standardised proportion (%), Scotland, October 2013 – September 2014.

Source: SMR01 dataset
1. Data points are NHS Boards.
2. Based on health board of residence.
3. This measure is indirectly standardised for age, sex and deprivation
Glossary

ACS
Acute Coronary Syndrome - an inclusive term referring to MI (see below) and unstable angina.

Angioplasty
A procedure performed to treat coronary heart disease that involves passing a thin, hollow tube into the coronary arteries under X-ray guidance, from an artery in the groin or arm (under local anaesthetic). A device on the tube is then used to unblock the artery, and stretch the artery walls so that more blood and oxygen can flow to the heart muscle. (The full name of the procedure is percutaneous transluminal coronary angioplasty - PTCA).

Average length of stay
The total length of stay divided by the number of admissions. See also length of stay and median length of stay.

CABG
Coronary artery bypass graft. An operation in which a blood vessel from another part of the body is grafted to the coronary artery or arteries, to bypass narrowed sections and restore blood flow to the heart muscle.

CHD
Coronary heart disease. Disease of the coronary arteries that supply the heart. This includes acute myocardial infarction, angina and most cases of heart failure.

Control limit
The upper and lower limits shown on a funnel plot. They are set at three standard deviations from the average because this provides an estimate of the level of expected variation around the average that might exist in a system. Data points above the upper limit and below the lower limit are called 'outliers' and may be worthy of further investigation. More details on funnel plots and statistical process control methods can be found on the Association of Public Health Observatories (APHO) website (now part of Public Health England).

Crude rate
A rate that is not adjusted to take the structure of the population into account (eg age, sex, deprivation). For example, the crude rate of readmission within 30 days is simply the number of readmissions within 30 days of being discharged divided by the number of initial admissions.

Discharge
Discharges include transfers to other specialties/significant facilities and hospitals as well as routine discharges home or deaths in hospital. A patient could have more than one discharge in a year.

ECG
Electrocardiogram. A medical test that records the electrical activity within the heart.

Emergency admission
An emergency admission occurs when, for clinical reasons, a patient is admitted at the earliest possible time after seeing a doctor.
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<tr>
<td>Funnel plot</td>
<td>A type of control chart where an indicator is plotted against the denominator and shown in relation to a reference figure (e.g., the Scottish average). Control limits are set at three standard deviations from the average and get narrower from left to right on the chart as the size of the denominator increases. Data points that are outside these control limits are called ‘outliers’ and may be worthy of further investigation. More details on funnel plots and statistical process control methods can be found on the Quality Improvement Hub website and the Association of Public Health Observatories (APHO) website (now part of Public Health England).</td>
</tr>
<tr>
<td>Heart attack</td>
<td>The result of sudden complete blockage of the blood supply to part of the heart. Also known as a myocardial infarction (MI).</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Failure of the heart as a pump, the commonest cause being coronary heart disease.</td>
</tr>
<tr>
<td>Indirect standardisation</td>
<td>Indirect standardisation is based on a comparison of observed numbers of events or cases in the population against expected numbers of events or cases. Age-specific rates from a reference population (Scotland, in the case of this publication) are applied to the population of interest (e.g., a health board). This calculates the number of events or cases that would be expected in the population of interest if the age-specific rates were the same as in the reference population. This is usually expressed as a ratio (observed/expected). In this publication, the ratio was then applied to the Scottish rate to give a standardised rate.</td>
</tr>
<tr>
<td>Length of stay</td>
<td>The total number of days that a patient spends in hospital between the initial date of admission and the ultimate date of discharge for a continuous inpatient stay (including any transfers between specialties or hospitals).</td>
</tr>
<tr>
<td>Mainland health boards</td>
<td>Health Boards in Scotland excluding the three Island Health Boards (Orkney, Shetland and Western Isles)</td>
</tr>
<tr>
<td>Median length of stay</td>
<td>The median is the middle value in a sample sorted in ascending order. When all the lengths of stay are sorted in ascending order, the middle value is the median length of stay.</td>
</tr>
<tr>
<td>MI (Myocardial Infarction)</td>
<td>See heart attack.</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>Non-ST segment elevation myocardial infarction. A type of heart attack caused by a partial blockage to the coronary artery. It causes less damage to the heart than a STEMI but is still a serious medical emergency. This is a form of acute coronary syndrome (ACS).</td>
</tr>
<tr>
<td>Outlier</td>
<td>A data point that lies outside the control limits of a funnel plot. This can be above the upper control limit or below the lower control limit.</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>PCI</td>
<td>Percutaneous Coronary Intervention. The full name for an angioplasty. Also known as percutaneous transluminal coronary angioplasty (PTCA). A procedure performed to treat coronary heart disease that involves passing a thin, hollow tube into the coronary arteries under X-ray guidance, from an artery in the groin or arm (under local anaesthetic). A device on the tube is then used to unblock the artery, and stretch the artery walls so that more blood and oxygen can flow to the heart muscle.</td>
</tr>
<tr>
<td>SIMD</td>
<td>Deprivation for individuals is estimated from aggregate data derived from the census and other routine sources. These are used to estimate the deprivation of small geographical areas. The Scottish Index of Multiple Deprivation (SIMD) has seven domains (income, employment, education, housing, health, crime, and geographical access), which have been combined into an overall index to pick out area concentrations of multiple deprivation.</td>
</tr>
<tr>
<td>SMR01</td>
<td>An SMR01 record is generated when a patient is discharged from hospital but also when a patient is transferred between hospitals, significant facilities, specialties or to the care of a different consultant.</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>A measure of the variation around the average.</td>
</tr>
<tr>
<td>Standardised rate</td>
<td>See indirect standardisation.</td>
</tr>
<tr>
<td>STEMI</td>
<td>ST-segment elevation myocardial infarction. A type of heart attack caused by a total blockage of the coronary artery. This can result in a prolonged interruption of the blood supply and extensive damage to the heart. This is a form of acute coronary syndrome (ACS).</td>
</tr>
<tr>
<td>Urgent admission</td>
<td>An urgent admission is a type of emergency admission where the admission is delayed for hospital/patient reasons and the patient's condition is such that he/she is not clinically compromised or disadvantaged by the short delay. An example of an urgent admission is a patient who attends for an outpatient appointment at which the doctor decides there is a clinical need to admit the patient within the next few days.</td>
</tr>
</tbody>
</table>
### List of Tables

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Name</th>
<th>Time period</th>
<th>File &amp; size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive Heart Failure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Average (mean) length of stay (days) following emergency or urgent admission to hospital for congestive heart failure.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>1.2</td>
<td>Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital for congestive heart failure.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>1.3</td>
<td>Mortality within 30 days of discharge following emergency or urgent initial admission to hospital for congestive heart failure.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>1.4</td>
<td>In-hospital mortality following emergency or urgent admission to hospital for congestive heart failure.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>Heart Attack</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Average (mean) length of stay (days) following emergency or urgent admission to hospital for heart attack.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>2.2</td>
<td>Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital for heart attack.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>2.3</td>
<td>Mortality within 30 days of discharge following emergency or urgent initial admission to hospital for heart attack.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>2.4</td>
<td>In-hospital mortality following emergency or urgent admission to hospital for heart attack.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>STEMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Average (mean) length of stay (days) following admission to hospital (all types of admission) for STEMI.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>NSTEMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Average (mean) length of stay (days) following admission to hospital (all types of admission) for NSTEMI.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
<tr>
<td>Angioplasty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Average (mean) length of stay (days) following emergency or urgent admission to</td>
<td>Oct 2013 –</td>
<td>Excel</td>
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</tbody>
</table>
### Information Services Division

#### 5.2 Average (mean) length of stay (days) following elective admission to hospital where angioplasty was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (mean) length of stay (days) following elective admission to hospital where angioplasty was performed.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### 5.3 Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital where angioplasty was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital where angioplasty was performed.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### 5.4 Emergency readmissions to hospital within 30 days of discharge following elective initial admission to hospital where angioplasty was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency readmissions to hospital within 30 days of discharge following elective initial admission to hospital where angioplasty was performed.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### Coronary Artery Bypass Graft

#### 6.1 Average (mean) length of stay (days) following emergency or urgent admission to hospital where a coronary artery bypass graft was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
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<tbody>
<tr>
<td>Average (mean) length of stay (days) following emergency or urgent admission to hospital where a coronary artery bypass graft was performed.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### 6.2 Average (mean) length of stay (days) following elective admission to hospital where a coronary artery bypass graft was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (mean) length of stay (days) following elective admission to hospital where a coronary artery bypass graft was performed.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### 6.3 Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital where a coronary artery bypass graft was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency readmissions to hospital within 30 days of discharge following emergency or urgent initial admission to hospital where a coronary artery bypass graft was performed.</td>
<td>Oct 2013 – Sep 2014</td>
<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### 6.4 Emergency readmissions to hospital within 30 days of discharge following elective initial admission to hospital where a coronary artery bypass graft was performed.

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Excel [1,258kb]</td>
</tr>
</tbody>
</table>

#### Additional Information

<table>
<thead>
<tr>
<th>Information</th>
<th>Date Range</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed definitions of each indicator</td>
<td>N/A</td>
<td>Excel [46kb]</td>
</tr>
</tbody>
</table>
Contact

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Further Information

The Information Services Division publish a wide range of heart disease statistics. You can find all our heart disease information at www.isdscotland.org/Health-Topics/Heart-Disease.

The annual Heart Disease Statistics publication will be released by ISD in January 2016.

The next release of the Heart Disease Indicators publication will be in September 2016.

Rate this publication

Please provide feedback on this publication to help us improve our services.
Appendix

A1 – Background Information

Data sources

This report brings together data from existing Scotland-wide data sources. They are:

- Scottish Morbidity Record (SMR) datasets, specifically SMR01 (inpatients, excluding maternity and psychiatric services)
- National Records of Scotland (NRS) deaths records

ISD routinely link these independent sources to create a linked database. All patient records, including deaths, are linked together by means of the Community Health Index (CHI) number. ISD uses ‘probability matching’ against the CHI database to confirm or seed CHI numbers in new and updated records. The ‘probability matching’ algorithm uses all available identifying information (name, date of birth, postcode, hospital patient reference number etc) in the CHI seeding process.

Within these patient record sets, the SMR01 records are grouped into continuous stays. A continuous stay is a continuous period of time spent as an inpatient or day case in hospital, regardless of any transfers between specialties or hospitals. For example, a patient may be admitted with a heart attack to the specialty of general medicine, be transferred to the cardiology specialty then transferred again to the geriatric assessment specialty before discharge. This single continuous stay would have generated three separate SMR01 discharge records but linkage has retrospectively brought them together.

This linked database, which also contains cancer registrations and discharge summaries from mental health specialties, currently contains over 35 million records relating to 6 million patients and covers the period from 1981 onwards.

Calculation of heart disease indicators

The indicators presented within this publication have focussed on:

- Average length of stay
- Emergency readmissions to hospital
- Mortality

A full set of detailed definitions for all indicators are provided in table A1.1. This appendix describes in general terms how each indicator has been calculated.

Average length of stay

Length of stay is only calculated for patients initially admitted as an ‘inpatient’ and identified with an ‘index’ episode. The length of stay is measured from the date of initial admission for the continuous inpatient stay through to the ultimate date of discharge for that stay.

The ‘index’ episode is the first SMR01 episode in the stay that meets the selection criteria (diagnosis, procedure or specialty). For certain indicators only emergency admissions are selected and this is taken from the first episode in the continuous stay regardless of whether this is the ‘index’ episode or not.

This measure is not standardised. The data will include only those patients who were resident in Scotland at time of admission.
**Emergency readmissions**

Readmissions are calculated using ‘continuous inpatient stays’. The denominator events (number of admissions) are based on selection of the first ‘index’ episode of a continuous stay.

The ‘index’ episode is the first SMR01 in the stay that meets the selection criteria (diagnosis, procedure or specialty). For certain indicators only emergency admissions are selected and this is taken from the first episode in the continuous stay regardless of whether this is the ‘index’ episode or not.

A readmission outcome is counted whenever the consecutive continuous inpatient stay for that patient is an emergency admission within the defined follow-up period as measured from the ultimate date of discharge for the denominator admission.

A case is excluded from the denominator if the patient died within the readmission follow-up period and had not been readmitted prior to death.

This measure is indirectly standardised for age, sex, and social deprivation (the latter using Scottish Index of Multiple Deprivation quintiles). Scotland is used as the reference population. The data therefore reflects all patients treated in Scotland and will include only those patients who were resident in Scotland at time of admission.

**Mortality**

There are two types of mortality indicators presented here based on the length of time patients are followed-up to death:

- **In-patient mortality**
  
The outcome is derived from the last episode of the index continuous inpatient stay, using the discharge-type variable.

- **30-day mortality from discharge**
  
The calculation takes account of patients who died within 30 days of ultimate hospital discharge; that is, it includes deaths that occurred in the community (out of hospital deaths) as well as all of those deaths occurring in-hospital.

In each case, a patient is counted only once in the given time period. The ‘index’ event for the patient is the first episode in the continuous inpatient stay that meets the selection criteria. If a patient has multiple continuous inpatient stays that meet the selection criteria within the year, then the final one is selected. The hospital to which both the patient and death outcome is attributed is taken from that first ‘index’ episode in that final continuous inpatient stay.

This measure is indirectly standardised for age, sex, and social deprivation (the latter using Scottish Index of Multiple Deprivation quintiles). Scotland is used as the reference population. The data will include only those patients who were resident in Scotland at time of admission.

**Data suppression**

Health boards have been excluded from the output if the number of admissions or patients (denominator) is less than 5 for any given indicator. In the case of mortality indicators, health boards have been excluded if the number of deaths is less than 5.
## A2 – Publication Metadata (including revisions details)

<table>
<thead>
<tr>
<th>Metadata Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication title</td>
<td>Heart Disease Indicators</td>
</tr>
<tr>
<td>Description</td>
<td>Presentation of hearts disease indicators (length of stay, readmissions, mortality within 30 days and in-hospital mortality) for several heart-related conditions and procedures (congestive heart failure, heart attack, angioplasty and coronary artery bypass graft).</td>
</tr>
<tr>
<td>Theme</td>
<td>Health and Social Care</td>
</tr>
<tr>
<td>Topic</td>
<td>Conditions and Diseases</td>
</tr>
<tr>
<td>Format</td>
<td>Excel workbook</td>
</tr>
<tr>
<td>Data source(s)</td>
<td>Scottish Morbidity Record 01 (SMR01), National Records of Scotland (NRS) Death Registrations, Scottish Index of Multiple Deprivation (Scottish Government)</td>
</tr>
<tr>
<td>Date that data are acquired</td>
<td>April/May 2015</td>
</tr>
<tr>
<td>Release date</td>
<td>22nd September 2015</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annual</td>
</tr>
<tr>
<td>Timeframe of data and timeliness</td>
<td>1st October 2013 – 30th September 2014</td>
</tr>
<tr>
<td>Continuity of data</td>
<td>ICD10 coding guidelines to allow STEMI and NSTEMI to be identified from hospital activity data was introduced in 2010 and was gradually adopted by Health Boards.</td>
</tr>
<tr>
<td>Revisions statement</td>
<td>No revisions have occurred and there are no revisions planned.</td>
</tr>
<tr>
<td>Revisions relevant to this publication</td>
<td>None.</td>
</tr>
<tr>
<td>Concepts and definitions</td>
<td>See glossary and appendices within this report.</td>
</tr>
</tbody>
</table>
| Relevance and key uses of the statistics | Uses of the data include:  
To allow NHS Boards to identify opportunities to improve patient care;  
To provide health intelligence and performance information for NHS Boards and the Scottish Government;  
To allow members of the public to readily access information on heart disease. |
| Accuracy                    | Hospital Activity: SMR01 data are subjected to validation on submission. The SMR01 data are also assessed for accuracy by ISD’s Data Quality Assurance team. The figures in this report were compared to the previous year's management information report.  
Mortality: For coding of deaths see the website of the |
| Completeness | Hospital Activity: Levels of SMR01 submission are deemed to be 99% complete compared to expected levels of submission at time of extraction.  
Mortality: Death registrations are deemed to be complete and finalised. |
| Comparability | Hospital activity: Data relating to heart disease in England, Wales and Northern Ireland are available separately. Please note that these figures are sometimes not directly comparable with published data from Scotland due to differences in recording and definitions. Prior to making comparisons, please check the definitions carefully for each of the sources.  
Wales: [Health in Wales – Statistics and Data](https://healthforall.wales.nhs.uk/statistics-and-data/)  
Northern Ireland: [DHSSPS(NI) - Statistics](https://www.gov.uk/government/organisations/dhssps-northern-ireland)  
Mortality: Deaths from specific causes, including heart disease, in England and Wales is available from the [Office for National Statistics](https://www.ons.gov.uk). |

| Accessibility | It is the policy of ISD Scotland to make its web sites and products accessible according to published guidelines. |
| Coherence and clarity | Statistics are presented within Excel spreadsheets. Health Board and national figures are presented in tables as well as being presented as funnel plots. Excel workbook contains detailed definitions of indicators. |
| Value type and unit of measurement | Hospital activity is based on continuous hospital stays. Indicators are expressed as number of continuous hospital stays, number of patients, mean and median lengths of stay (in days), crude and standardised rates (readmissions), crude and standardised rates (mortality within 30 days), crude and standardised rates (in-hospital mortality). |

| Disclosure | The [ISD protocol on Statistical Disclosure Protocol](https://www.isdscotland.org/health-topics/statistical-disclosure-protocol) is followed. |
| Official Statistics designation | Official Statistics |
| UK Statistics Authority Assessment | Not assessed. |
| Last published | 30th September 2014 |
| Next published | September 2016 |
| Date of first publication | 30th September 2014 |
| Help email | andrew.deas@nhs.net |
| Date form completed | 4th September 2015 |
A3 – Early Access details (including Pre-Release Access)

Pre-Release Access
Under terms of the "Pre-Release Access to Official Statistics (Scotland) Order 2008", ISD are obliged to publish information on those receiving Pre-Release Access ("Pre-Release Access" refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard Pre-Release Access:
- Scottish Government Health Department
- NHS Board Chief Executives
- NHS Board Communication leads

Early Access for Management Information
These statistics will also have been made available to those who needed access to ‘management information’, ie as part of the delivery of health and care:
- NHS Board Managed Clinical Network Lead Clinicians
- NHS Board Managed Clinical Network Managers
- NHS Board Medical Directors
A4 – ISD and Official Statistics

About ISD

Scotland has some of the best health service data in the world combining high quality, consistency, national coverage and the ability to link data to allow patient based analysis and follow up.

Information Services Division (ISD) is a business operating unit of NHS National Services Scotland and has been in existence for over 40 years. We are an essential support service to NHSScotland and the Scottish Government and others, responsive to the needs of NHSScotland as the delivery of health and social care evolves.

Purpose: To deliver effective national and specialist intelligence services to improve the health and wellbeing of people in Scotland.

Mission: Better Information, Better Decisions, Better Health

Vision: To be a valued partner in improving health and wellbeing in Scotland by providing a world class intelligence service.

Official Statistics

Information Services Division (ISD) is the principal and authoritative source of statistics on health and care services in Scotland. ISD is designated by legislation as a producer of ‘Official Statistics’. Our official statistics publications are produced to a high professional standard and comply with the Code of Practice for Official Statistics. The Code of Practice is produced and monitored by the UK Statistics Authority which is independent of Government. Under the Code of Practice, the format, content and timing of statistics publications are the responsibility of professional staff working within ISD.

ISD’s statistical publications are currently classified as one of the following:

- National Statistics (ie assessed by the UK Statistics Authority as complying with the Code of Practice)
- National Statistics (ie legacy, still to be assessed by the UK Statistics Authority)
- Official Statistics (ie still to be assessed by the UK Statistics Authority)
- other (not Official Statistics)

Further information on ISD’s statistics, including compliance with the Code of Practice for Official Statistics, and on the UK Statistics Authority, is available on the ISD website.