NSS Information and Intelligence

NHS National Services Scotland

Data Quality Assurance

Assessment of SMR02 (Maternity Inpatient and Day Case) Data; Scotland 2017-2018

Contents

Executive Summary

The SMR02 data scheme collects information in Scotland on all maternity and inpatient day cases. In 2017/18 The Data Quality Assurance Team from the Information Services Division (ISD) of National Services Scotland audited a selection of diagnostic and hard-coded SMR02 variables at 19 hospitals and maternity units across Scotland.

Findings

- The audit assessed the accuracy of 21 hard-coded SMR02 data items across 1,100 patient records. The combined accuracy for these variables is 90.6%, which meets the ISD recommended minimum standard of 90%
- Of the 21 hard-coded SMR02 variables assessed, 15 had an accuracy score of 90% or above. Four had accuracy scores between 80% and 89%. Only two, Ethnic Group and Transfer of Responsibility Midwife to Consultant, were recorded with less than 80% accuracy
- 16 of the 21 hard-coded variables assessed in this audit were also assessed in the last DQA national SMR02 audit in 2008/09. Of these only Neonatal Indicator decreased in accuracy in this most recent audit. Two variables, Birthweight and Induction of Labour achieved the same accuracy score in both audits and the other 13 increased in accuracy, some of them considerably
- The accuracy and recording of SMR02 variables around drug use has improved greatly because the data items became mandatory in the years between this DQA national audit project and the last one in 2008/09
- Main Condition accuracy at a 3-digit level was 72% which did not meet the ISD recommended minimum standard of 90%. There was very wide variation in the quality of coding for Main Condition in individual hospitals, with accuracy varying from just 20% in the least accurate hospital to 95% in the most accurate
- Other Conditions accuracy at a 3-digit level was 71% which did not meet the ISD recommended minimum standard of 90%
- There was a 24% under-recording of co-morbidities. 1,824 co-morbidities should have been recorded in the sampled records and 446 (24%) were found to be missing
- Important conditions were frequently under-recorded in the diagnostic section. For example, only 34% of all diabetes and 61% of high blood pressure found in the audit sample had been coded using ICD10 codes
- There was also a 27% under-recording of hard-coded diabetes in SMR02.
- Indication for Operative Delivery accuracy at a 3-digit level was 92% which exceeded the ISD recommended minimum standard of 90%
- Across the 1,100 SMR02 episodes assessed in the random sample, 330 individual variables were rendered “Non-assessable” because DQA auditors found conflicting, contradictory evidence between the Scottish Women Held Maternity Record (SWHMR) and other hospital systems. These variables were excluded from the final assessment and accuracy calculations. The issue of conflicting evidence was less problematic for boards using an electronic version of the SWHMR at the time of assessment
- Despite ISD issuing coding clarification on the recording of Transfer of Responsibility Midwife to Consultant in Sept 2016 this data item was recorded with the lowest accuracy of all the assessed variables

Summary of Recommendations

- NHS Boards scoring less than 80% accuracy in any of the clinically classified or hard-coded data items should take urgent action to improve the coding quality of those variables
- NHS Boards should work with system suppliers to ensure their patient administration systems and maternity systems are aligned with SMR02 national standards. DQA auditors found that some NHS Boards' systems were set up incorrectly with options on the user interface linking to incorrect SMR02 codes. Interfaces between systems didn't function as intended. System validation rules were also often insufficient, allowing single variables to be recorded completely differently in multiple fields across the interface leading to conflicting and confusing information. There is also a lack of consistency with how the coding summary function widely used in the BadgerNet Maternity system has been set up from one NHS Board to another
- NHS Boards should ensure that all the documents in the medical record are available to their coding staff so that all relevant information is considered when coding SMR02 data
- Coding staff should only use O80-O84 delivery codes in Main Condition if no other condition classifiable to chapter XV of ICD-10 is recorded
- Coding staff should ensure they are recording all co-morbidities that either co-exist or develop during the episode of healthcare and affect the management of the patient. There was a 24% under-recording of co-morbidities in the audit sample
- All NHS Boards should ensure that their SMR02 coding staff make use of the existing training and helpdesk support as provided by ISD Terminology Services. ISD Terminology Services operate a coding helpdesk for coders - 0131 275 7283, Tue to Thurs, 9am - 5pm or email NSS.terminologyhelp@nhs.net
- During this audit, clinical coding staff at some NHS Boards reported that they find some current SMR02 clinical coding guidelines to be ambiguous or open to interpretation. It is recommended that ISD revise and reissue guidance to provide greater clarity on some aspects of SMR02 clinical coding
- During the audit, DQA auditors were made aware of local coding instructions at some NHS Boards. It is recommended that local instructions to coding departments are put in writing and checked with ISD prior to implementation to ensure their suitability and adherence to national standards
- Indication for Operative Delivery should be coded as the primary reason for the patient's assisted delivery
- A patient's ethnicity is often recorded on hospital systems on admission. Data accuracy for the Ethnic Group variable will increase if coding staff double check the ethnicity which is recorded on admission against all information which is available in the patient's full medical record. There were many SMR02 records where the patient's Ethnic Group was recorded as 99 - Not Known but details of a specific ethnicity were found in the medical record
- The variable Transfer of responsibility midwife to consultant should be recorded in line with the most recent ISD recording clarification letter of Sept 2016 (Appendix D)
- Where possible NHS boards should move to an electronic version of SWHMR. Boards that used paper SWHMR had issues with inconsistent and contradictory information being recorded between the paper SWHMR and hospital systems

Introduction

Quality assurance work carried out by Information Services Division (ISD) is an essential component of Information Governance and supports the meaningful use of nationally collated patient based data in health care service planning. As part of ISD's data quality assurance remit a National Assessment is carried out periodically, examining the quality of Scottish Morbidity Records (SMR) data items.

The SMR02 data collection records information on all maternity inpatient and day case episodes in Scotland. As the last National SMR02 data quality assessment was undertaken some time ago in 2008/09, a data quality assurance exercise was required to determine the accuracy of data used to produce ISD's statistical outputs which inform Scottish health care policy and strategy. This data is also used in answers to parliamentary questions, FOI requests and is widely used in health research. During 2017/18 the Data Quality Assurance (DQA) team at ISD carried out a quality assurance assessment of SMR02 data submitted to ISD with the aims of:

- Determining the accuracy and completeness of recording of selected SMR02 data items in line with national standards
- Determining if national clinical coding standards are being appropriately applied, highlighting and addressing any areas of ambiguity, identifying training requirements and sharing good practice
- Highlighting gaps in information being supplied to health board coding staff who record SMR02 data
- Gathering information about the workforce and resources applied to SMR02 coding at NHS Boards

The DQA team have been assessing the quality of SMR data for over 25 years. As mentioned previously the last national assessment of SMR02 data took place a decade ago in 2008/09. Therefore, when reading this report, it is important to bear in mind some significant changes that were made in the intervening years and impacted the recording of Maternity data.

- In 2007 it was recommended by the Strategic Review of Health and Care Statistics in Scotland that timescales for the receipt of SMR records by ISD should be reduced to six weeks.
- Since late 2010 several NHS Boards have implemented new electronic Patient Management Systems called TrakCare and BadgerNet Maternity.
- In 2015 ISD issued new guidance on how to correctly attribute SMR02 activity at Obstetric units and Midwifery led units (Appendix D)

Intended Audience

This report is intended for the chief executive, medical director, clinical coding staff, and other staff connected with records management. DQA would be happy to attend meetings at NHS Boards to review the report on request. It would also be beneficial for clinicians to have sight of the report through appropriate local meetings and forums because DQA's recommendations often pertain to information shared between clinicians and coders.

Methodology

The DQA team assessed selected data items submitted to the National Maternity Inpatient/Day case Scottish Morbidity Records (SMR02) database held at ISD. DQA compared the quality of submitted information against all patient information available at source, which included assessing both the accuracy of coding and the quality of information available to coders.

Sampling

A random sample of 1,100 episodes was assessed across 19 hospital sites. Due to constraints in DQA resources not all maternity units could be assessed so the 19 participating hospitals were selected on a minimum threshold of over 100 deliveries in 2015/16. The hospitals were then grouped into the following three categories based on the number of deliveries:

- Large, ≥ 3,000 deliveries in 2015/16
- Medium, between 1,000 and 2,999 deliveries in 2015/16
- Small, less than 1,000 deliveries in 2015/16

A random sample of delivery episodes were assessed at each hospital and the samples were weighted as follows:

- 75 episodes were assessed at each large hospital
- 50 episodes were assessed at each medium hospital
- 25 episodes were assessed at each small hospital

For this assessment DQA assessed delivery episodes only. The sample was taken from records with a discharge date between 1st October 2016 and 30th June 2017.

A breakdown of how the hospitals were grouped can be found in Appendix C.

Data items in scope

The audit assessed the accuracy of three clinically classified data items: Main Condition, Other Conditions and Indication for Operative Delivery. These items are recorded using World Health Organisation (WHO) ICD-10 codes and can be coded to a 3-digit level or combined with a 4th digit to provide more detail and specificity. The assessment considered whether the code selected was within the correct 3-digit group and also whether the correct more detailed 4-digit code had been used. This assessment report shows accuracy at 3-digit and (more detailed) 4-digit level. Twenty-one selected hard coded SMR02 data items were also assessed. All data items have been assessed in line with National standards and definitions. SMR02 recording rules can be accessed via the Data Dictionary.

Error Codes

When auditing records DQA auditors assign error codes to any submitted SMR02 variable which is proved to be inaccurate. Major and Minor errors are assigned to clinically classified data items. Major errors (3-digit errors) are so described because the first 3 digits of the ICD-10 code are incorrect and this is considered more likely to have an adverse effect on the subsequent value of

the data than minor errors. Minor errors (also known as 'partial' or '4-digit' errors) are awarded to ICD-10 codes that are correct to 3 digits but have an incorrect 4th digit.

Accuracy and under-recording

When assessing clinically classified data items, DQA auditors look to prove the validity of the code that has been submitted by the NHS Board by examining all source records at each hospital. Sometimes as well as the conditions and diagnosis that were submitted DQA also find evidence of some that should have been recorded but were left out by mistake, we call this "**under-recording**".

Some tables in this report highlight the total percentage of a condition which was under-recorded. DQA calculate this percentage by expressing the total omitted codes as a percentage of the combined correctly recorded and omitted codes. For example, the audit found that 38 Group B streptococcal carriage codes had been correctly recorded but also that 32 codes for the condition had been incorrectly omitted. So in this instance 70 (38 + 32) diagnoses should have been coded nationally and the 32 that were left out (32/70) represent a 46% under-recording of Group B streptococcal carriage across Scotland.

ISD's SMR02 publication

ISD's SMR02 maternity and births publication is called "Births in Scottish Hospitals". It focuses mainly on the analysis of hard-coded SMR02 data items. The latest issue of the publication from November 2018 focused on the following topics:

- Live births and stillbirths
- Maternal age
- Maternal smoking at booking
- Maternal Body Mass Index (BMI) at booking
- Time to first booking
- Method of delivery
- Gestation and birthweight at delivery
- Admission to neonatal care

DQA assessed hard-coded data items pertaining to these topics where low accuracy had been noted in the 2008/09 DQA audit. In this new audit DQA auditors found a marked improvement in accuracy. DQA were also asked by clinical colleagues to look at the quality of the ICD coding in the diagnostic section of SMR02 and conduct analysis of the accuracy of recording for six specific common conditions that were deemed of particular clinical and statistical interest. These were:

- Diabetes
- Hypertension
- Epilepsy
- Group B streptococcal carriage
- Premature rupture of membranes
- Postpartum haemorrhage

ISD's "Births in Scottish Hospitals" publication does not focus on SMR02 diagnostic information so the data quality of the assessed common conditions and other clinically classified data items does not impact on the reliability of the statistics provided in the publication.

More information about the Data Quality Assurance team can be found on the ISD website.

Findings

For the 2017/18 national assessment of SMR02 data, DQA auditors assessed the accuracy of the following selection of data items:

ICD Coded:

- Main Condition on Discharge (to 3 and 4-digit level)
- Other Conditions (1-5) on Discharge (to 3 and 4-digit level)
- Indication for Operative Delivery (to 3 and 4-digit level)

Hard Coded:

- Ethnic Group
- Specialty/Discipline
- Transfer of Responsibility Midwife to Consultant
- Booking Date
- Original Booking
- Drugs Misuse During This Pregnancy
- Drugs Used
- Ever Injected Illicit Drugs
- Smoking History at Booking
- Smoker During Pregnancy
- Height
- Weight of Mother at Booking
- Diabetes
- Estimated Gestation
- Induction of Labour
- Presentation at Delivery
- Mode of Delivery
- Birthweight
- Neonatal Indicator
- Feed on Discharge
- First Feed Given

The sections that follow provide a detailed explanation of the audit findings on the accuracy of these variables and commentary on factors that contributed significantly to the accuracy scores.

1. Data items excluded from accuracy

Where DQA auditors find conflicting evidence on the accuracy of a variable within a particular patient's record then that one variable in that one specific patient record is excluded from the final national accuracy calculations for the variable. Of the total 1,100 patient records assessed, there was conflicting or inconclusive evidence found for the individual data items detailed in table 1 below.

Table 1: Number of Data Items with conflicting or inconclusive evidence

Data Item	No. Data Items With conflicting Evidence
Booking Arrangement Original	18
Booking Smoking History	10
Date Of Booking	131
Drug Misuse	1
Drugs Used 1	1
Estimated Gestation	1
Ethnic Group	7
Feed On Discharge Baby1	2
First Feed Given Baby 1	2
Height	14
Indication For Operative Delivery	10
Induction Of Labour	3
Main Condition	6
Midwife To Consultant Transfer	18
Neonatal Indicator Baby 1	1
Other Condition 1	4
Other Condition 2	2
Other Condition 3	4
Smoker During Pregnancy	15
Specialty	17
Weight Of Mother	63

Conflicting evidence often occurred at boards using a paper version of SWHMR. DQA auditors would find one value recorded in the paper SWHMR and a conflicting value recorded in electronic systems. In 131 (11.9%) of the 1,100 records DQA auditors found the Date of Booking recorded on the paper SWHMR document was different to the date recorded in electronic systems. The Weight of mother variable also had conflicting evidence in the paper SHWMR and electronic systems in 63 (5.7%) of the 1,100 records assessed.

As it was not possible for DQA auditors to establish which of the conflicting values in the medical records were correct, data items with conflicting evidence were excluded from the final accuracy calculation. Conflicting evidence in these data items was less prevalent at NHS Boards with an electronic version of SWHMR incorporated into their BadgerNet Maternity or TrakCare Maternity systems. NHS Boards which had inconsistent recording across paper and electronic records had the issue highlighted in their individual hospital level audit reports and it was also raised and discussed in post-audit meetings between the NHS Boards and DQA auditors.

2. SMR02 ICD Coding Accuracy

This section describes the findings of the quality assessment of clinical items which were coded using the ICD-10 system.

Accurate coding depends on appropriately trained, skilled and experienced workforce. ISD Terminology Services offer a long-established free SMR02 bespoke training course and an expert-led helpline to support NHS Boards. They can be reached by telephone 0131 275 7283, Tue to Thurs, 9am - 5pm or email NSS.terminologyhelp@nhs.net.

NHS Boards should ensure that coding departments are adequately resourced and coding staff are trained to an acceptable standard. Coding managers should notify ISD Terminology Services when staff new to SMR02 coding require training. This includes staff previously trained in other SMR datasets. Staff should be trained at an appropriate point in time which allows them to apply their training immediately and should also have a sufficient element of regular coding in their post to both retain and develop their skills. ISD Terminology Services are in the process of updating their written SMR02 coding guidance and this will be relaunched in the near future.

The headings in Tables 2 through 9 in this report can be interpreted as follows:

- **Correctly recorded:** The number of codes where the condition was correctly recorded
- **Over-recorded:** Condition has been coded but should not have been because either the condition was not present or had been recorded in place of another condition which was more relevant to the episode
- **Under-recorded:** Condition should have been coded, but was incorrectly omitted
- **Accuracy:** The percentage of the total recorded conditions in SMR02 which had been coded accurately
- **Major error:** Coding incorrect to 3-digit level (assigned to the wrong 3-digit code category), coded unnecessarily (over-recorded), code omitted (under-recorded) and any Main Condition code that was misplaced in Other Conditions
- **Minor error:** Coding incorrect to 4-digit level (assigned to the correct 3-digit code category, but the more detailed 4-digit code was not selected)

A detailed breakdown of accuracy scores for all assessed diagnostic variables by hospital can be found in Appendix A and a similar breakdown for hard-coded variables in Appendix B.

Table 2 shows the national accuracy at a 3 and 4 digit level for the assessed clinically classified variables Main Condition, Other Conditions and Indication for Operative Delivery. Any records with conflicting evidence were excluded from the final accuracy calculations.

Table 2: Accuracy of ICD coded data items (numbers and percentages) for 1,100 records assessed

Data Item	Total Recorded	Conflicting Evidence		Major error[1]	Minor error[1]	3-digit accuracy (%)	4-digit accuracy (%)
		3-digit	4-digit				
Main Condition	1,100	6	0	309	26	**72**	**69**
Other Conditions	1,938	10	1	560	23	**71**	**70**
Indication for Operative Delivery	1,100	10	2	85	60	**92**	**87**

1. Major errors include codes recorded incorrectly to 3-digit level, codes that are recorded unnecessarily (over recorded), codes that have been omitted (under recorded), and codes that should have been recorded as Main Condition but were misplaced in Other Conditions.
2. Minor errors include codes recorded incorrectly to 4-digit level.

2.1 Main Condition

Accuracy Summary Main Condition	
Records assessed	1,100
Conflicting / inconclusive evidence	6
Total Assessed	1,094
Correct to 3 digits	791 (72%)
Correct to 4 digits	765 (69%)

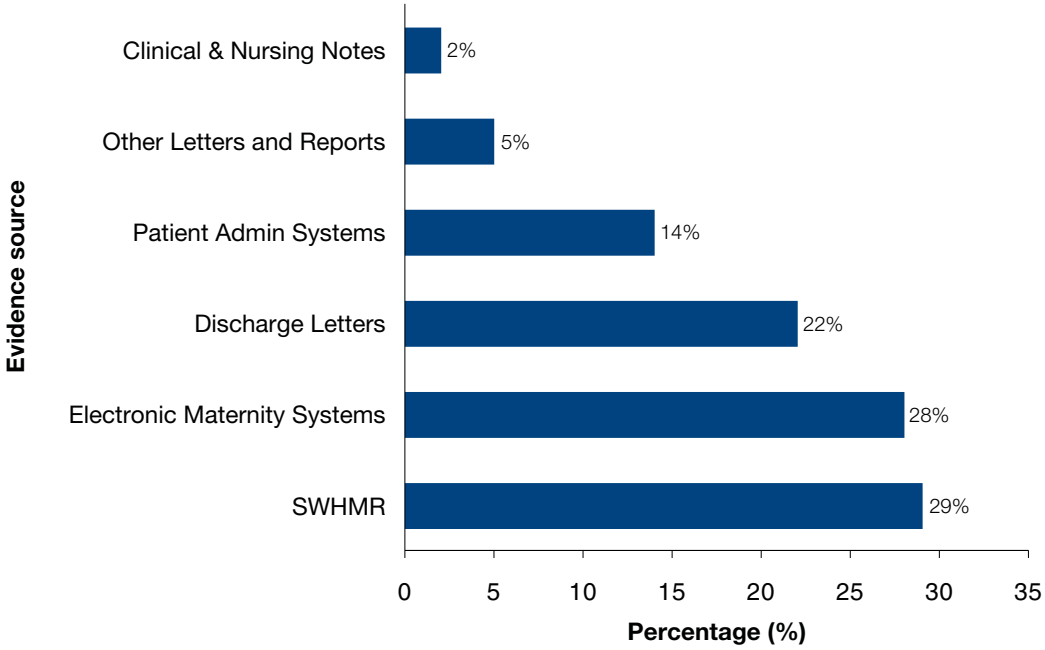
Main Condition accuracy at a 3-digit level was 72%, which fell well below the ISD recommended minimum standard of 90%. There were 303 major errors and 26 minor errors found in Main Condition. The 268 major errors occurred because a condition had been incorrectly recorded and the correct condition had been omitted (under recorded). 35 Major errors occurred because the correct code had been recorded to a 3-digit level, but was misplaced in Other Conditions. 26 minor errors occurred because the code was correct to 3-digits but incorrect to the 4th digit.

The overuse of Delivery Codes in Main Condition

For 183 (60%) of the major errors in Main Condition O80-O84 delivery codes had been recorded incorrectly when a more specific condition should have been recorded but had been omitted. National guidance currently states that O80-O84 delivery codes from chapter XV of ICD-10 must only be used in Main Condition if no other condition classifiable to that chapter is recorded.

Figure 1 below shows the various information sources where DQA found evidence of a more specific condition which had been omitted when an O80-O84 delivery code had been used instead. As you can see the evidence was found in sources across the medical record which should have been available to coding staff.

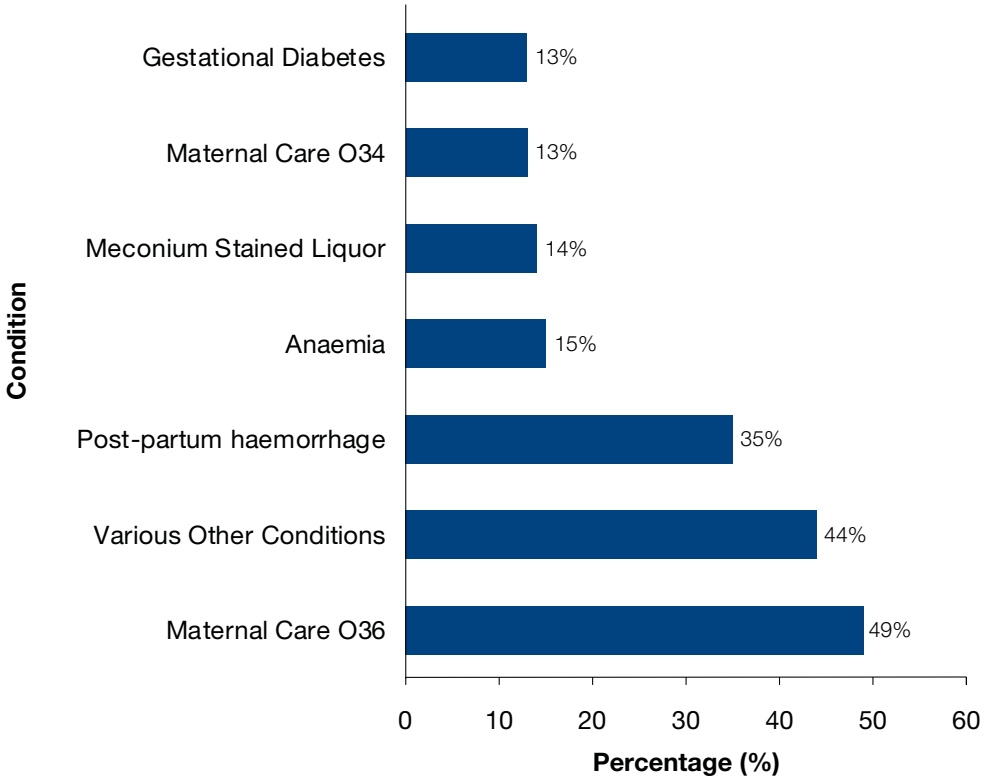
Figure 1: Percentage of O80 – O84 errors by evidence source



As mentioned earlier there was a total of 183 major errors due to the overuse of delivery codes when a more relevant condition should have been recorded instead. DQA auditors found evidence for 53 (29%) of these errors in the SWHMR, 52 (28%) in electronic maternity systems, 39 (22%) in discharge letters, 26 (14%) in the electronic patient administration system and the remaining 13 (7%) in notes, letters and reports.

Figure 2 below shows which conditions had been omitted and replaced by an O80–O84 delivery codes and gives the total number of those conditions which had been incorrectly omitted.

Figure 2: Number of conditions which should have been coded instead of O80-O84 delivery codes



62 of the 183 major errors were caused by the incorrect coding of delivery codes at the expense of Maternal Care codes, O34 Maternal care for known or suspected abnormality of pelvic organs or O36 Maternal care for other known or suspected fetal problems which had been omitted (under recorded).

35 of these patients had O721 Post-partum haemorrhage omitted / under-recorded. National guidance currently states this code must be recorded in all cases where either the clinician states 'post-partum haemorrhage' or blood loss is recorded as 500 mls or more and includes haemorrhage occurring during a caesarean section. In the audit sample post-partum haemorrhage should have been coded 397 times in total so these 35 omissions account for a 9% under-recording of the condition. It should be noted that the DQA assessment of whole diagnostic section found that Post-partum haemorrhage was more widely under-recorded than just these 35 cases left out of Main Condition. Details on the total accuracy and under-recording of Post-partum haemorrhage can be found in Section 2.3 of this report.

15 Patients with a delivery code in Main Condition had O990 Anaemia omitted, 14 had O681 Meconium Stained Liquor omitted and 13 had O244 Gestational Diabetes omitted. The remaining 44 errors were due to the omission of various conditions which had no specific pattern.

Other major errors due to omission / under recording

A further 91 major errors occurred because an incorrect condition (other than an O80-O84 delivery code) had been recorded and the correct diagnosis left out. However, there was no particular pattern to either the 91 incorrectly recorded codes that had been incorrectly recorded or the ones which had been wrongly omitted.

Misplaced Main Conditions

For the remaining 35 major errors in Main Condition the correct code had been recorded to a 3-digit level, but was misplaced in Other Conditions. For 17 of these, DQA found that code O72 Post-partum haemorrhage should have been recorded as the Main Condition but had been misplaced by a less relevant condition or a code that didn't need to be recorded at all. There were also several instances where the diagnosis in Main Condition had already been recorded in the indication of operative delivery field - the Indication for operative delivery code should only be repeated in main condition when there are no other complications (see SCCS 9, March 2015).

Main Condition Minor Errors

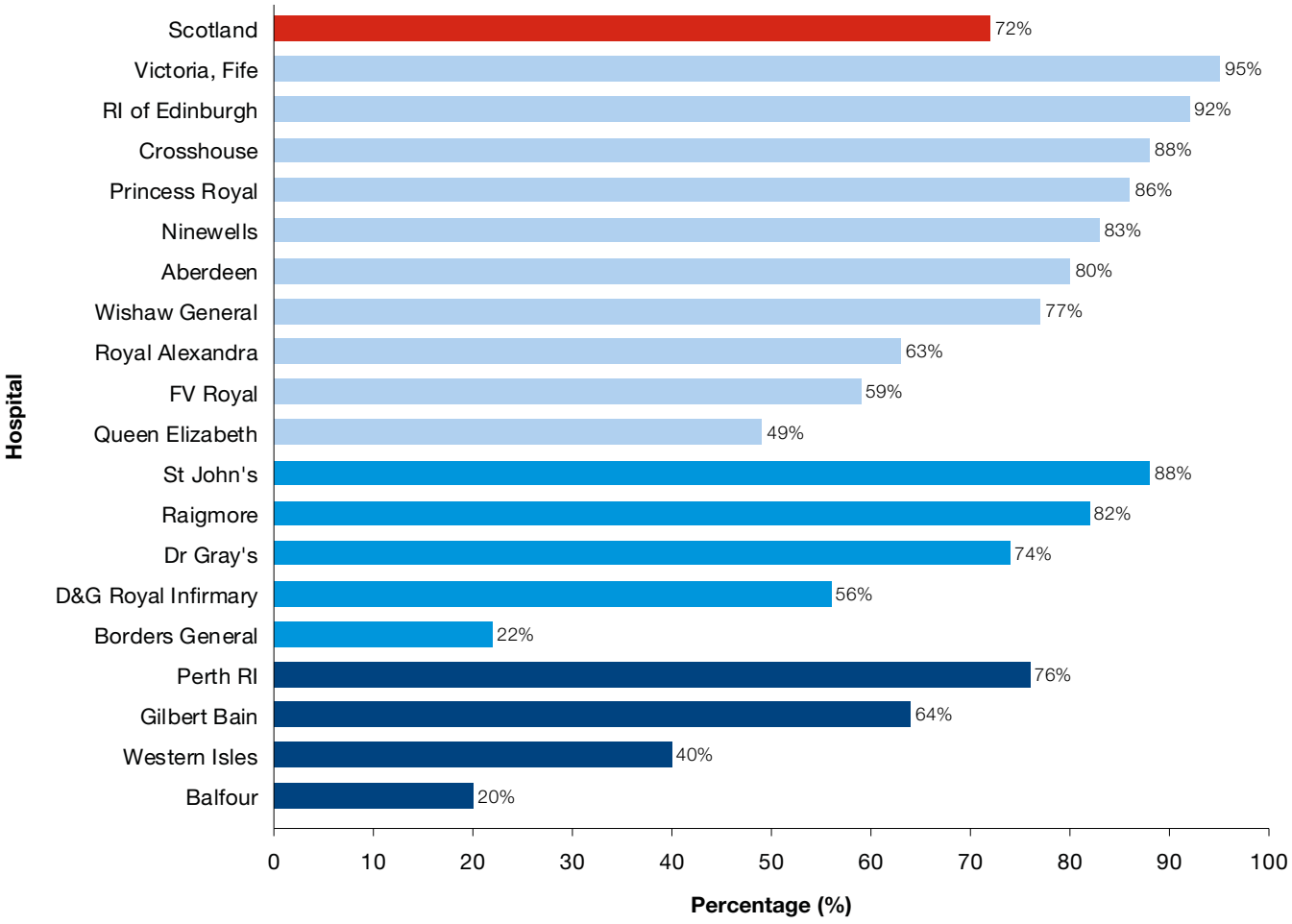
There were 26 minor errors in Main Condition where the condition was coded correctly to three digits but DQA auditors found that the fourth digit had been recorded incorrectly.

There was no specific pattern to these errors and evidence was found in a wide range of information sources.

Main Condition 3-Digit Accuracy by hospital

Figure 3 below shows the Main Condition accuracy at each of the 19 participating hospitals. The hospitals have been stratified into three categories; large, medium and small based on the amount of annual delivery episodes.

Figure 3: Main Condition 3 - digit Accuracy (%)



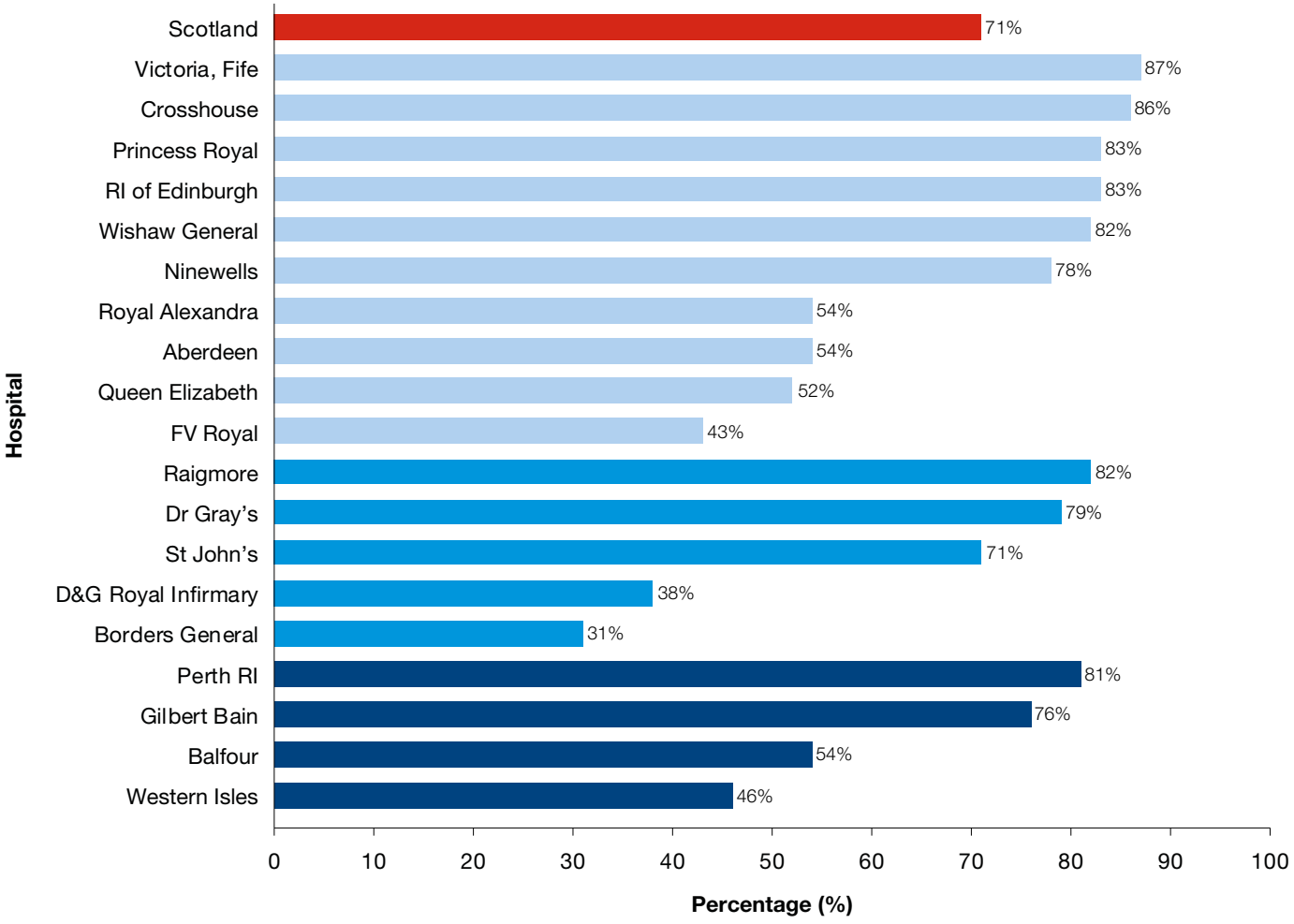
As shown in Figure 3 data accuracy was extremely low at some hospitals for the coding in Main Condition. Diagnostic data on Main Condition from the six hospitals with accuracy levels below 60% should be used with extreme caution and diagnostic data from Borders General, Western Isles and the Balfour hospitals should not be used for decision making. Low accuracy at the large and medium sized hospitals is also of particular concern due to the impact on national data. ISD advise all hospitals with data accuracy below 80% for Main Condition to initiate an action plan to improve recording. ISD Terminology Services provide free training on clinical coding to NHS coding staff and training requests can be submitted by email.

2.2 Other Conditions

Accuracy Summary Other Conditions 1-5	
Records assessed	1,100
Conditions recorded	1,938
Correct to 3 digits	1,378 (71% Accuracy)
Correct to 4 digits	1,355 (70% Accuracy)
Over recorded	81
Under recorded	446

Accuracy of the recorded Other Conditions at a 3-digit level was 71% which did not meet the ISD recommended minimum standard of 90%. There were 560 major errors and 23 minor errors found in Other Conditions.

Figure 4: Other Conditions 3-digit Accuracy (%)



Under-recording of other conditions

There is a significant under-recording of Other Conditions in SMR02 delivery episodes. 1,378 conditions were found to have been correctly recorded to 3-digits but a further 446 should have been recorded and were wrongly omitted. This means that in total 1,824 co-morbidities (1,378 + 446) should have been recorded and the omission of the 446 codes equates to 24% under-recording of the total Other Conditions.

Under-recording of Anaemia

Of the 446 major errors due to a code being omitted/under-recorded, 109 were due to D64.9 Anaemia codes being omitted. During the course of this DQA audit it became apparent that coding staff at NHS Boards found the guidance on the recording of anaemia in the ISD SMR02 training manual (2014) to be ambiguous. For the purposes of this audit DQA assessed records in line with the following statement from the manual -

> ***"Anaemia is considered to exist when haemoglobin (Hb) levels are below 10g/dl blood. Where a Haematology report confirms such a reading, an anaemia code should be attributed to the patient."***

The training manual also included worked examples which suggested that anaemia should be coded in the delivery episode if the mother had been treated for the condition "during" or "throughout" her pregnancy. Following internal consultation on how to audit the condition it was decided that, in line with the 2014 guidance, DQA should expect to see anaemia coded in the diagnostic section of the SMR02 delivery episode when any blood tests during the pregnancy confirmed haemoglobin levels were below 10g/dl blood. If the condition was not coded DQA auditors assigned an error.

Our audit findings on the under recording of anaemia have led to further conversations within ISD and the guidance around the coding of the condition in SMR02 delivery episodes is set to be revised. It is now thought that the guidance in the training manual should be more aligned to the ISD data dictionary rule on coding the diagnostic section in SMR02 -

> ***"Record details of the delivery episode only. All conditions which affect the management of the patient during the delivery episode should be included. Conditions relating to previous antenatal episodes, which do not affect patient care during the delivery episode, should not be recorded."***

It is advised that coding staff at NHS boards **do not** alter their current recording practices for anaemia on the basis of these audit findings until the new updated ISD training manual is released.

Under-recording of Z codes

160 of the major errors occurred because DQA auditors found evidence that Z-codes had been omitted when either the patient was Group B strep (GBS) carrier or Anti-D / antibiotics had been administered. National SMR02 guidance on Group B strep coding states -

> ***"If a patient is colonised with GBS but with no current infection the code Z22.3 Carrier of other specified bacterial diseases should be recorded in Other Conditions."***

The National guidance on the recording of Anti-D states -

"If Anti-D is administered during pregnancy this must be coded in the delivery episode."

In line with these statements, DQA expected to see Anti-D or GBS Z-code in the diagnostic section if there was evidence recorded in the medical record during the pregnancy or after the delivery. A total of 32 patients had Group B Strep omitted (under recorded) from Other Conditions whilst 128 patients had Anti-D omitted (under recorded) from Other Conditions.

Over recording of Other Conditions

81 major errors occurred due to a code being over-recorded because either:

- There was no record of the condition in the source documents assessed
- There was a record of a different condition which was more relevant and should have been coded instead
- The condition was not recorded properly in accordance with clinical coding guidelines. For example, 15 errors were due to code E66.9 Obesity being over-recorded when there was there was no clinical statement of obesity in the medical record and it appeared that the condition had been interpreted from the patients BMI measurements which contravenes national coding guidelines

Other Condition minor errors

There were 23 minor errors (codes correct to 3-digits but incorrect to 4-digits) found in Other Conditions. There was no specific pattern to these errors and evidence was found in a wide range of information sources.

2.3 Common Conditions

The DQA team was asked by ISD colleagues and stakeholders to conduct an analysis of six common conditions deemed of high clinical and statistical interest. The six conditions are detailed in the table below. This analysis relates only to the conditions as coded in the diagnostic section.

Table 3 below shows the accuracy of coding for the six groups of common conditions. The percentage accuracy shows how many of the conditions coded in the sample had been assigned the correct ICD-10 code. **The accuracy in Table 3 does not take into account codes which had been omitted (under-recorded).**

Table 3: Percentage accuracy of common conditions

Common conditions	Total coded in audit sample	Over-Recorded	3-digit accuracy (%)	4-digit accuracy (%)
Diabetes (pre-existing or pregnancy induced)	25	3	88	88
Hypertension (pre-existing or pregnancy induced / pre-eclampsia)	46	2	95	80
Epilepsy	2	0	100	100
Group B streptococcal carriage	40	2	95	60
Premature rupture of the membranes	64	4	93	81
Postpartum haemorrhage	337	3	99	98

DQA assessed the accuracy of every instance of these conditions coded in the diagnostic section of the SMR02 record. The table above shows the number of instances where each of the conditions were recorded in the 1,100 delivery episodes. DQA assessed all these conditions as they appeared in the sample. Any time the condition should not have been recorded it was assigned an error code and these are detailed in the “Over-recorded” column of the table. The coding accuracy is then based on the number that were correctly coded as a percentage of the total codes recorded in the sample. So, for example. 25 patients were recorded as having diabetes, DQA found 3 of these to be erroneous (over-recorded) and so 22 of the total 25 were correct which translates to 88% 3-digit accuracy for the total instances coded in the sample.

All common conditions scored above the ISD recommended 3-digit accuracy standard of 90% apart from diabetes which fell just below the recommended standard at 88%.

There was also a very notable under-recording of the six common conditions in the audit sample

Under-recording of the six selected common conditions

As well as assessing the accuracy of the conditions when they had been recorded DQA auditors also kept a record of the number of times that the common conditions were evident in the medical record but had not been coded in the diagnostic section. The extent of this under-recording is detailed in table 4 below.

Common conditions	Total correctly coded in audit Sample	Total incorrectly omitted (Under-recorded)
Diabetes (pre-existing or pregnancy induced)	22	43 (66%)
Hypertension (pre-existing or pregnancy induced / pre-eclampsia)	44	28 (39%)
Epilepsy	2	1 (33%)
Group B streptococcal carriage	38	32 (46%)
Premature rupture of the membranes	60	20 (25%)
Postpartum haemorrhage	334	63 (16%)
Totals	**500**	**187 (27%)**

There was a notable under-recording of common conditions. DQA auditors found 500 instances of the selected common conditions which had been correctly recorded to a 3-digit level in the random sample of 1,100 patients. However, DQA auditors also found evidence in medical records of a further 187 instances of these conditions which had not been coded and were incorrectly omitted. Therefore 687 conditions should have been coded rather than the 500 found in the sample which means there was a total under-recording of 27%.

Diabetes had the highest percentage of under-recorded conditions in the diagnostic section. 43 of the 65 cases that DQA found in medical records had been omitted which means that only 34% of all diabetes evidenced in medical records had been coded in the diagnostic section of SMR02.

Group B streptococcal carriage was only coded in 54% of the patients who had the condition and high blood pressure (hypertension) was only coded in 61% of all patients who had it.

2.4 Indication for Operative Delivery

Accuracy Summary Indication for Operative Delivery	
Records assessed	1,100
Conflicting / inconclusive evidence	12
Total assessed	1,088
Correct to 3 digits (including valid blanks)	1,003 (92% Accuracy)
Correct to 4 digits (including valid blanks)	943 (87% Accuracy)
Under recorded	446

Accuracy of Indication for Operative Delivery at a 3-digit level was 92% which exceeds the ISD recommended minimum standard of 90%. There were 85 major errors and 60 minor errors found for this variable. The minor errors occurred because the ICD-10 code was correct to three digits but incorrect to the 4th digit.

17 of the 85 major errors were due to a code being over-recorded when the patient had a normal delivery or was induced and no operative procedure was performed. A further 17 were recorded as code O26 Maternal care of other conditions rather than more specific codes found by DQA such as previous or maternal requests for caesarean section or malposition. There was no pattern to the remaining major errors.

For the 85 major errors in Indication for Operative Delivery evidence was found in the Discharge Letters for 31 patients, Electronic Systems for 29 patients and the Labour and Birth record for a further 14 patients. Evidence of the remaining 11 major errors was found in a variety of other information sources in the medical records which should have been readily available to coding staff.

2.5 Common Indications for Operative Delivery

DQA was asked by ISD Colleagues and stakeholders to conduct an analysis of five common reasons for operative delivery deemed of high clinical and statistical interest. Table 5 shows the accuracy of recording to 3 and 4-digit level. The accuracy is based on the number of instances found in the sample which had been coded correctly, it does not include codes which were omitted (under-recorded).

Table 5: Percentage accuracy of common reasons for operative delivery

Common reasons for operative delivery	Total instances in audit sample	3-digit accuracy (%)	4-digit accuracy (%)
Placenta praevia/abruption/antepartum haemorrhage	9	100	100
Failure to progress/long labour	102	89	80
Foetal distress	111	94	50
Malpresentation	23	87	72
Previous Caesarean section	117	99	97

Accuracy for Failure to Progress/Long Labour and Malpresentation fell just below the 90% ISD recommended accuracy standard. All other common reasons for operative delivery exceeded the recommended standard and were recorded with high levels of accuracy.

Under-recording of Indication for Operative Delivery

Table 6 below details the under-recording of the five common reasons for operative delivery. As with other clinically classified data items the percentage under recorded is calculated by expressing the number which were incorrectly omitted as a percentage of the total correctly recorded and incorrectly omitted. For example, Foetal distress was correctly recorded 105 times and 15 were incorrectly omitted therefore 15/120 = 12.5% under-recording.

Table 6: Under recording of Indication for Operative Delivery

Common reasons for operative delivery	Total correctly recorded in audit sample	Under Recorded
Placenta praevia/abruption/ antepartum haemorrhage	9	1 (10%)
Failure to progress/long labour	91	7 (7%)
Foetal distress	105	15 (12.5%)
Malpresentation	18	5 (22%)
Previous Caesarean Section	115	8 (7%)
Totals	**338**	**36 (9%)**

Under-recording of the common reasons for operative delivery was not as extensive as it was in the assessed common conditions. The audit found that, in total, 9% of these five common reasons for operative delivery were under-recorded across Scotland.

2.6 SMR02 ICD coding – Other General Observations

Coding of Diabetes

Diabetes is hard-coded in SMR02 but in addition to the completion of this hard-coded data item, the appropriate ICD-10 code should also be recorded in either the Indication for Operative Delivery field or in the diagnostic section.

Therefore, the number of patients with hard-coded diabetes should tally exactly with the number of ICD-10 Diabetes codes found in either the indication for operative delivery field or in the diagnostic section.

Hard-coded Diabetes

Diabetes is a hard-coded data item in SMR02 and has five possible answers:

- **Code 1 - Yes, pre-existing**: The patient has pre-existing diabetes
- **Code 2 - Yes, gestational**: The patient has gestational diabetes
- **Code 3 - Yes, time of diagnosis unknown**
- **Code 4 - No: The patient does not have diabetes**
- **Code 9 - Unknown**: It is unknown whether the patient has diabetes or not

Table 7 below shows how many of these codes were found in the audit sample along with how many of the codes were recorded in error and the resulting percentage accuracy.

Table 7: Hard-coded diabetes as found in the audit sample

Diabetes Source	Total instances in audit sample	Errors Found	Diabetes Accuracy
1 - yes pre existing	5	1	80%
2 - yes gestational	45	0	100%
3 - yes time of diagnosis unknown	0	0	100%
4 - no	1,045	26	97.5%
9 - unknown	5	2	60%

Table 8 below shows how many instances of each Diabetes code were over or under-recorded and the actual total that should have been recorded.

Table 8: Hard coded Diabetes that should have been recorded

Diabetes Source	Total Number in Sample	Over Recorded	Under Recorded	Total Number that should have been recorded
1 - yes pre existing	5	1	1	5
2 - yes gestational	45	0	17	62
3 - yes time of diagnosis unknown	0	0	0	0
4 - no	1,045	26	2	1,021
9 - unknown	5	2	9	12

There was a significant over use of code 4 - No with 26 patients having the code incorrectly recorded. 16 of these patients actually had gestational diabetes and therefore should have been recorded as 2 - Yes gestational, 9 should have been recorded as 9 - Unknown and the remaining one patient should have been coded as 1 - Yes pre-existing. This means that instead of the 49 patients who were correctly hard-coded as having diabetes there should have actually been 67 patients with hard-coded diabetes on their SMR02 episode. The 18 patients who had diabetes incorrectly omitted from their SMR02 episode equates to a 27% under-recording of the condition in the hard-coded section.

Diabetes in the diagnostic section

As noted in the previous table DQA auditors found 67 patients who should have been hard-coded as having either gestational or pre-existing diabetes. This should tally exactly with the number of ICD-10 Diabetes codes found in either the indication for operative delivery field or the diagnostic section. There were two instances where a code was correctly recorded in the indication for operative delivery field. Therefore, based on the hard-coded figures, 65 patients should have had a diabetes code in the diagnostic section. Table 9 below details the audit findings.

Table 9: Diabetes codes (E10–E149, O240-O249) in the diagnostic section

Total Conditions Assessed	Correct	Over Recorded	Under Recorded
25	22	3	43 (66%)

DQA auditors found 25 diabetes codes recorded in the diagnostic section in the sample, 22 of which (88%) were correctly recorded while the remaining three should not have been coded. There were a further 43 instances where diabetes should have been recorded but had been omitted. This brings the total to 65 patients (22 correct and 43 under recorded) who should have had an ICD-10 code in their diagnostic section and matches the expectation set by the hard-coded diabetes findings. These findings mean that Diabetes was 66% under-recorded in the diagnostic section.

3. SMR02 Hard-coded Variables - Findings

Table 10 below shows the percentage accuracy of hard-coded data items assessed in NHS Scotland.

Table 10: Percentage accuracy of hard coded SMR02 data items

Data item	Number assessed	Percentage accuracy (%)	Percentage accuracy (%) 2008/09
Birthweight	1100	99	99
Mode of Delivery	1100	98	87
Original Booking	1082	98	Not assessed
Diabetes	1100	97	85
Height	1086	96	72
Estimated Gestation	1099	95	92
Specialty/Discipline	1083	94	Not assessed
Induction of Labour	1097	93	93
Neonatal Indicator	1099	93	96
Smoking History at Booking	1090	93	81
Booking Date	969	92	67
Smoker during pregnancy	1085	92	90
Feed on Discharge	1098	92	Not assessed
First Feed Given	1098	92	Not assessed
Weight of Mother at Booking	1037	91	77
Drugs Misuse During This Pregnancy	1099	88	33
Drugs Used	1099	88	25
Ever Injected Illicit Drugs	1100	88	29
Presentation at delivery	1100	81	69
Ethnic Group	1093	75	11
Transfer of Responsibility Midwife to Consultant	1082	68	Not assessed

Although the hard-coded diabetes variable was 97% accurate this was largely due to the vast majority of the 1,100 sampled records being correctly coded as having no diabetes. It is important to emphasise that where the condition was present there was a 27% under recording. Therefore, whilst overall accuracy for this hard-coded variable was high across the sample the condition was still poorly coded for the 67 patients whose medical records confirmed the diagnosis.

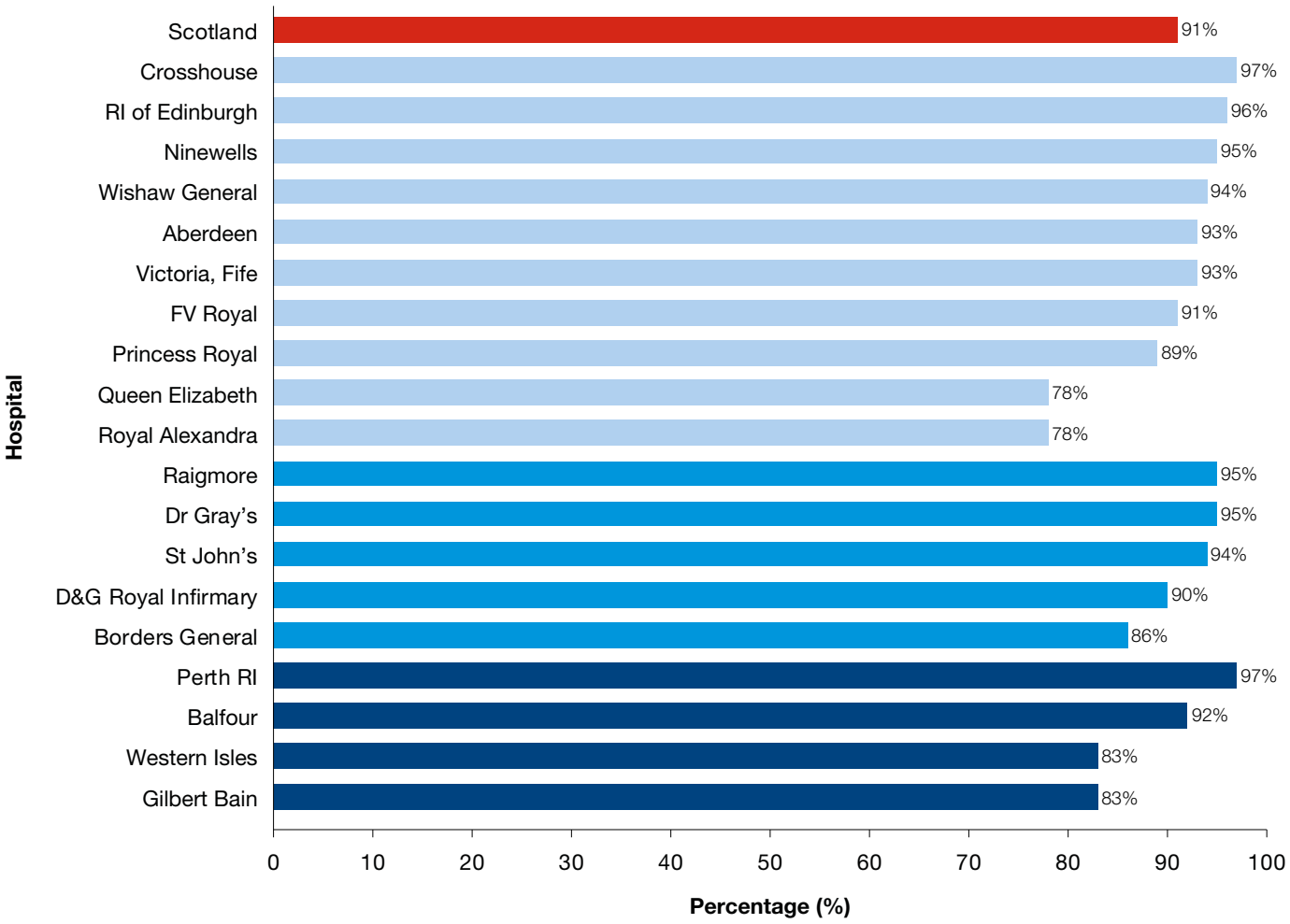
15 of the 21 hard-coded data items assessed were recorded with an accuracy of over 90% which meets the ISD recommended minimum standard.

The three drugs variables: Drugs Misuse During this Pregnancy, Drugs Used and Ever Injected Illicit Drugs were each recorded with 88% accuracy which fell just below the ISD recommended

minimum standard of 90%. However, as illustrated in table 10 there was a great improvement in accuracy since the last assessment in 2008/09. The increase in accuracy is due to the variable becoming mandatory following the 2008/09 DQA audit.

Figure 5 shows the overall hard-coded percentage data accuracy by hospital and at a national level. Hard-coded SMR02 data in Scotland was found to be 91% accurate in this audit which is above the ISD recommended accuracy standard of 90%.

Figure 5: Hard coded data combined accuracy (%)

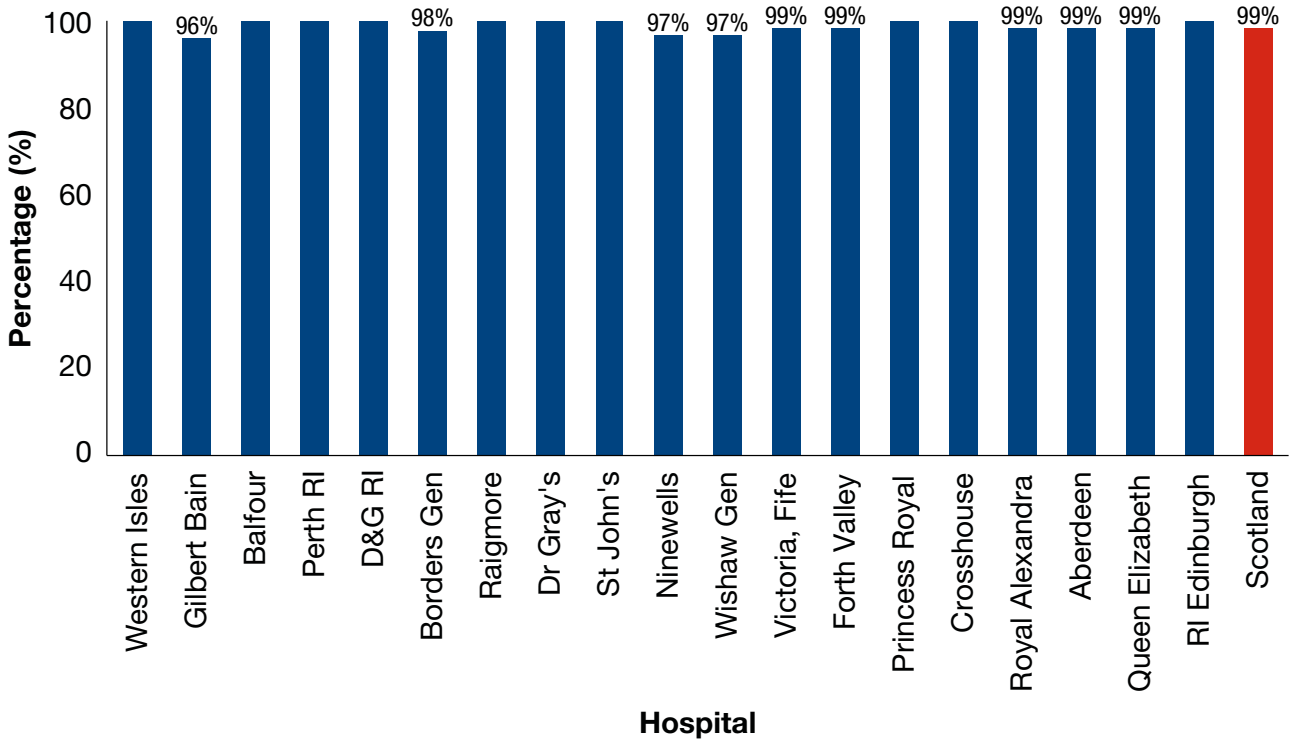


3.1 Individual Hard-coded Data Item Accuracy

Birthweight - Babies 1 to 3

Accuracy Summary	
Total Records assessed	1,100
Conflicting / inconclusive evidence	0
Total errors	11
Percentage Accuracy	99%

Birthweight Accuracy by Hospital

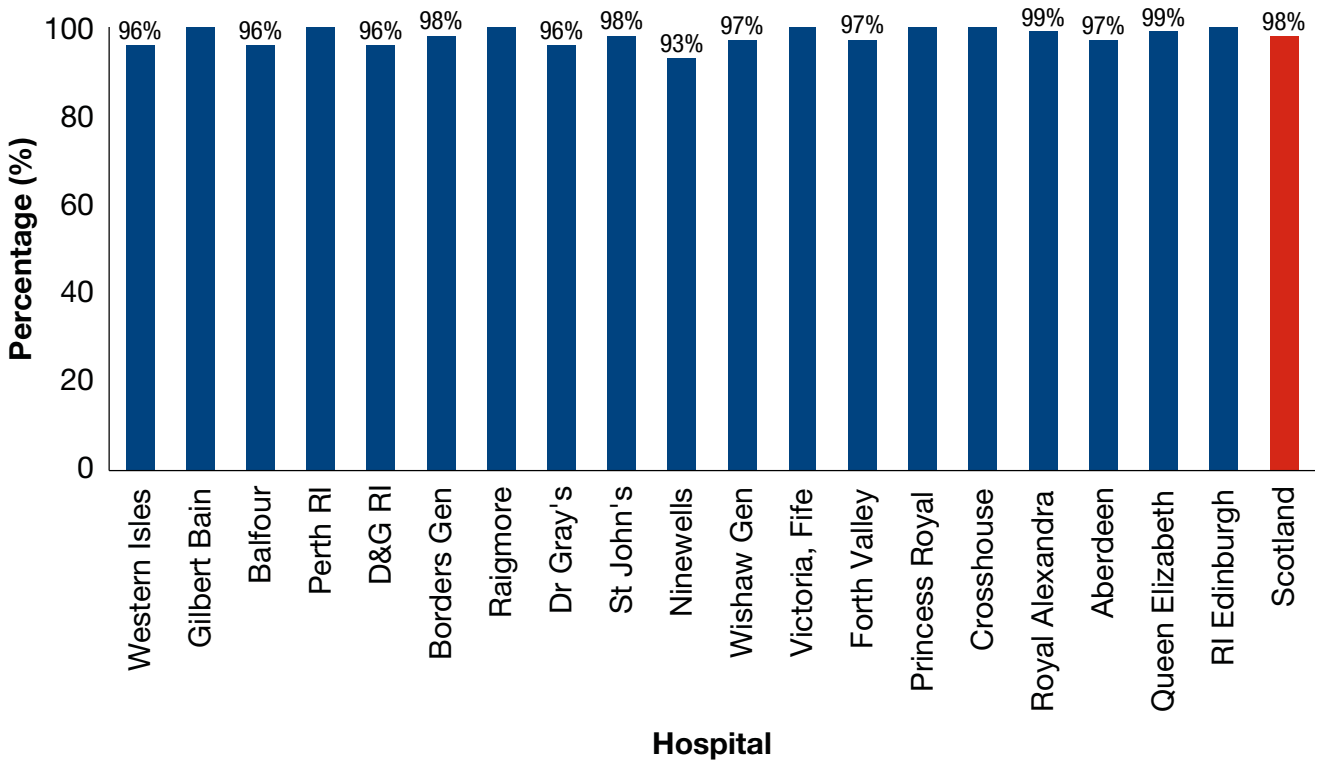


For Birthweight there were only 11 errors found in the 1,100 records assessed. The errors had no particular pattern.

Mode of Delivery

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	0
Total records assessed	1,100
Total errors	22
Percentage Accuracy	98%

Mode of Delivery accuracy by hospital

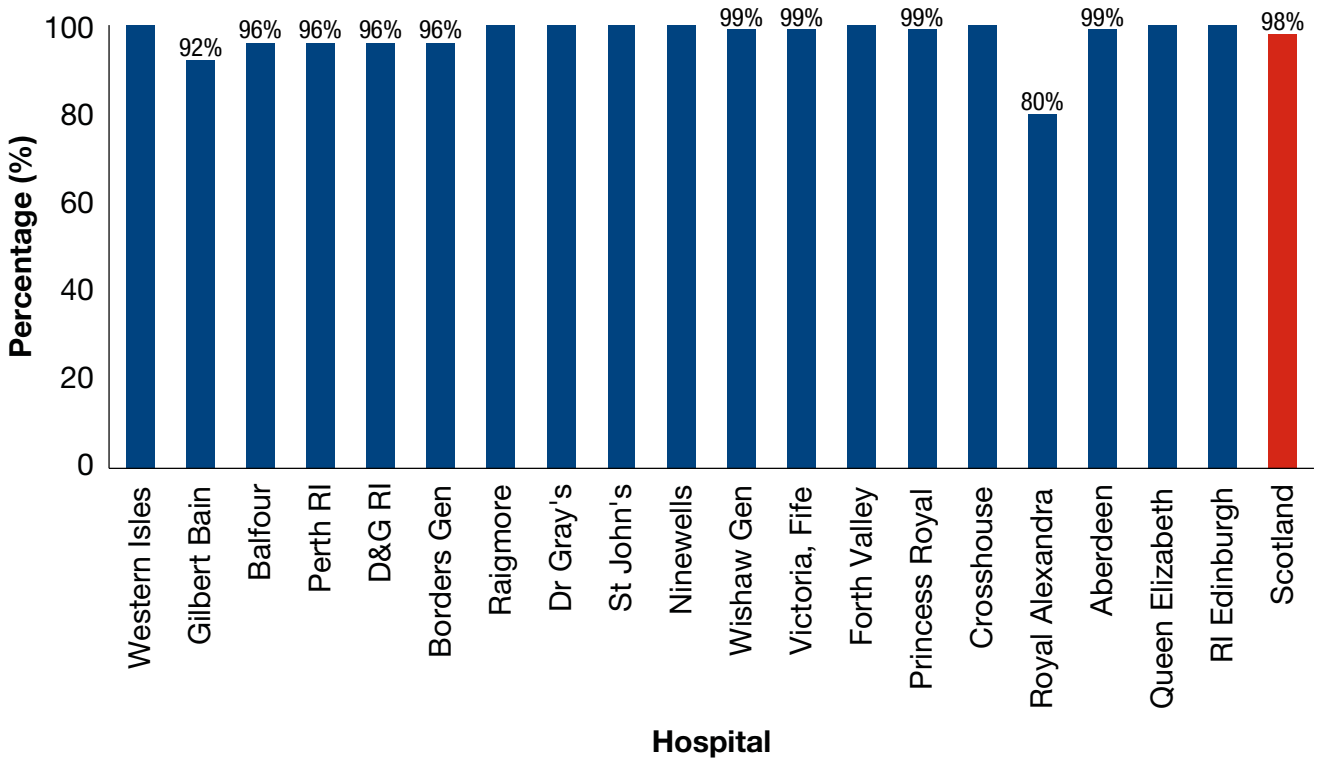


For Mode of Delivery there were 22 errors found in the 1,100 records assessed. Ten of the errors had been incorrectly recorded as A - Mid cavity forceps - no rotation (incl. Haig-Fergusson, Neville-Barnes etc.). Eight of these should have been recorded as 2 - Low forceps - no rotation, forceps NOS (incl. Wrigleys) and the other two should have been B - Rotational forceps (incl. Kiellands). The remaining 12 errors had no significant pattern.

Original Booking (the location at which the patient originally intended to deliver her baby)

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	18
Total Records assessed	1,082
Total errors	27
Percentage Accuracy	98%

Original Booking accuracy by hospital

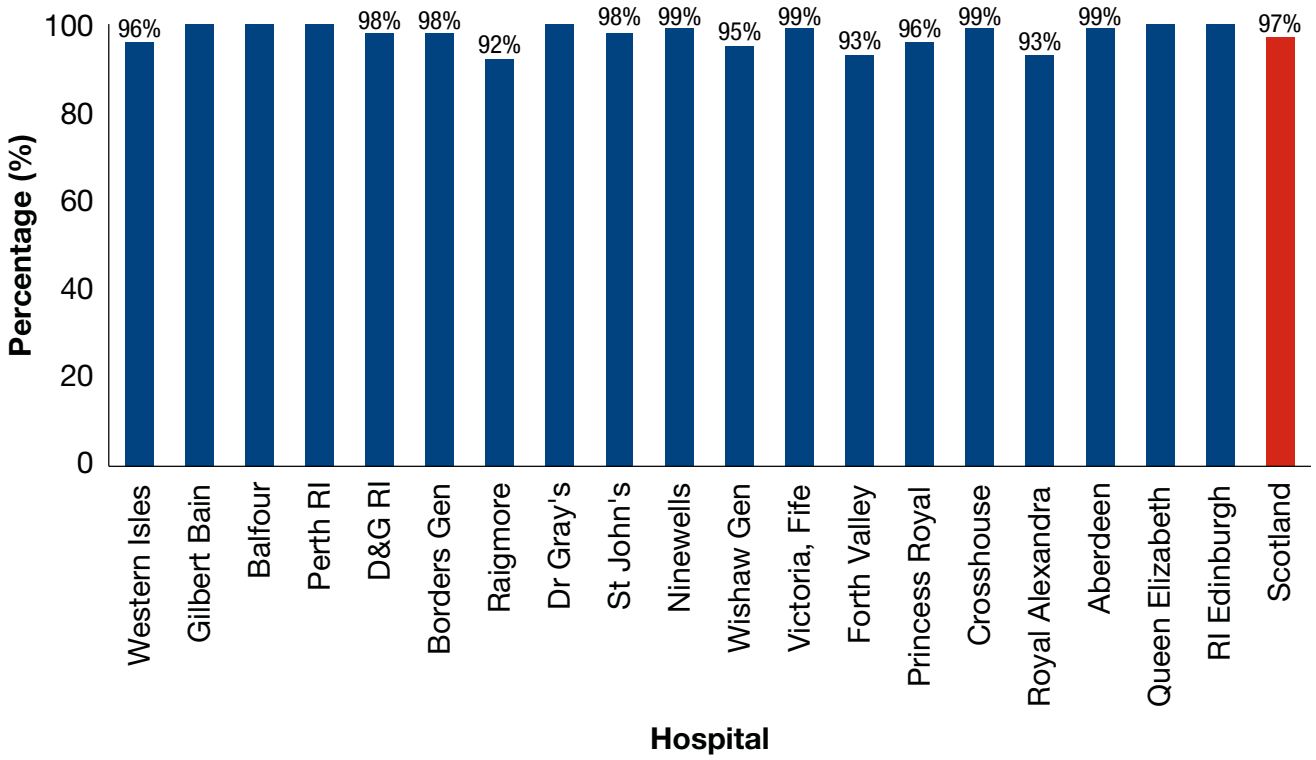


For Original Booking 18 records in the sample had conflicting or inconclusive evidence and these were excluded from the assessment and final accuracy calculation. 27 errors were found in the remaining 1,082 assessed records. 15 of these errors occurred when C418H - Royal Alexandra Hospital, Paisley had been wrongly recorded as the planned location for birth. These patients did actually have their babies at the Royal Alexandra Hospital but evidence in the medical record showed that they had originally intended to attend a different hospital for delivery. The 15 errors were simple coding errors where an alternative location should have been recorded and they have been highlighted to NHS GG&C in the Royal Alexandra Hospital audit report. The other 12 errors had no significant pattern.

Diabetes

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	0
Total Records assessed	1,100
Total errors	29
Percentage Accuracy	97%

Diabetes accuracy by hospital

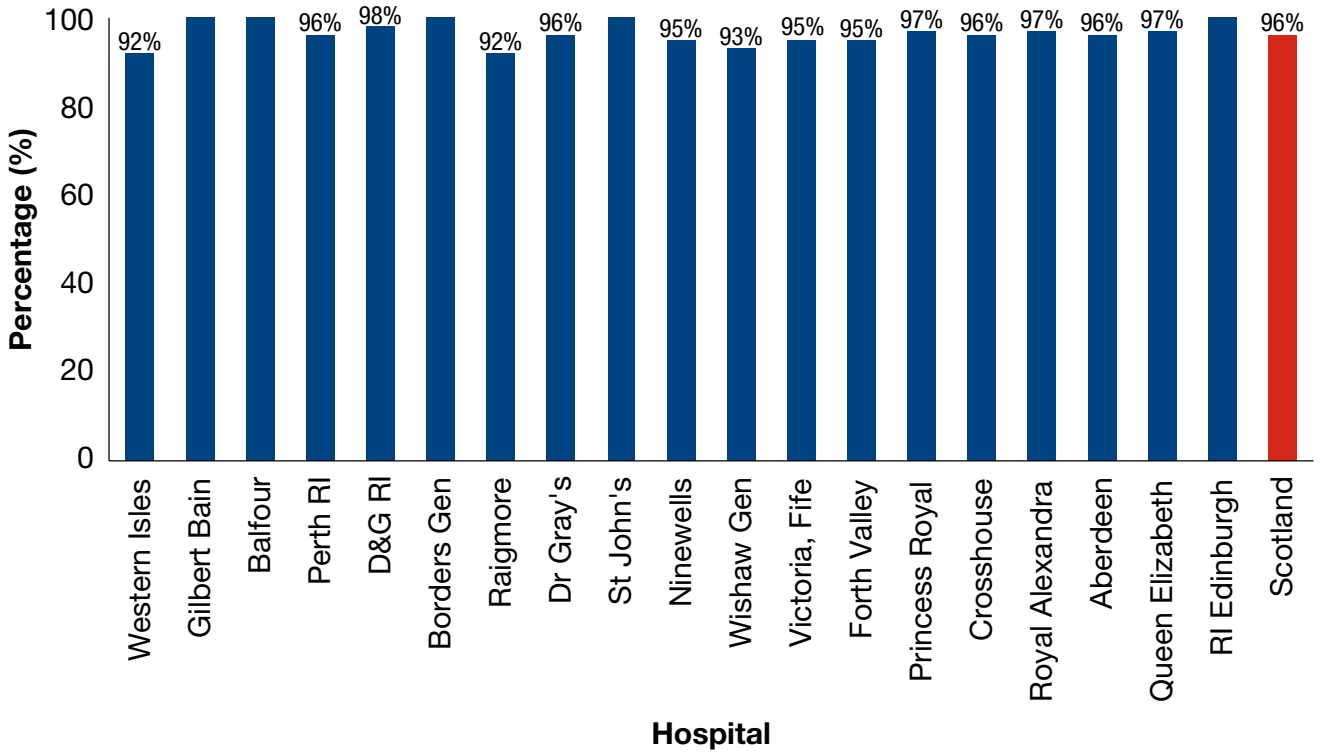


For Diabetes there were 29 errors found in the 1,100 records assessed. 26 of these patients had been incorrectly coded as 4 - No when records showed that 16 had gestational diabetes, one had pre-existing diabetes and the other nine patients should have been recorded with code 9 - Unknown. It's important to emphasise that although 97% of the total diabetes that was found in the random sample was correctly hard-coded there was still a notable under-recording of the condition in patient's that did have a diagnosis of diabetes. In total 67 of the 1,100 patients should have had either pre-existing or gestational diabetes hard-coded but only 49 did, this equates to 27% under-recording of hard-coded diabetes in SMR02.

Height

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	14
Total Records assessed	1,086
Total errors	39
Percentage Accuracy	96%

Height accuracy by hospital



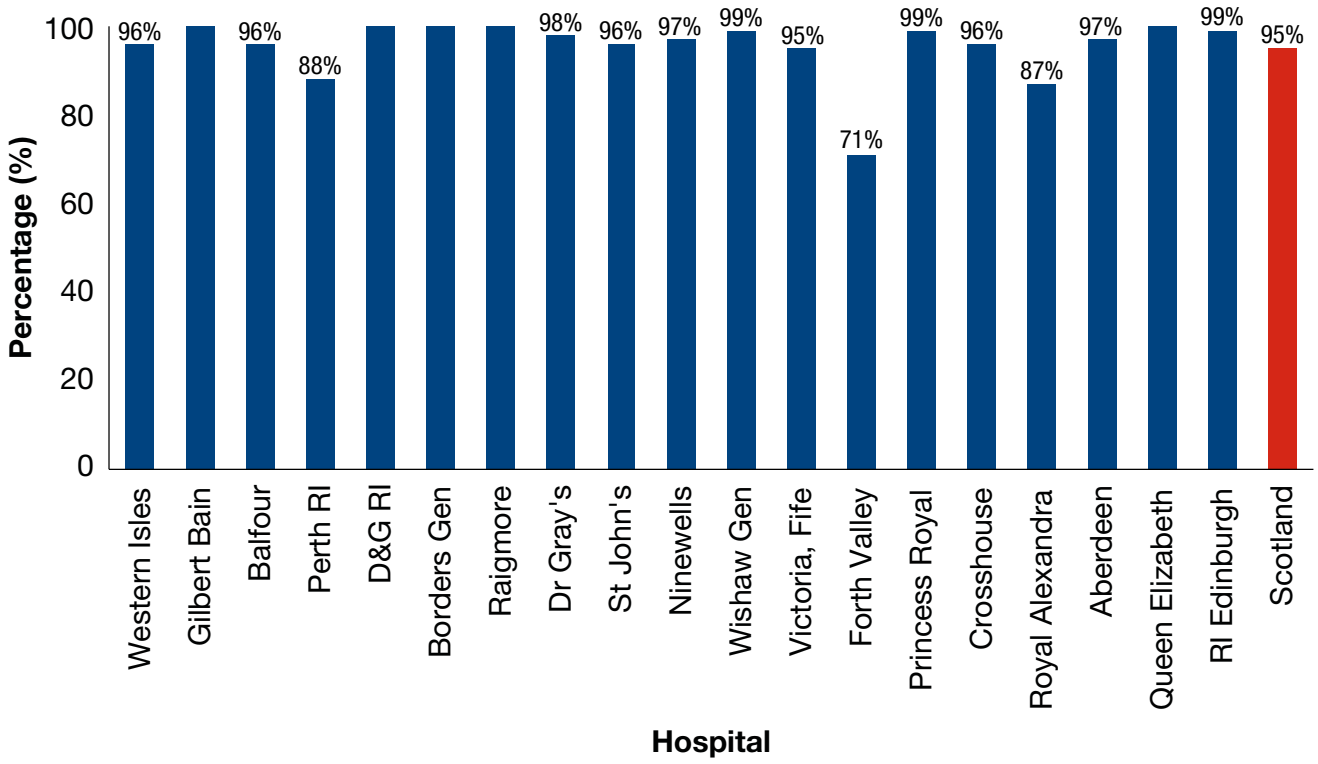
For Height 14 records in the sample had conflicting or inconclusive evidence and these were excluded from the assessment and final accuracy calculation. 39 errors were found in the remaining 1,086 assessed records. For nine of these errors the code 999 had been used. This code should only be used when the measurement is unavailable, however DQA auditors found height measurements for these nine patients in their medical records. Conversely, two errors were awarded when a height had been entered but DQA auditors found no evidence of the mother's height in the medical records. The remaining 28 errors occurred because the medical records showed that a different height should have been recorded to the one that had actually been entered in SMR02.

This variable scored 72% data accuracy in the last DQA audit of 2008/09. The move to 96% data accuracy in 2017/18 is to be commended.

Estimated Gestation (at delivery)

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	1
Total Records assessed	1,099
Total errors	54
Percentage Accuracy	95%

Estimated Gestation accuracy by hospital

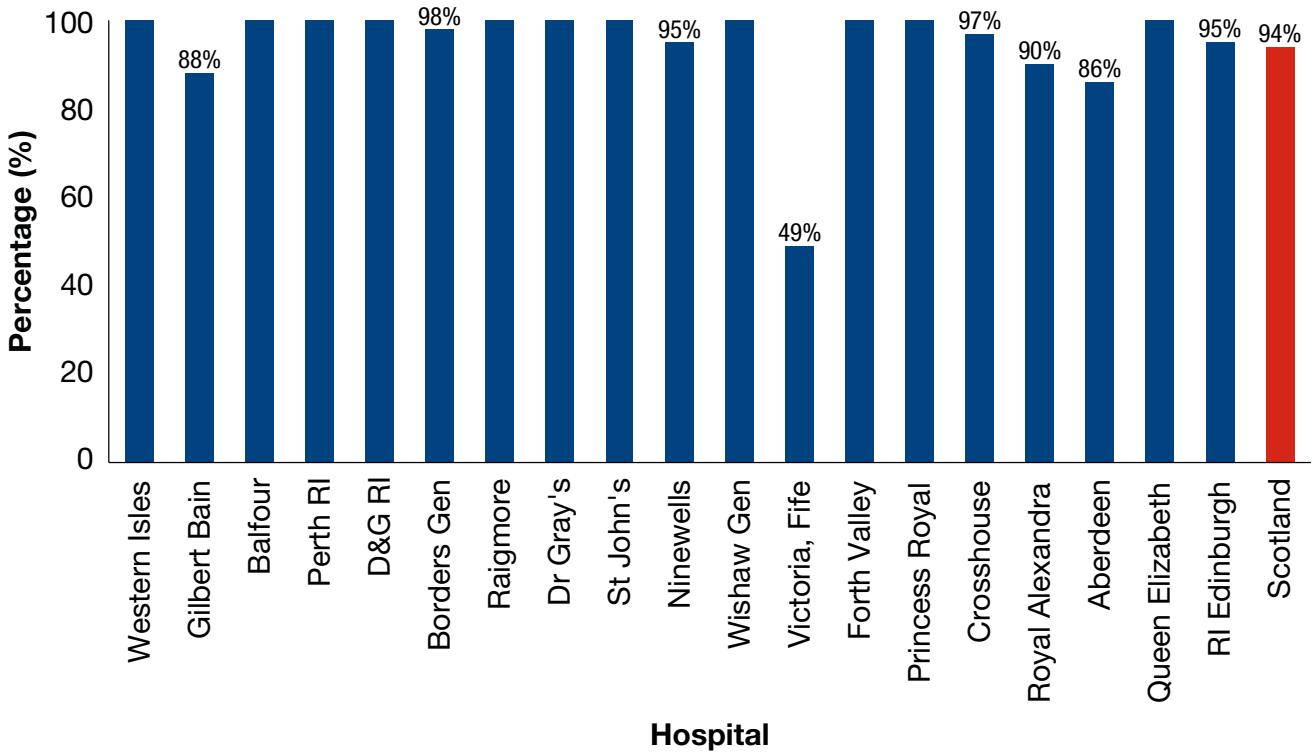


For Estimated Gestation 54 errors were found in the 1,099 records assessed. There was no particular pattern to the errors but DQA did find one board where the Patient Administration System (PAS) was using the wrong date fields to calculate the estimated gestation. Where the calculation of this variable is automated within the PAS, NHS Boards should work with their system suppliers to ensure the correct date fields are being used. Forth Valley Royal had 22 errors for this variable in their sample of 75 records. 20 of these had the estimated gestation exactly one week over what it should have been. Therefore, it is suspected that there is either a local coding instruction or a system issue with their MATSYS system which is causing the number of weeks to be rounded up when it should be rounded down to the number of completed weeks. e.g. 39 weeks and 5 days was rounded up to 40 weeks when it should have been rounded down to 39 completed weeks as per the definition. DQA asked NHS Forth Valley to investigate and clarify following the audit but no definitive clarification on the cause of the issue has been forthcoming.

Specialty/Discipline

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	17
Total Records assessed	1,083
Total errors	69
Percentage Accuracy	94%

Specialty/Discipline accuracy by hospital



The ISD coding clarification issued in September 2016 (Appendix D) states that the Specialty/Discipline for SMR02 records should reflect the speciality of the person who was responsible for the care for the mother **on original admission**. If the mother was originally admitted under the care of a midwife in an Alongside Midwifery Unit (AMU) or Freestanding Midwifery Unit (FMU), then the midwifery specialty should be recorded in this section, irrespective of whether the mother was then transferred to an Obstetric unit during labour/delivery. Obstetrics specialty should only be recorded if the mother was originally admitted under the care of a consultant in an Obstetric unit.

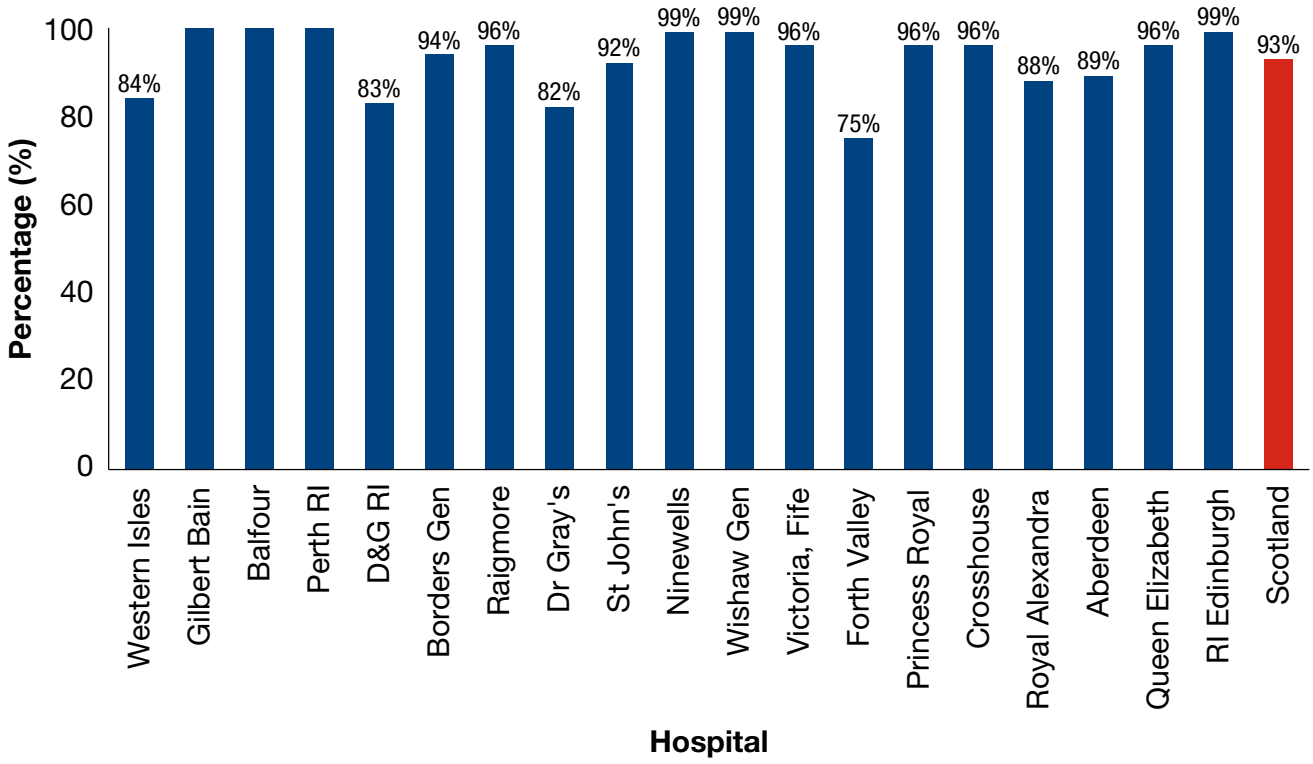
17 records in our sample had conflicting or inconclusive evidence and these were excluded from the assessment and final accuracy calculation. 69 errors were found in the remaining 1,083 assessed records. 68 of these errors were due to the specialty being incorrectly recorded as F3 - Obstetrics. 58 of these should have been T2 - Midwifery, seven should have been T21 - Community Midwifery and the remaining 3 should have been E11- GP Obstetrics.

The Victoria Hospital in Kirkcaldy, Fife was responsible for 38 of the errors. All 38 records had been incorrectly recorded as code F3 - Obstetrics when the patients were originally admitted to the midwife led unit (MLU) there. The specialty should therefore have been recorded as code T2 - Midwifery for all 38 patients.

Induction of Labour

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	3
Total Records assessed	1,097
Total errors	81
Percentage Accuracy	93%

Induction of Labour accuracy by hospital

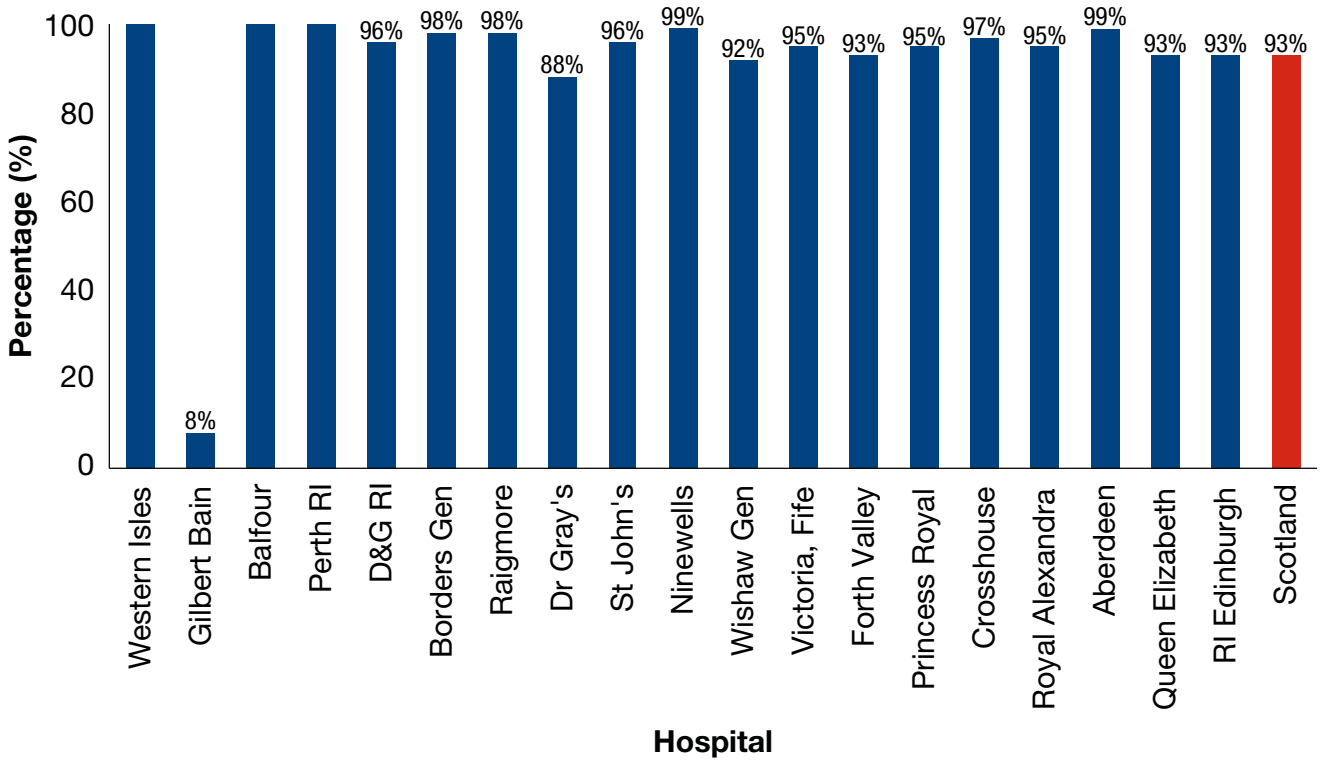


For Induction of Labour 81 errors were found in the 1,097 records assessed. 28 of these were due to the variable having been recorded as 0 - None when DQA auditors found evidence that the patient had been induced. 22 errors were due to either Artificial rupture of membranes, Prostaglandins or Oxytocics being recorded in isolation when evidence showed that either two or all three of these induction methods had been used in combination. There was no significant pattern to the remaining 31 errors.

Neonatal Indicator

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	1
Total Records assessed	1,099
Total errors	72
Percentage Accuracy	93%

Neonatal Indicator accuracy by hospital



For Neonatal Indicator there were 72 errors found in the 1,099 records assessed. 32 of these were due to the babies having been recorded as 9 - Not known when DQA auditors found evidence that 28 of them had not been admitted to the neonatal unit and the other four had been admitted. A further 17 errors were due to babies being recorded as admitted to the neonatal unit when evidence showed that they hadn't been admitted. The remaining 33 errors had no particular pattern. National Guidance states -

> ***"Code 0 should be used if the hospital has no Neonatal Unit, even if it is known that the baby was ill."***

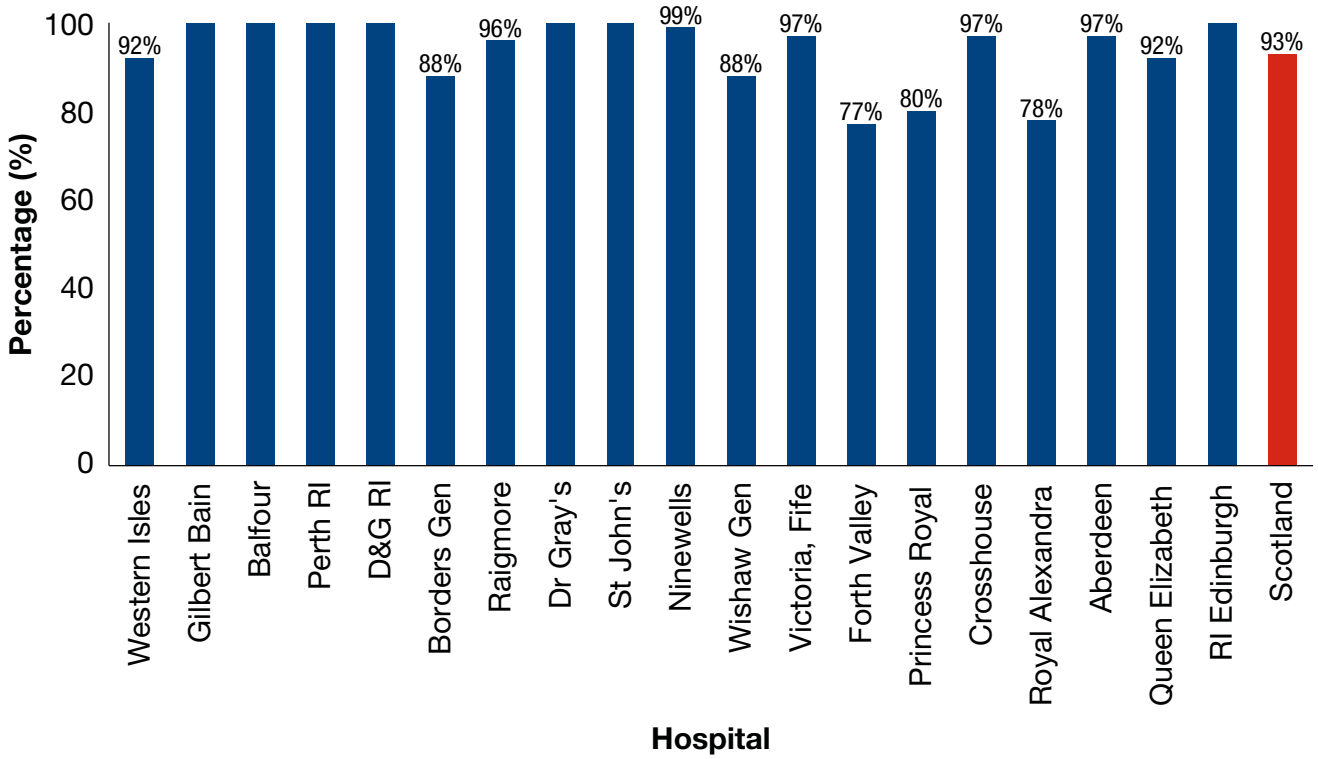
The record should be coded as 0 - Not admitted even if it is known that the baby was transferred to another hospital for neonatal care.

Gilbert Bain Hospital in NHS Shetland had 23 errors in the random sample of 25 records for the Neonatal Indicator variable. The hospital doesn't have a neonatal unit, yet 7 babies were recorded as having been admitted to the neonatal unit and 16 were coded 9 - Not known. This led to an assessed accuracy of just 8% for the variable.

Smoking History at Booking

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	10
Total Records assessed	1,090
Total errors	80
Percentage Accuracy	93%

Smoking History at Booking accuracy by hospital



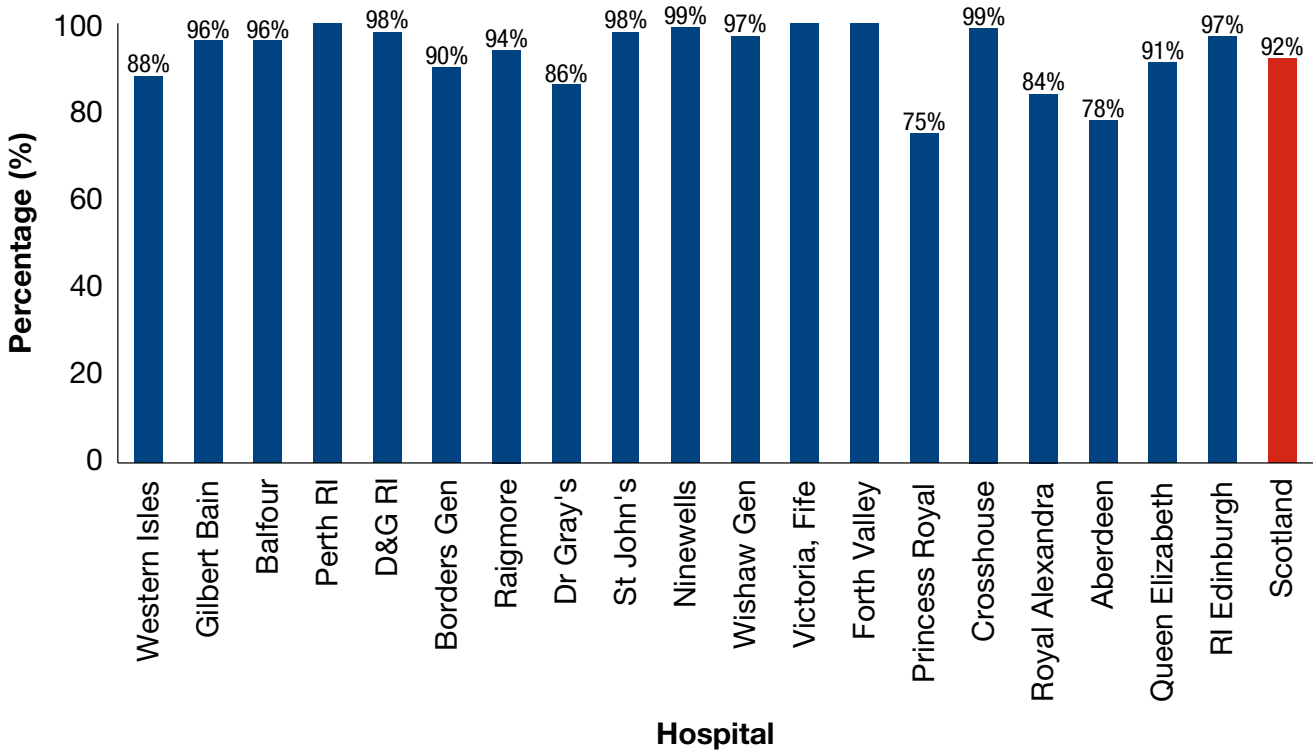
For Smoking History at Booking 80 errors were found in the 1,090 records assessed. 40 of these errors were due to the patient having been recorded as 0 - Never smoked, non-smoker when evidence in the medical records showed that they were either a current or former smoker.

A further 12 patients had been recorded as 0 - Never smoked, non-smoker when there was no evidence to justify that code and they should have been recorded as 9 - Not known instead. 12 other patients had been recorded as 9 - Not known when evidence of their smoking history was available. There was no specific pattern to the remaining 16 errors.

Booking Date

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	131
Total Records assessed	969
Total errors	82
Percentage Accuracy	92%

Booking Date accuracy by hospital



For Booking Date 131 records in the sample had conflicting or inconclusive evidence of the booking date. In the vast majority of these cases the date recorded in SWHMR conflicted with a date or dates recorded on electronic systems. As it was not possible to discern which date was accurate in these records, they were excluded from the assessment and final accuracy calculation.

A written local coding instruction in NHS Fife had led to inconsistent recording of this variable across medical records and therefore 53 booking dates were excluded from assessment for conflicting evidence. Therefore, even though the Victoria Hospital in Fife scored 100% accuracy in the 22 records which DQA auditors could assess, the accuracy score must be tempered by the fact that 71% of the records in their sample were non-assessable due to conflicting dates across the medical records. NHS Fife have been advised by DQA to record the variable in line with the ISD data definition and hopefully this will lead to less conflicting and contradictory information in future.

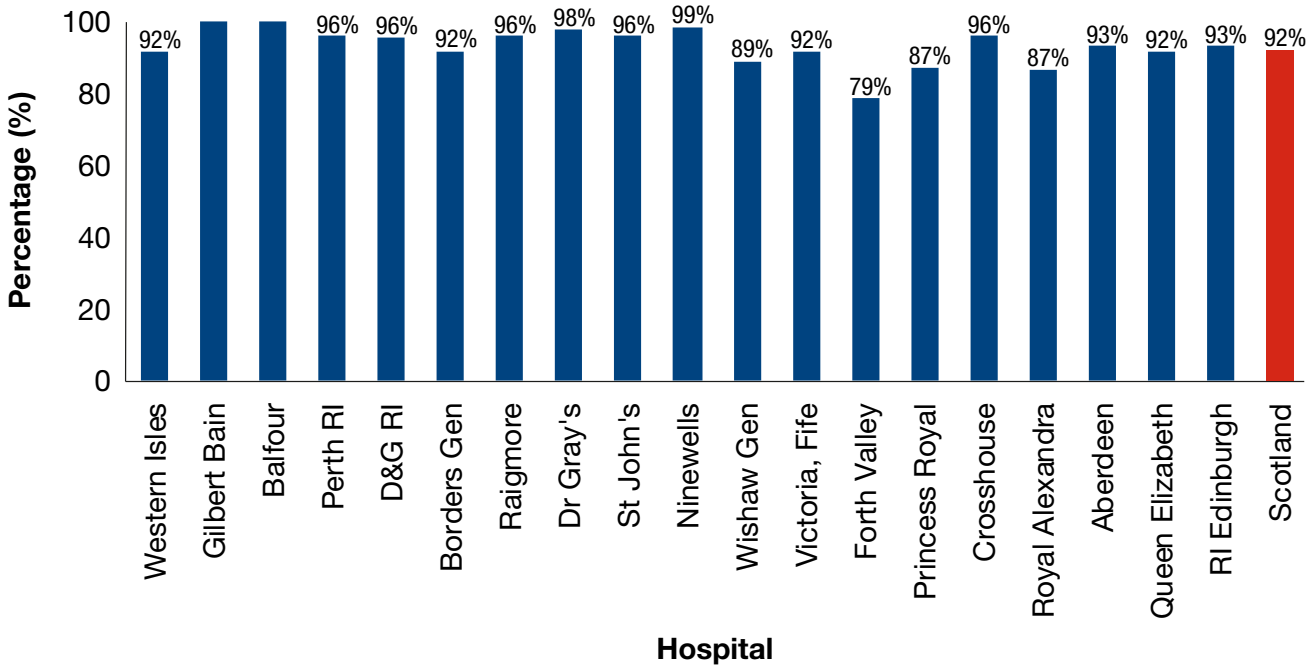
82 errors were found in the 969 records which could be assessed. In each of the 82 errors DQA auditors found evidence that the incorrect booking date had been recorded. The evidence for 42 errors was found in electronic systems and 31 in the SWHMR. Evidence for a further four incorrect booking dates was found in notes, letters and reports. There were five cases where a date had been entered but no evidence of the booking date could be found anywhere in the medical records.

This variable scored 67% data accuracy in the 2008/09 audit. So the increase in assessed accuracy should be commended. A clarification of the definition of the Booking Date variable had been made in the intervening years which may have contributed to this notable rise in accuracy. The improvement is also highly likely to be related to the introduction of the 2012/13 health improvement HEAT target to ensure that at least 80% of pregnant women were booked for antenatal care by the 12th week of gestation. This target has continued in the Local Delivery Plan (LDP) targets which replaced the HEAT targets in 2015/16.

Smoker During Pregnancy

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	15
Total Records assessed	1,085
Total errors	83
Percentage Accuracy	92%

Smoker During Pregnancy accuracy by hospital



For Smoker During Pregnancy 83 errors were found in the 1,085 assessed records. 55 errors occurred because the patient had been recorded as having not smoked during the pregnancy when evidence showed that 41 of these patients had smoked at some stage during the pregnancy and the remaining 14 had no evidence in their medical records to say that they had not smoked.

11 errors occurred because the patients had been recorded as having smoked during the pregnancy when evidence showed that 10 of them had not smoked and one had no evidence on their records to prove that they had or had not.

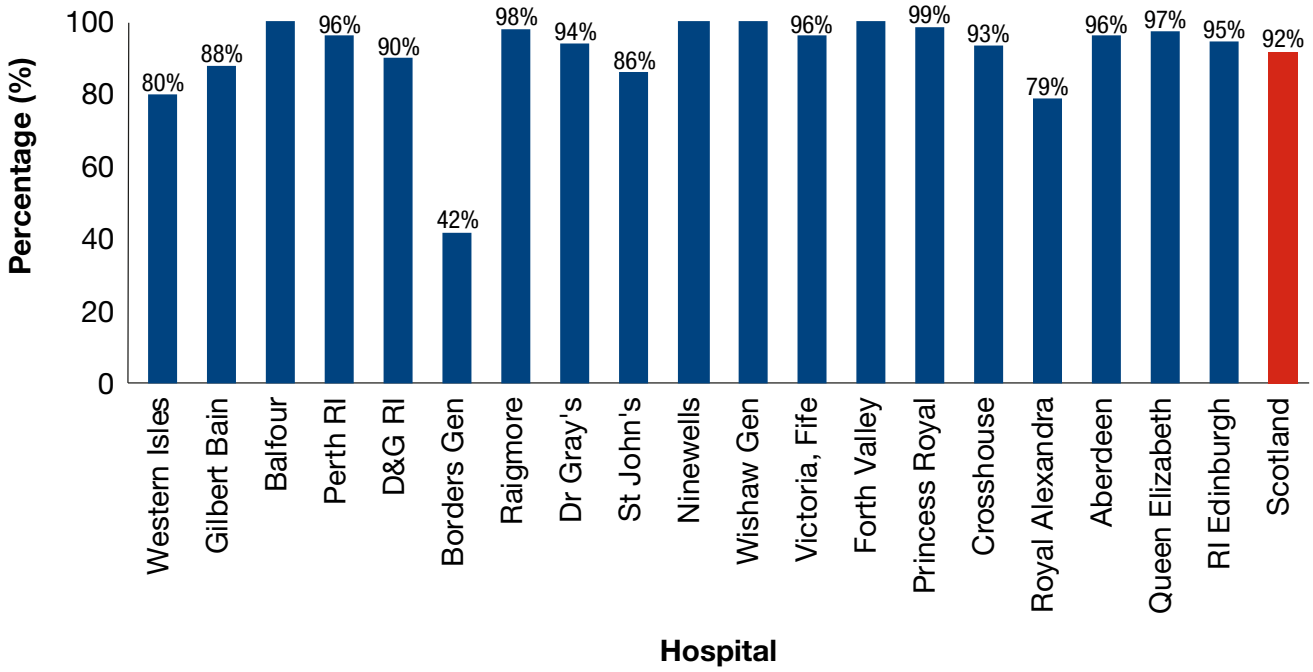
15 errors occurred because the patients had been recorded as code 9 - Not Known when evidence showed that 13 of these patients had not smoked during their pregnancy and the other two had smoked during their pregnancy.

Evidence for 66 of the total 83 errors were found in either the SWHMR or the electronic maternity systems. The remaining 17 errors were found across a variety of other sources readily available in the patient's medical records.

First Feed Given

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	2
Total Records assessed	1,098
Total errors	90
Percentage Accuracy	92%

First Feed Given accuracy by hospital



The figures for this variable look remarkably similar to those for the variable Feed on Discharge. Both data items achieved 92% accuracy and while Feed on Discharge had 89 total errors First Feed Given had 90. However, only 18 patients had errors in both of these variables. 72 of the patients with an error in First Feed Given had their Feed on Discharge correctly recorded.

59 of these errors in First Feed Given were due to patients being recorded as 9 - Not known when evidence showed that they should have been coded as either 1 - Breast only, 2 - Formula only or 3 - Mixed. The other 41 errors had no particular pattern.

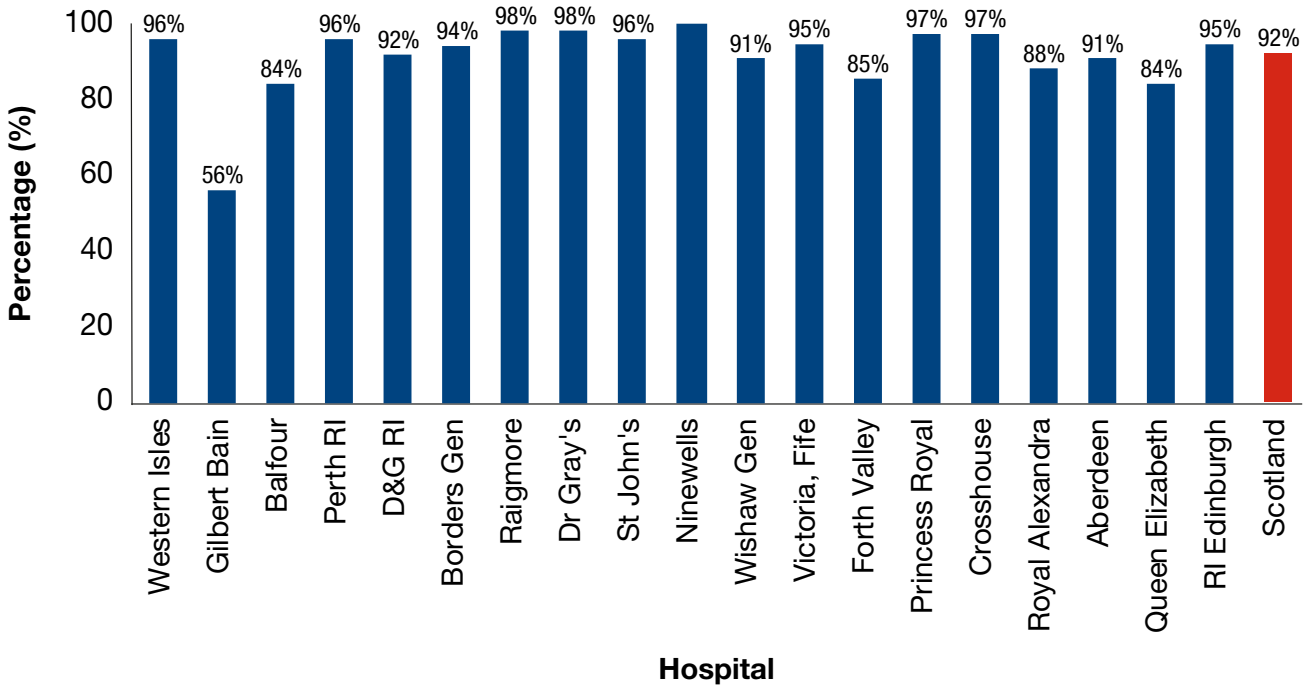
Evidence for 38 errors was found in the electronic Patient Administration or Maternity Systems. Evidence for a further 34 errors was found in the Labour and Birth Record.

Borders General Hospital recorded the variable with just 42% accuracy, this was because they had 29 records from a sample of 50 where the variable was incorrectly coded as 9 - Not known when evidence of the babies being breast fed or formula fed for the First Feed Given was available in the patient's medical records.

Feed on Discharge Babies 1 to 3

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	2
Total Records assessed	1,098
Total errors	89
Percentage Accuracy	92%

Feed on Discharge Babies 1 to 3 accuracy by hospital



For Feed on Discharge Babies 1 to 3 89 Errors were found in 1,098 records. 47 of these errors were due to the patient being coded as 1 - Breast Only when evidence showed that either 4 - Mixed or 2 - Formula only should have been recorded in 44 of the cases and the other three were 9 - Not known.

17 errors were incorrectly recorded as 9 - Not known when evidence of the specific feeding method on discharge was available in the medical records.

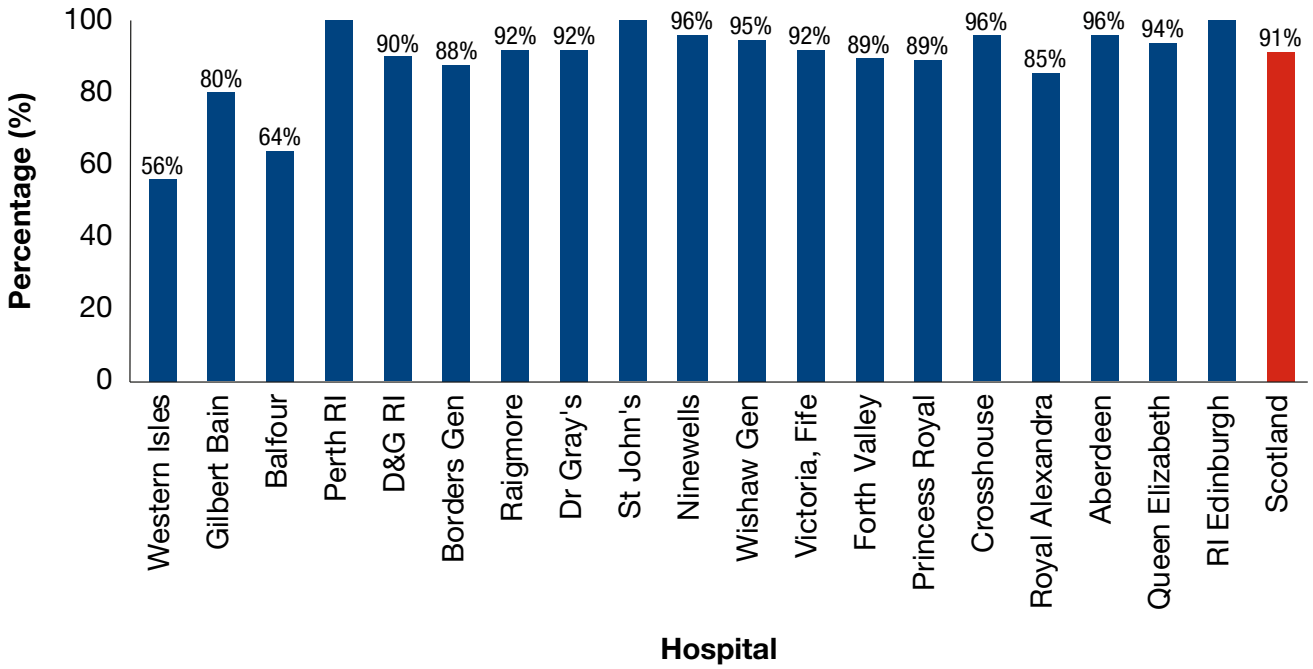
The remaining 25 errors had no significant pattern. Evidence for 52 of the 89 errors was found on electronic maternity and patient administration systems.

Gilbert Bain Hospital was assessed as 56% accurate in the recording of this variable. In their sample of 25 records there were 11 errors. Nine of these were incorrectly recorded as code 1 - Breast only when DQA found evidence for formula feeding or mixed feeding on discharge.

Weight of Mother at Booking

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	63
Total Records assessed	1,037
Total errors	89
Percentage Accuracy	91%

Weight of Mother at Booking accuracy by hospital



For Weight of Mother at Booking there were 63 records with conflicting evidence entered into the SWHMR and electronic systems. These records were excluded from the final accuracy calculation.

89 errors were found in the remaining 1,037 records. Ten of these errors occurred because code 999 - Not known had been recorded when a specific weight was identified in the medical record. 61 errors were due to the weight not being correctly rounded up. National guidance states -

> ***"Weight held in the case notes as kilograms and grams should be rounded to the nearest kilo, not truncated."***

Evidence for 58 of the errors was found in SWHMR and a further 21 were found in the electronic Patient Administration System (PAS) or maternity systems. Evidence for the remaining ten errors was found in a variety of other sources in the medical records.

Western Isles and Balfour Hospitals were assessed with just 56% and 64% accuracy respectively for this variable. 25 records were assessed at each hospital and Wester Isles had 11 errors while Balfour had nine. All the errors were due to the Weight of Mother at Booking having been truncated instead of rounded up to the nearest kilo.

Drugs variables

Three drugs variable were assessed in this audit:

- Drugs Misuse during This Pregnancy
- Drugs Used
- Ever injected illicit drugs

These variables were assessed in the 2008/09 DQA audit and found to be recorded inconsistently and with poor accuracy. Following that audit, these data items became mandatory fields in SMR02 and as a result, data accuracy has improved markedly. All three variables scored 88% data accuracy and the errors found followed a pattern. Of the 133 patients who had an error in the Drugs Misuse variable, all but one had a corresponding error in the Drugs Used field and 120 had a corresponding error in the Ever Injected Illicit Drugs field.

Most errors in the three drugs variables were found at the Royal Alexandra and Queen Elizabeth Hospitals in Glasgow. 75 records were assessed at both hospitals. At the Queen Elizabeth Hospital DQA auditors found that codes for no drug use were being used when there was no evidence recorded anywhere on the patient's records to support the codes. The pattern of errors at Queen Elizabeth were as follows:

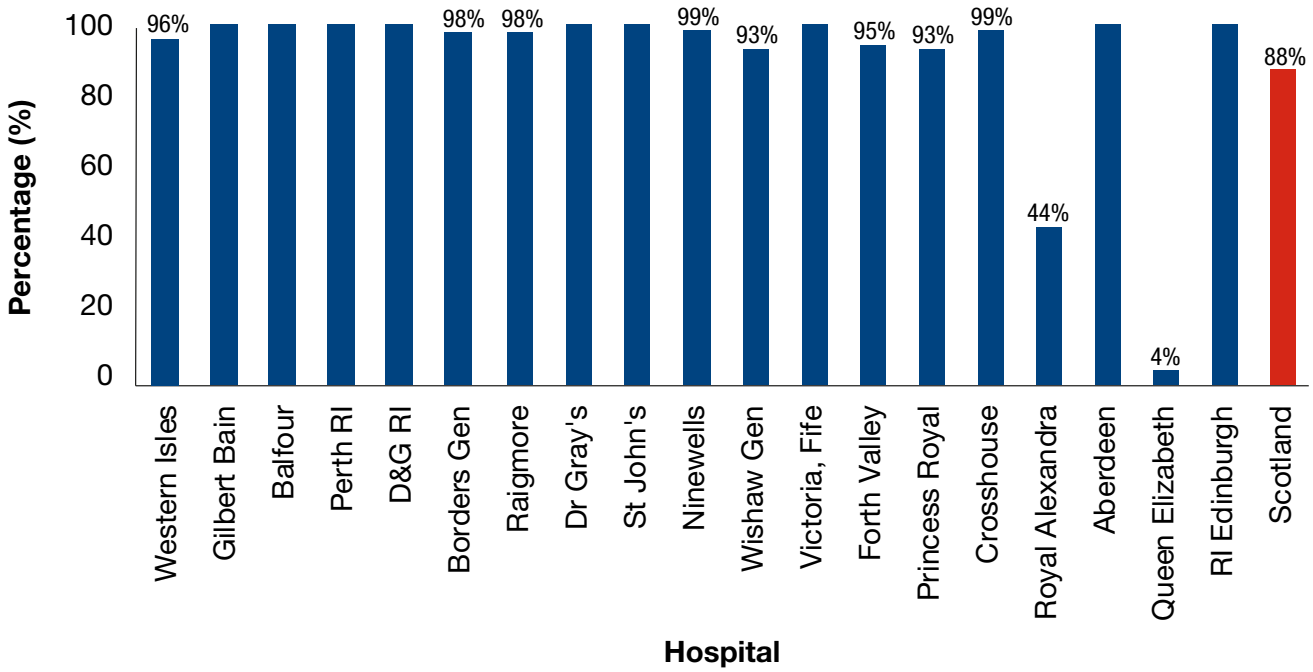
- Drugs Misuse during this pregnancy - 72 errors for unsupported recording of 0 - No, should have been coded 9 - Not known
- Drugs used - 71 errors for unsupported recording of 00 - None, should have been coded 99 - Not known
- Ever injected illicit drugs – 72 errors for unsupported recording of 0 - No, should have been coded 9 - Not known

At the Royal Alexandra hospital, many errors were assigned for the same issue of unsupported coding of no drugs use. However, at the Royal Alexandra there were also many records recorded as 9 or 99 (Not known) where DQA found evidence on systems that the patient had no drugs use. There was also a small number of records where drugs use was evidenced in the patients records but had been coded as No or Not known.

Drugs Misuse During This Pregnancy

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	1
Total Records assessed	1,099
Total errors	133
Percentage Accuracy	88%

Drugs Misuse During this Pregnancy accuracy by hospital



For Drugs Misuse During This Pregnancy there were 133 errors found in the 1,099 records assessed. 104 of these had been incorrectly recorded as code 0 - No when they should have been coded as 9 - Not known because there was no evidence anywhere in the medical record to prove or disprove that drugs had been misused during the pregnancy. A further four had been incorrectly recorded as 0 - No when evidence showed that drugs had been used and the patient should have been recorded as 1 - Yes. The remaining 25 errors had been incorrectly recorded as 9 - Not known when evidence showed that no drugs had been misused and the patient's should have instead been recorded as 0 - No.

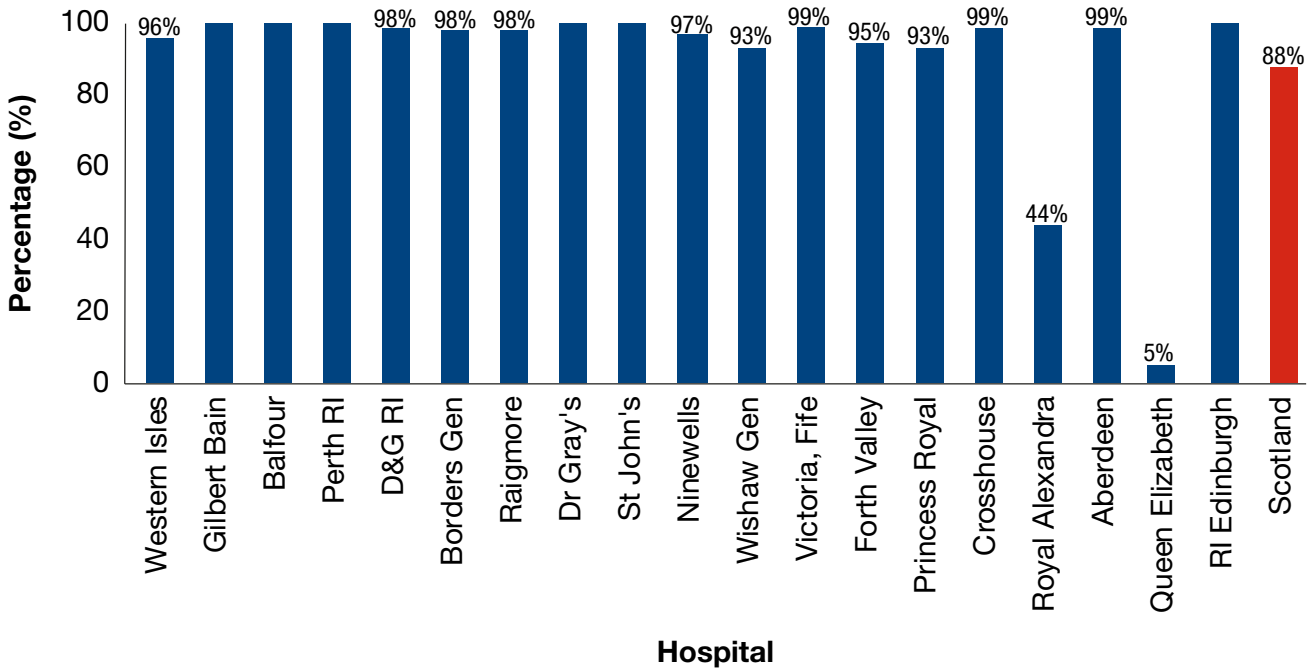
Evidence for 45 of these errors was found in electronic PAS and maternity systems.

Although the data item fell below the recommended minimum accuracy of 90%, it was assessed in 2008/09 with only 33% accuracy. Therefore, the increase in data quality for this variable between the two audits is notable.

Drugs Used

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	1
Total Records assessed	1,099
Total errors	139
Percentage Accuracy	88%

Drugs Used accuracy by hospital



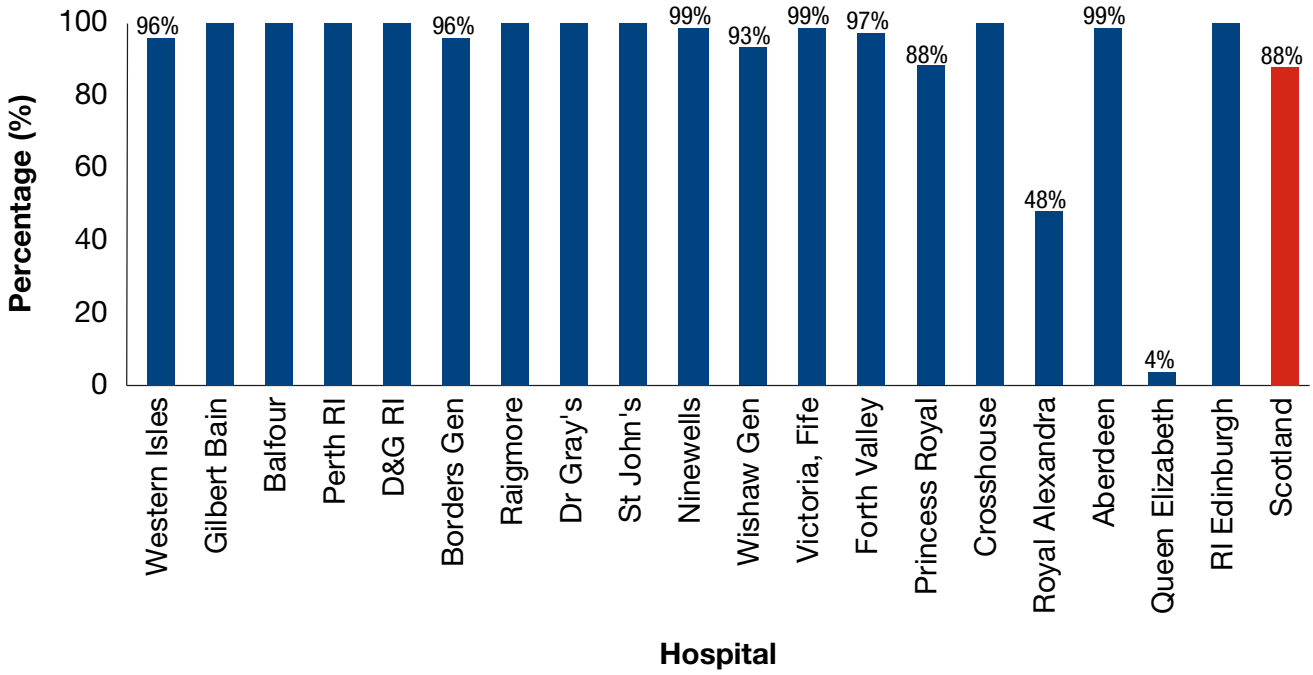
For Drugs Used there were 139 errors found in the 1,099 records assessed. The record with conflicting evidence was the same record which was non-assessable in Drugs Misuse during this Pregnancy. As with that variable, the recording of Drugs Used became mandatory following the DQA audit of 2008/09 and has increased significantly in data accuracy from 25% in 2008/09 to 88% in 2017/18.

139 errors were noted across 136 individual patient records. The accuracy results for this variable match closely to that of Drugs Misuse during this Pregnancy. 132 of the patients had corresponding errors in both variables. 103 of the errors were assigned because the patients had been coded as 00 - None when the medical record showed that they should have been coded as 99 - Not known. 24 errors were due to patients being coded as 99 - Not known when their medical records evidenced they had not used drugs and therefore should have been coded as 00 - None. The other 12 errors were due to patients who had used drugs being incorrectly coded.

Ever Injected Illicit Drugs

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	0
Total Records assessed	1,100
Total errors	133
Percentage Accuracy	88%

Ever Injected Illicit Drugs accuracy by hospital

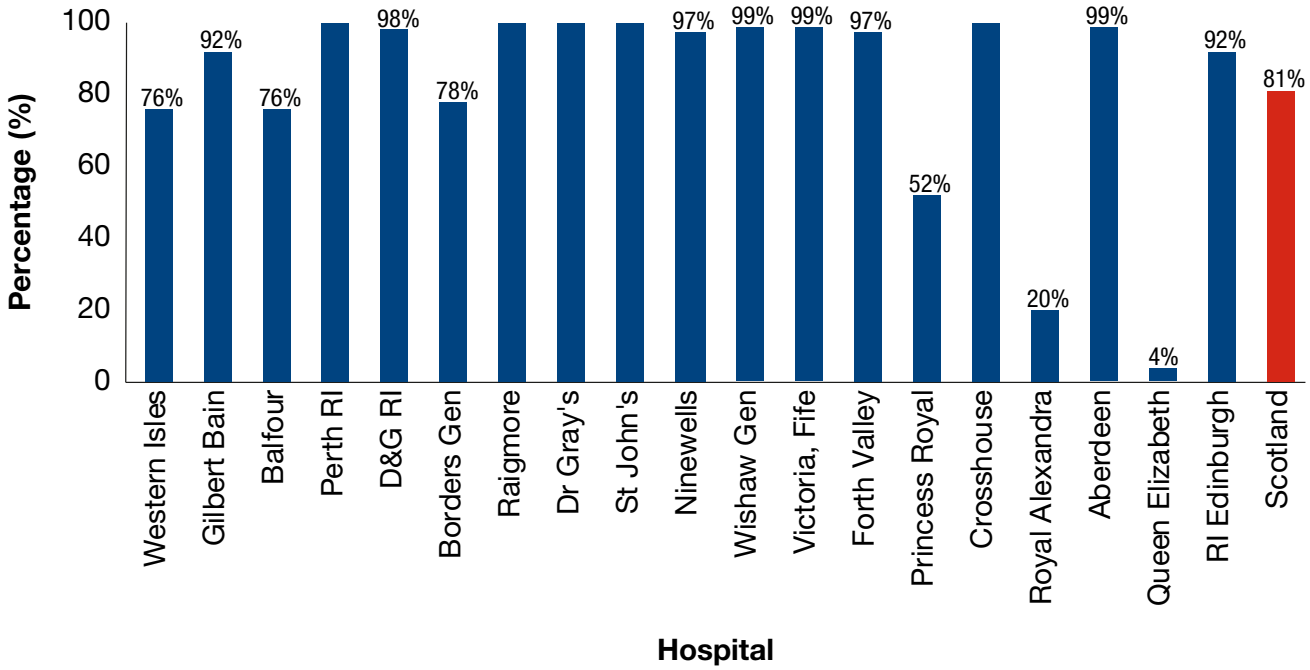


A similar picture was found for Ever Injected Illicit Drugs where there were 133 discrepancies and 120 of these had a corresponding error in Drugs Misuse while 119 had a corresponding error in Drugs Used.

Presentation at Delivery

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	0
Total Records assessed	1,100
Total errors	211
Percentage Accuracy	81%

Presentation at Delivery accuracy by hospital

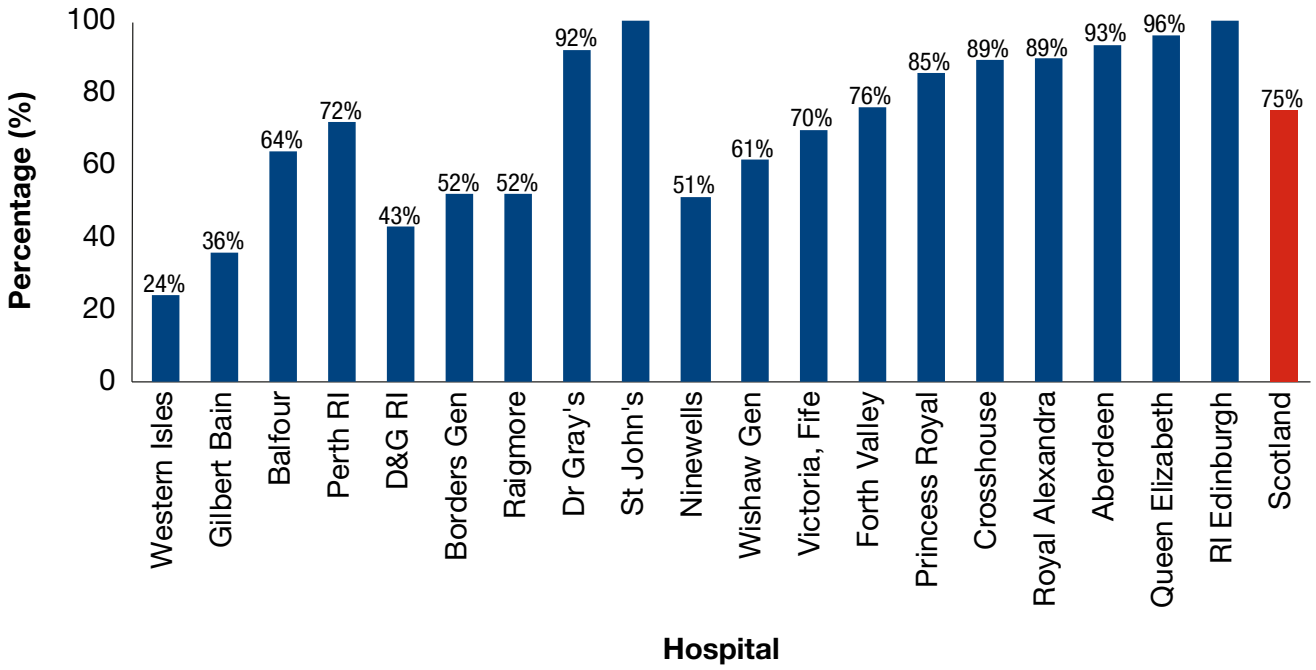


There were 211 errors for Presentation at Delivery. Of these, 177 were incorrectly recorded as code 1 - Occipito-Anterior, 159 of these errors were found at hospitals in Greater Glasgow & Clyde where DQA auditors were advised that a default code of 1 - Occipito-Anterior (OA) had been used and that coding staff at the hospitals did not have the option to specify a different code for this data item. Since the audit, all the maternity sites within NHS GG&C have changed to the BadgerNet Maternity system and this problem is no longer an issue with staff now able to select all applicable codes. There was no particular pattern to the other 34 errors.

Ethnic Group

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	7
Total Records assessed	1,093
Total errors	271
Percentage Accuracy	75%

Ethnic Group accuracy by hospital



DQA were asked to audit Ethnic Group as it is achieved just 11% accuracy in the 2008/09 audit. The current definition of the data item states -

> ***"Ethnic group classifies the person according to their own perceived ethnic group and cultural background."***

As this data item is based on the patient's own perception of their ethnicity, it makes this variable difficult to audit given that DQA auditors could not question the actual patients as to how they perceived their own cultural background. Therefore, the data item had to be audited on the basis of the information available on the patient's medical records. If the value submitted in the SMR02 was contradicted by evidence on the patient's medical record, then an error was assigned.

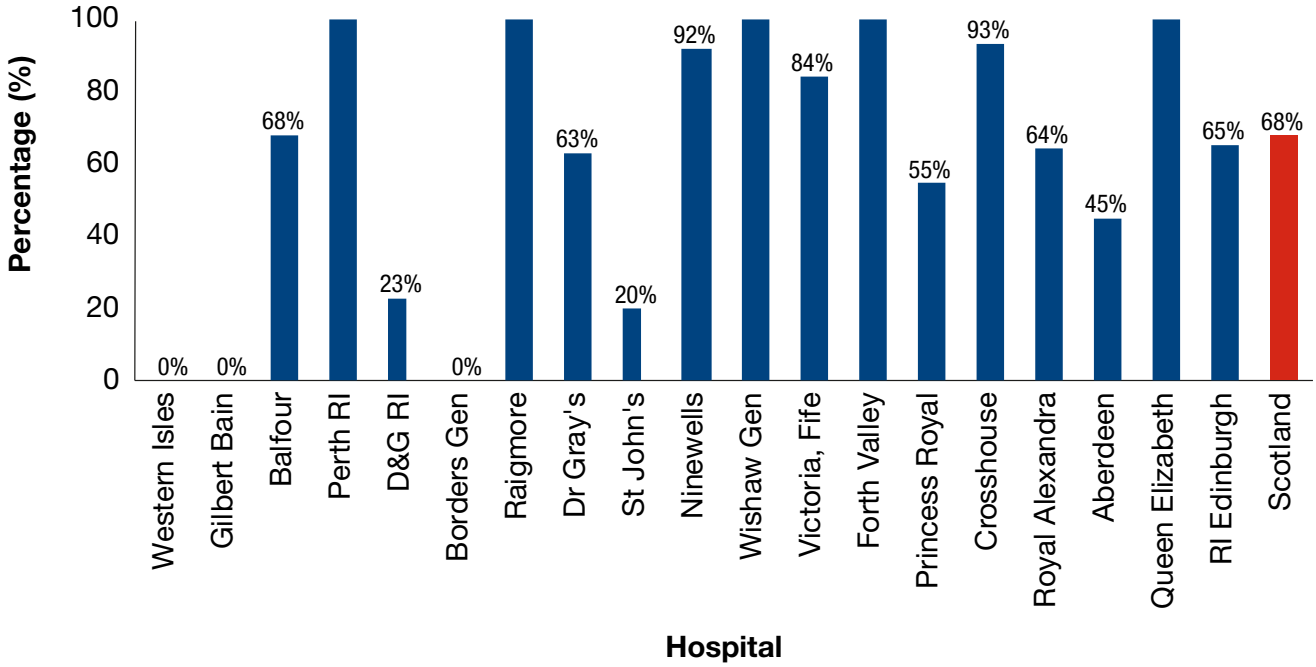
There were 271 errors for Ethnic Group. 143 of these were recorded as code 99 - Not known but DQA auditors found evidence of the patient's Ethnic Group in either the SWHMR or medical records. 85 were incorrectly recorded as code 1A - White Scottish. Of these, 73 should have been recorded as code 1B - White British. A further 17 cases were recorded as code 1B - White British, 16 of which should have been 1A - White Scottish. 13 patient's refused to provide details of their ethnicity and there were 13 other errors with no particular pattern. The options for ethnicity in the SWHMR does not include a tick box for "White Scottish", there is only an option for "White British". DQA auditors found that in cases where the patient was Scottish the White British

box was ticked and the word “British” had been scored out by the midwife and replaced with a handwritten note saying “Scottish”.

Transfer of Responsibility: Midwife to Consultant

Accuracy Summary	
Total Records in sample	1,100
conflicting / inconclusive evidence	12
Total Records assessed	1,082
Total errors	348
Percentage Accuracy	68%

Transfer of Responsibility: Midwife to Consultant accuracy by hospital



This variable achieved the lowest accuracy score in the audit with three hospital scoring 0% accuracy and eight scoring under 70%. For Transfer of Responsibility: Midwife to Consultant there were 348 errors identified. 338 of these patients were admitted straight into an obstetrics ward under the care of a consultant. Therefore, a transfer of responsibility from the midwife to a consultant would be impossible and all these cases should all have been coded 8 - Not applicable for this variable. DQA auditors found that 168 were coded as 0 - No transfer - midwife retains responsibility throughout the delivery, 116 were recorded as code 1 - midwife to consultant transfer in labour/delivery, three cases were recorded as code 2 - midwife to consultant transfer after delivery and 51 had been recorded as code 9 - Not known.

In 2016 ISD issued guidance to all NHS Boards stating -

> ***"This field is used to capture the cases when a mother is transferred from midwifery care to a consultant and should be completed when the HCP Responsible for Care and Specialty are both attributed to a midwife. This transfer can only happen from an Alongside Midwifery Unit (AMU) or Freestanding Midwifery Unit (FMU)".***

- **Alongside midwifery unit (AMU):** an NHS clinical location offering care to women with straightforward pregnancies during labour and birth in which midwives take primary professional responsibility for care. During labour and birth diagnostic and treatment medical services, including obstetric, neonatal and anaesthetic care are available, should they be needed, in the same building, or in a separate building on the same site. Transfer will normally be by trolley, bed or wheelchair.
- **Freestanding midwifery unit (FMU):** an NHS clinical location offering care to women with straightforward pregnancies during labour and birth in which midwives take primary professional responsibility for care. General Practitioners may also be involved in care. During labour and birth diagnostic and treatment medical services including obstetric, neonatal and anaesthetic care, are not immediately available but are located on a separate site should they be needed. Transfer will normally involve car or ambulance."

At the time of the assessment midwife led units were located as follows:

AMUs

- Crosshouse Hospital,
- Victoria Hospital Kirkcaldy
- Aberdeen Maternity Hospital
- Royal Alexandra Hospital
- Raigmore Hospital
- Lothian Birth Centre, Royal Infirmary of Edinburgh

FMUs

- Peterhead
- Caithness
- Perth
- Dundee
- Montrose

4. Additional Issues Identified

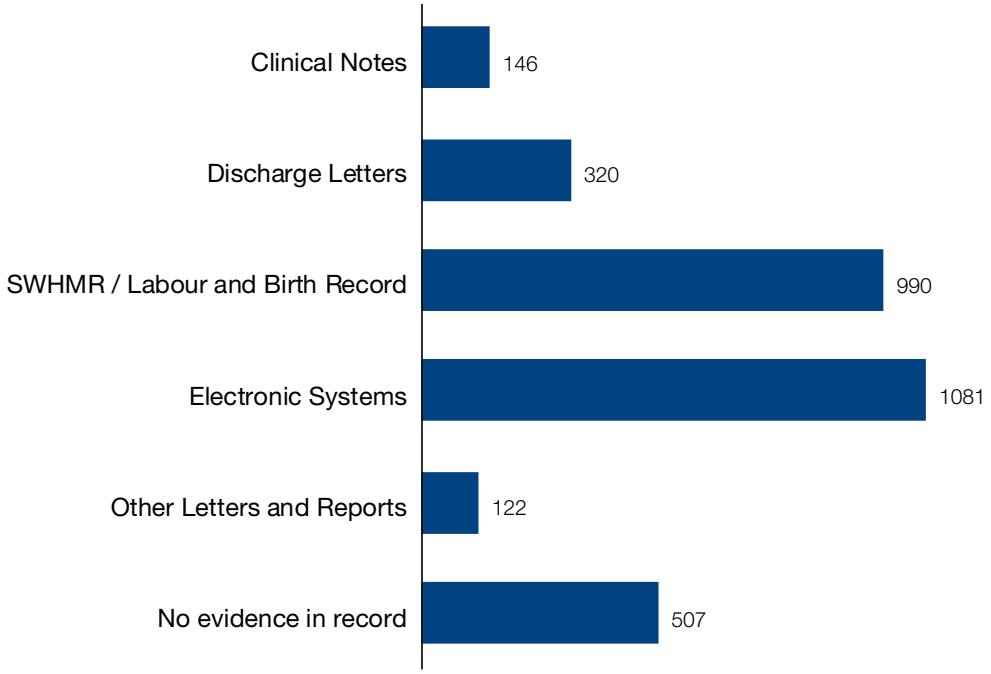
4.1 Use of SWHMR

The Scottish Woman Held Maternity Record (SWHMR) was used, at the time of assessment, in several hospitals and was completed by the midwifery staff responsible throughout the woman's pregnancy and labour. If a paper SWHMR was used, then in addition to the original held by the mother either a scanned copy or photocopy were kept on file at the hospital. Many hospitals had implemented the Maternity Systems BadgerNet Maternity or Trak Maternity which included an electronic version of SWHMR. Boards with electronic SWHMR had much less contradictory or conflicting information in the patient's medical record.

4.2 Source Documents

When DQA identify an error, the main source document containing the key evidence is recorded. Figure 6 below illustrates the number of errors by source document grouping.

Figure 6: Source documents used for all errors



There were 3,166 data item errors in total. For 1,081 errors (34%) the evidence was found in electronic maternity and patient administration systems, 990 (31%) were found in the SWHMR/ Labour and birth record, 146 were found in clinical notes, 122 were found in other letters and for 320 errors the evidence was found in Discharge Letters: 106 in FDLs and 214 in IDLs. For 507 errors, no evidence was found in the record.

4.3 Additional Factors and Local Practices

Coding resources

NHS Boards should ensure that coding departments are adequately resourced. DQA found that many SMR02 coding staff perform their duties in addition to a different primary role. Seeking to make efficiencies through reduced staff in coding departments blurs roles and responsibilities and risks deteriorating accuracy. Inaccurate, missing or poor information can result in poor policy development and decision making for healthcare improvement purposes.

Systems

At the time of the audit all participating hospitals recorded data in the patient-held SWHMR. If the hospital used a paper version of SWHMR then a scanned or photocopied copy was also kept on the patients file held by maternity services and the details were keyed into the patient administration systems by the midwives. The ICD-10 codes for diagnostic information are then added by clinical coding staff.

At some NHS boards coding staff were solely using information taken from electronic systems and not interrogating the paper records completed by the midwives for each patient. These case notes often provided important information which was then incorrectly omitted from the SMR02 record. Coding staff should interrogate all available information on the patient's medical record including paper and electronic sources.

Some NHS Boards reported technical issues with the electronic patient administration and maternity systems which impacted data quality. Some systems were set up in ways that made recording incompatible with SMR02 coding rules. Some systems used default codes which could not be changed, had drop-down lists with insufficient options or produced incorrect codes when linking to the national SMR02 database. NHS Lothian suffered particularly with these issues due to the configuration of their TrakCare System.

Some boards employed two or three different systems which were meant to interface with each other, However information sometimes wasn't transferring/ populating between the systems and this resulted in coders receiving incorrect or incomplete information.

Aberdeen Maternity Hospital reported issues with BadgerNet Maternity and the quality of data that had been recorded following an update to the system. For some data items, such as smoking fields, BadgerNet Maternity started defaulting to code 0 - No, where they had been left blank by the midwives. The coders have subsequently returned to coding from the case notes instead to make ensure that they get the correct information regarding smoking.

Issues caused where electronic patient administration and maternity systems have been set up, structured and linked incorrectly contributed to a large number of the errors found in the audit. It is however important to say that these issues did occur at a minority of NHS Boards and that no one particular system problem could be viewed as widespread across Scotland.

System issues which impacted data accuracy have been highlighted to affected NHS Boards in their individual audit reports and post audit meetings with DQA. It is expected that NHS Boards affected will address the highlighted technical issues with their system suppliers.

Local Practices

Some areas have local coding rules which have not been aligned to national standards. Any data items which were not coded to national standards were marked in error regardless of what local instructions had been given to coding staff. Any instances where local rules led to inaccurate recording were highlighted to NHS Boards in their hospital level audit reports and were discussed in detail during post audit meetings between the NHS Boards and DQA auditors. Any NHS Boards seeking to implement new local practices should check them for compliance to national SMR02 recording rules which can be found in the Data Dictionary.

NHS Ayrshire & Arran have a question on their system "**Does patient have diabetes during this pregnancy?**". Information from this field is used to code the presence of the condition in SMR02 and the field is completed by nursing staff. A local rule asserts that if this field is left blank then clinical coders should treat this as a statement that the patient does not have diabetes. However, leaving the field blank makes it impossible to ascertain if the condition is actually not present, if the field has been unintentionally overlooked or if the patient's status is simply unknown. Therefore, this field should be completed as DQA auditors required a clear statement to evidence that the patient was not diabetic to back up the corresponding code. Patients who were coded as not having diabetes on the basis of a blank field were marked in error.

In 2011, Fife coding staff were issued written instructions on recording the Booking Date variable which were not aligned to the ISD data definition. DQA subsequently found conflicting evidence between the booking dates in the paper SWHMR and the electronic patient administration system 'Oasis' but were unable to ascertain which dates were correct from the evidence available. This happened in 53 of the 75 records in the random sample and these were excluded from accuracy calculations. Following the audit, NHS Fife were advised to always record the variable in line with national recording standards. NHS Fife has also now moved to the BadgerNet Maternity system which includes an electronic version of SWHMR which means the booking date should now only be entered once directly into the BadgerNet Maternity system and contradictory records should cease to be an issue.

Within NHS Greater Glasgow and Clyde, the administering of Anti-D is conducted in an outpatient setting and coders do not look for SMR00 information as a matter of local coding practice. This has led to under-recording of Anti-D in delivery episodes.

NHS Lothian are currently recording E66.9 Obesity, unspecified when a mother has a high BMI and when she has been referred to Endocrinology. Whilst National Guidance currently states BMI measurements shouldn't be used to record Obesity and a clinical statement is therefore required, the staff at NHS Lothian feel that a clinical statement is never used by the midwife therefore this would be highly under-coded. It was agreed that this issue will be discussed internally by NHS Lothian.

NHS Tayside has implemented an antenatal maternal obesity service called "optiMUM". As part of this service patients are referred to the antenatal maternal obesity service and given an optimum clinic booklet, their Body Mass Index (BMI) is plotted on an obesity chart at the back of this booklet. Any BMI readings within the red section of this chart are clearly labelled as Obesity (BMI >30) and coders are subsequently recording E66.9 Obesity, unspecified. Whilst National Guidance currently states BMI measurements alone should not be used to record Obesity, it was agreed that given the readings are accompanied by a clear label stating Obesity in the patient

identifiable clinic booklet, it was considered sufficient evidence for coders to record the condition. It is recommended that this local coding convention is documented in NHS Tayside's local policy.

In some NHS Boards, Ethnic Group is collected at registration and populated in the Patient Administration System (PAS). Coders then only check the ethnicity of a patient if there is no code in the PAS system. If further checks had been made on ethnicity against the medical record before submission of SMR02 then the vast majority of noted errors in this variable could have been corrected. Although it is recognised that ethnic group depends on how the patient identifies 53% of the total 271 errors for this data item were due to the coding of 99 - Not known when DQA auditors found evidence of the patient's Ethnic Group readily available in their medical records.

Conclusions

Coding accuracy for Main Condition and Other Conditions was low at 72% and 71% respectively. This falls well below the ISD recommended standard of 90% accuracy. Only two participating hospitals reached the recommended standard for Main condition, these were Victoria Hospital in Fife which achieved 95% accuracy and the Royal Infirmary of Edinburgh which achieved 92%. No Hospital achieved the recommended standard for Other Condition.

183 major errors in Main Condition (59% of total major errors for the variable) were due to the overuse of O80-O84 delivery codes which had been recorded incorrectly when a more specific condition should have been recorded instead. If these errors had been avoided national data accuracy for Main Condition would have improved from 72% to 89%.

In Other Conditions 446 major errors (80% of total major errors for the variable) were due to conditions being under-recorded. The most notable under-recording occurred due to the omission of 160 z-codes for Group B strep and Anti-d.109 Anaemia codes had also been omitted.

Any hospital not reaching at least 80% accuracy in the clinical coding of Main Condition or Other Conditions is advised to take urgent action to improve the quality of coding of these clinically classified variables.

Indication for Operative Delivery did surpass the recommended standard at a national level with 92% accuracy. 15 of the 19 participating hospitals reached the standard for the variable.

Coding of hard-coded variables was at a generally high standard. 15 of the 21 assessed data items were recorded with an accuracy of over 90%. Many had improved considerably since their last assessment in 2008/09.

The three drugs variables: Drugs Misuse During this Pregnancy, Drugs Used and Ever Injected Illicit Drugs were each recorded with 88% accuracy which fell just below the ISD recommended minimum standard of 90%. However, this was a marked improvement of on the last assessment where these variable scored 33%, 25% and 29% respectively. This improvement is mainly due to the data items becoming mandatory in the time between the two audits.

The three hard-coded SMR02 variables recorded with the lowest accuracy were Presentation at Delivery (81%), Ethnic group (75%) and Transfer of Responsibility Midwife to Consultant (68%).

Accuracy in Presentation of delivery should improve now that NHS Greater Glasgow & Clyde have moved to TrakCare Maternity and stopped using their old systems which forced coders into record default values for this variable which could not be amended.

The accuracy of Ethnic group would benefit immensely if coders double checked the information which had been entered on admission against other information sources in the patient's records. There were a high number of records where the Ethnic Group was recorded as 99 - Not known when the patient's Ethnic Group was clearly recorded in the medical record.

Transfer of responsibility Midwife to Consultant can only occur when a patient has been transferred from a midwife led unit to an obstetrics unit. 338 of the 348 total major errors in the recording of the variable occurred because the patient had been admitted to an obstetrics led unit and had an

incorrect code which either intimated that a transfer of responsibility might have been possible or had actually taken place. When a patient is admitted straight into an obstetrics led ward then the consultant is automatically responsible for the patient and a transfer of responsibility from the midwife to the consultant is not possible. The attached ISD coding clarification in Appendix D should be noted and followed to improve data accuracy.

On the basis of their local DQA audit reports some NHS Boards have implemented action plans to address the issues raised. ISD's DQA team will be in ongoing contact with NHS Boards to offer assistance and spread best practice.

ISD Terminology Services and the DQA Team will work closely with relevant NHS Boards to ensure that national coding standards are adhered to. NHS Boards should cease using local coding rules not aligned to national standards as they can lead to skewing of data with dramatic results in some areas. If NHS Boards are unclear on the validity or suitability of their local SMR02 coding rules they should contact ISD for clarification or consult the Data Dictionary.

The ISD DQA team found that some NHS Boards do not have dedicated coding staff and employ staff where coding is only part of their daily duties e.g. the maternity administration team or medical secretaries. It is important that SMR02 coding staff have sufficient training, time and resources to effectively record all of the required and relevant information. ISD Terminology Services offer a long-established free SMR02 bespoke training course and an expert-led helpline to support NHS Boards. They can be reached by telephone 0131 275 7283, Tue to Thurs, 9am - 5pm or email NSS.terminologyhelp@nhs.net.

All audit findings were raised and discussed with hospital staff at the end of each hospital visit and individual hospital reports containing a full set of DQA recommendations were issued to each site. DQA will monitor progress in meeting recommendations in individual Board reports through ongoing engagement and future audit projects.

Recommendations

Issue	Action
Clinical coding staff conforming to local coding rules.	All NHS Boards should ensure that new information collection processes comply with national standards and coding conventions.
There were 309 major errors in Main Condition.	Coders should only code the delivery event in Main Condition if there are no more specific conditions to record. Obstetric conditions are classified in Chapter XV of ICD-10, Pregnancy, Childbirth and the Puerperium (O00-O99). These codes should be used in Main Condition. O80-O84 delivery codes must only be used in Main Condition if no other condition classifiable to Chapter XV of ICD-10 is recorded.
There were 560 major errors in Other Conditions, including 446 co-morbidities that were under recorded.	Staff should ensure they are recording all co-morbidities that either co-exist or develop during the episode of healthcare, and affect the management of the patient.
There were 85 major errors in Indication for Operative Delivery.	In Indication for Operative Delivery the reason primarily responsible for the patient's need for an assisted delivery should be recorded. the Indication for Operative Delivery code should only be repeated in Main Condition when there are no other complications (see SCCS 9, March 2015).
All NHS Boards should apply appropriate resources to SMR02 coding. Some NHS Boards employ staff where clinical coding is only an adjunct to other daily duties. Also, despite the availability of free SMR02 training and support offered by ISD some coders advised that they had never had attended training in SMR02 coding and were unaware of national rules and guidelines.	NHS Boards should ensure that all SMR02 coding staff receive appropriate training to enable them to code data with accuracy and compliance. ISD Terminology Services offer free coding training sessions and operate a coding helpdesk function. They can be contacted for assistance by telephone - 0131 275 7283 (Tue-Thurs 9am-5pm) or email NSS.terminologyhelp@nhs.net NHS Boards should also ensure that coding departments are adequately resourced. DQA found that many coding staff perform their duties in addition to a different primary role. Seeking to make efficiencies through reduced staff in coding departments blurs roles and responsibilities and risks deteriorating accuracy. Inaccurate, missing or poor information can result in poor policy development and decision making for healthcare improvement purposes.
During this audit clinical coding staff at some NHS Boards reported that they find some current SMR02 clinical coding guidelines to be ambiguous or open to interpretation.	It is recommended that ISD revise and reissue guidance to provide greater clarity on some aspects of SMR02 clinical coding.
There were 2,142 errors in total for hard-coded data items. This included 348 errors for Transfer of Responsibility Midwife to Consultant, 408 errors for the three drugs fields: Drugs Misuse During this Pregnancy, Drugs Used and Ever Injected Illicit Drug, 271 for Ethnic Group and 207 for Presentation at Delivery.	Staff responsible for inputting these data items should be made aware of the importance of accurate selection of this data item. Coding staff are also reminded that they should amend any inaccuracies that they identify in any SMR02 variables which are commonly entered by other staff on admission or during the stay.

Transfer of Responsibility Midwife to Consultant was the variable which was assessed to have the lowest accuracy (68%). This was mainly due the wrong code being applied to patients who had been admitted directly to an obstetrics ward under the care of a consultant. In these cases the correct code should always be 8 - Not applicable.	NHS Boards should train their coding staff in the correct coding conventions for this variable in accordance to the ISD recording clarification that was issued in September of 2016.
For 761 errors the evidence was found in source documents other than a discharge letter. Furthermore clinical coders at some NHS boards were only using information recorded on electronic systems and not interrogating paper case notes.	In addition to electronic systems, all paper and scanned documents in the patient record should be reviewed by coding staff to ensure accurate recording of all data items in the SMR02 dataset.
The variable Typical Weekly Alcohol Consumption. Was impossible to assess because the question in the SWHMR - “How many units of alcohol do you drink in an average week?” which is completed at the antenatal booking appointment is not being asked and calculated in accordance to the supplementary guidance from 2013.	This variable should be calculated as a weekly average taken over the three months preceding booking as stipulated in the supplementary guidance from 2013. Midwives are asked to bear this guidance in mind when calculating the variable and completing the question in SWHMR.
Some Electronic Patient Administration and Maternity Systems were set up with restrictions which prevented variables from being recorded correctly.	In order for coding staff to record the correct codes, systems must be set up to enable the full and compliant coding of SMR02. NHS Boards should work with their system suppliers to ensure the systems are aligned to SMR02 recording in accordance with all national standards and guidelines.
Conflicting and contradictory evidence was greatly reduced in the medical records of NHS boards which used an electronic version of SWHMR.	NHS Boards should consider using a system with an inbuilt electronic version of SWHMR if possible.

Appendix A - Percentage Accuracy by Clinically Classified Data Items and Hospital

Table 9 shows the percentage accuracy by hospital for each clinically classified data item assessed and the number of records assessed at each hospital.

- For Main Condition two hospitals had above 90% accuracy and the average accuracy across Scotland was 72%.
- For Other Conditions no hospitals achieved the 90% accuracy standard and eight hospitals were below 70%.
- For Indication for Operative Delivery, 15 of the 19 hospitals assessed exceeded the 90% accuracy standard and the overall average across Scotland was 92%.

Table 10 - Percentage accuracy by clinical data item and hospital

NHS Board	Hospital	No. of Records Assessed	Main Condition (3-digit accuracy)	Main Condition (4-digit accuracy)	Other Condition (3-digit accuracy)	Other Condition (4-digit accuracy)	Indication for Operative Delivery (3-digit accuracy)	Indication for Operative Delivery (4-digit accuracy)
NHS Ayrshire & Arran	Crosshouse Hospital	75	88	87	86	86	96	93
NHS Borders	Borders General Hospital	50	22	22	31	31	86	84
NHS Dumfries & Galloway	Dumfries & Galloway Royal Infirmary	50	56	54	38	37	96	88
NHS Fife	Victoria Hospital Maternity Unit	75	95	93	87	86	96	92
NHS Forth Valley	Forth Valley Royal Hospital	75	59	59	43	43	95	84
NHS Grampian	Aberdeen Maternity Hospital	75	80	79	54	53	91	87
	Dr Gray's Hospital	50	74	74	79	79	94	90

NHS Board	Hospital	No. of Records Assessed	Main Condition (3-digit accuracy)	Main Condition (4-digit accuracy)	Other Condition (3-digit accuracy)	Other Condition (4-digit accuracy)	Indication for Operative Delivery (3-digit accuracy)	Indication for Operative Delivery (4-digit accuracy)
NHS Greater Glasgow & Clyde	Princess Royal Maternity Unit	75	86	83	83	81	97	88
	Royal Alexandra Hospital	75	63	57	54	53	66	55
	Queen Elizabeth University Hospital	75	49	41	52	51	95	81
NHS Highland	Raigmore Hospital	50	82	76	82	77	98	96
NHS Lanarkshire	Wishaw General Hospital	75	77	76	82	82	99	93
NHS Lothian	Royal Infirmary of Edinburgh	75	92	88	83	82	91	84
	St John's Hospital at Howden	50	88	86	71	68	98	96
NHS Orkney	Balfour Hospital	25	20	20	54	54	84	84
NHS Shetland	Gilbert Bain Hospital (Shetland)	25	64	64	76	76	80	80
NHS Tayside	Ninewells Hospital	75	83	80	78	77	95	93
	Perth Royal Infirmary	25	76	76	81	81	100	100
NHS Western Isles	Western Isles Hospital	25	40	40	46	46	92	88

For Main Condition four hospitals achieved an accuracy of below 50%. This was mainly due to O82-O84 delivery codes being recorded where national guidance states that this code must only be used if no other condition classifiable to Chapter XV of ICD-10 is recorded. It was found that coding staff were unaware of or misinterpreted these rules. Similarly, for Other Conditions, four hospitals again achieved less than 50% accuracy. The majority of errors were caused by under-recording of co-morbidities.

Appendix B - Percentage Accuracy by Hard-coded Data Items and Hospital

Table 11 shows the percentage accuracy by hospital for each hard-coded data item assessed and the number of records assessed at each hospital.

- For Ethnic Group five hospitals had above 90% accuracy and the average accuracy across Scotland was 75%.
- For Transfer of Responsibility Midwife to Consultant, seven hospitals exceeded the 90% accuracy standard and the overall average across Scotland was 68%.

Table 11 - Percentage accuracy by hard-coded data item and hospital

Health Board	Hospital	Number Records Assessed	Ethnic Group	Specialty/ Discipline	Transfer of Responsibility Midwife to Consultant	Booking Date	Original Booking	Drugs Misuse During This Pregnancy	Drugs Used	Ever Injected Illicit Drugs	Smoking History at Booking	Smoker During Pregnancy	Height	Weight of Mother at Booking	Diabetes	Estimated Gestation	Induction of Labour	Presentation at Delivery	Mode of Delivery	Birthweight	Neonatal Indicator	First Feed Given	Feed on Discharge
NHS Ayrshire & Arran	Crosshouse Hospital	75	89	97	93	99	100	99	99	100	97	96	96	96	99	96	96	100	100	100	97	93	97
NHS Borders	Borders General Hospital	50	52	98	0	90	96	98	98	96	88	92	100	88	98	100	94	78	98	98	98	42	94
NHS Dumfries & Galloway	Dumfries & Galloway Royal Infirmary	50	43	100	23	98	96	100	98	100	100	96	98	90	98	100	83	98	96	100	96	90	92

Health Board	Hospital	Number Records Assessed	Ethnic Group	Specialty/ Discipline	Transfer of Responsibility Midwife to Consultant	Booking Date	Original Booking	Drugs Misuse During This Pregnancy	Drugs Used	Ever Injected Illicit Drugs	Smoking History at Booking	Smoker During Pregnancy	Height	Weight of Mother at Booking	Diabetes	Estimated Gestation	Induction of Labour	Presentation at Delivery	Mode of Delivery	Birthweight	Neonatal Indicator	First Feed Given	Feed on Discharge
NHS Fife	Victoria Hospital Maternity Unit	75	70	49	84	100	99	100	99	99	97	92	95	92	99	95	96	99	100	99	95	96	95
NHS Forth Valley	Forth Valley Royal Hospital	75	76	100	100	100	100	95	95	97	77	79	95	89	93	71	75	97	97	99	93	100	85
NHS Grampian	Aberdeen Maternity Hospital	75	93	86	45	78	99	100	99	99	97	93	96	96	99	97	89	99	97	99	99	96	91
	Dr Gray's Hospital	50	92	100	63	86	100	100	100	100	100	98	96	92	100	98	82	100	96	100	88	94	98
NHS Greater Glasgow & Clyde	Princess Royal Maternity Unit	75	85	100	55	75	99	93	93	88	80	87	97	89	96	99	96	52	100	100	95	99	97
	Royal Alexandra Hospital	75	89	90	64	84	80	44	44	48	78	87	97	85	93	87	88	20	99	99	95	79	88
	Queen Elizabeth University Hospital	75	96	100	100	91	100	4	5	4	92	92	97	94	100	100	96	4	99	99	93	97	84
NHS Highland	Raigmore Hospital	50	52	100	100	94	100	98	98	100	96	96	92	92	92	100	96	100	100	100	98	98	98
NHS Lanarkshire	Wishaw General Hospital	75	61	100	100	97	99	93	93	93	88	89	93	95	95	99	99	99	97	97	92	100	91

Health Board	Hospital	Number Records Assessed	Ethnic Group	Specialty/ Discipline	Transfer of Responsibility Midwife to Consultant	Booking Date	Original Booking	Drugs Misuse During This Pregnancy	Drugs Used	Ever Injected Illicit Drugs	Smoking History at Booking	Smoker During Pregnancy	Height	Weight of Mother at Booking	Diabetes	Estimated Gestation	Induction of Labour	Presentation at Delivery	Mode of Delivery	Birthweight	Neonatal Indicator	First Feed Given	Feed on Discharge
NHS Lothian	Royal Infirmary of Edinburgh	75	100	95	65	97	100	100	100	100	100	93	100	100	100	99	99	92	100	100	93	95	95
	St John's Hospital at Howden	50	100	100	20	98	100	100	100	100	100	96	100	100	98	96	92	100	98	100	96	86	96
NHS Orkney	Balfour Hospital	25	64	100	68	96	96	100	100	100	100	100	100	64	100	96	100	76	96	100	100	100	84
NHS Shetland	Gilbert Bain Hospital	25	36	88	0	96	92	100	100	100	100	100	100	80	100	100	100	92	100	96	8	88	56
NHS Tayside	Ninewells Hospital	75	51	95	92	99	100	99	97	99	99	99	95	96	99	97	99	97	93	97	99	100	100
	Perth Royal Infirmary	25	72	100	100	100	96	100	100	100	100	96	96	100	100	88	100	100	100	100	100	96	96
NHS Western Isles	Western Isles Hospital	25	24	100	0	88	100	96	96	96	92	92	92	56	96	96	84	76	96	100	100	80	96

Four hospitals achieved below 50% accuracy for Ethnic Group. Evidence was found on the electronic maternity systems these.

Only one hospital achieved less than 50% accuracy for Specialty/Discipline. Records had been incorrectly recorded as Obstetrics rather than Midwifery as the patients were admitted to the midwife led unit.

Six hospitals were below 50% for Transfer of Responsibility Midwife to Consultant, four of which had 0% accuracy. At the time of the assessment, these four hospitals had no midwife led unit. However, since then NHS Shetland have advised that they are now a midwife led unit standing alongside a District General Hospital.

Two hospitals had notably low accuracy for the three drugs fields: Drugs Misuse During this Pregnancy, Drugs Used and Ever Injected Illegal Drugs. DQA could find no evidence anywhere in the medical record to support the codes that had been used, therefore the available Not known codes for these variables should have been used instead. These same two hospitals also had poor accuracy for Presentation at Delivery. The option to select this data item was not available in the hospital systems at the time of the audit and a default code of 1 - Occipito-anterior had been used. This has now been addressed by a change of maternity system.

One hospital had only 8% accuracy for Neonatal Indicator. In the sample of 25 records 23 had been incorrectly recorded as either admitted to the neonatal unit or code 9 - Not known. The hospital had no neonatal unit and therefore the correct code in all cases should have been 0 - Not admitted. National guidelines state that code 0 - Not admitted should be used if the hospital has no neonatal unit even if it is known that the baby is ill.

Appendix C - Sample Sizes based on number of delivery episodes by hospital

Category	Hospital	Deliveries 2015/2016	Sample Size
Large	Royal Infirmary of Edinburgh	6,635	75
Large	Southern General Hospital/now Queen Elizabeth University Hospital	5,899	75
Large	Princess Royal Maternity Hospital	5,622	75
Large	Aberdeen Maternity Hospital	5,260	75
Large	Wishaw General Hospital	4,426	75
Large	Ninewells Hospital	3,760	75
Large	Royal Alexandra Hospital	3,519	75
Large	Crosshouse Hospital/now University Hospital Crosshouse	3,473	75
Large	Forth Park Maternity Hospital/now Victoria Maternity Unit	3,366	75
Large	Forth Valley Royal Hospital	3,135	75
Medium	St. John's at Howden, Livingston	2,720	50
Medium	Raigmore Hospital	2,012	50
Medium	Dumfries and Galloway Royal Infirmary	1,218	50
Medium	Dr. Gray's Hospital	1,068	50
Medium	Borders General Hospital	1,059	50
Small	Perth Royal Infirmary	259	25
Small	Western Isles Hospital	183	25
Small	Gilbert Bain Memorial Hospital	125	25
Small	Balfour Hospital	123	25

Appendix D - ISD Recording Clarification

Information Services Division

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Date: 27/09/2016
Your Ref
Our Ref SMR02-1
Enquiries to: Lindsay Mathie
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FAO: Lead Midwife and Head of Clinical Coding

Dear Colleague,

SMR02 – Recording of Consultant/HCP Responsible for Care, Specialty and Transfer of Responsibility from Midwife to Consultant

Clinical colleagues within your Board are likely to be aware that Scotland has recently committed to participating in a Healthcare Quality Improvement Partnership funded UK wide audit of maternity services. This audit will draw on Scotland's routinely available data, in particular SMR02. It will be important that SMR02 data can distinguish women delivering in midwife led and consultant led facilities so that women are included in appropriate audit measures that reflect the kind of facility they delivered in.

This, along with a recent enquiry from colleagues at Scottish Government on activity in alongside midwifery units and freestanding midwifery units, led ISD to do some analysis and investigation on the data submitted by NHS Boards through SMR02 returns. This has shown that activity in these units in many hospitals is being attributed to an obstetrician/obstetrics rather than the midwife/midwifery, which we would consider to be inaccurate. Accepted definitions of alongside and freestanding midwifery units and obstetrics units are provided in the Appendix for information.

We have reviewed our documentation and guidance around the recording of Consultant/HCP Responsible for Care, Specialty, and Transfer of responsibility from Midwife to Consultant within SMR02 records and can appreciate that there may be some ambiguity on how these variables should be recorded. To this end we have developed the following additional Points to Note, detailed below and available on our data dictionary, http://www.ndc.scot.nhs.uk/Dictionary-A-Z/, which we hope clarifies how these data items should be recorded in these units.

Consultant/HCP responsible for care – Point to note

For SMR02 records this should reflect the person who was responsible for the care of the mother on original admission to the unit.
Example 1 - If the mother was originally admitted under the care of a midwife in an Alongside Midwifery Unit (AMU) or Freestanding Midwifery Unit (FMU), then the midwife should be recorded in this section, irrespective if the mother was then transferred during her care episode.
Example 2 - If the mother was originally admitted to an Obstetric Unit then the Consultant initially responsible for her care should be recorded here, irrespective of whether care was primarily provided by midwifery staff.

We are writing to your hospital specifically as we understand it contains both an alongside midwifery unit and an obstetric unit. It is therefore particularly important that coding from your hospital is accurate to ensure that the national data can accurately identify women receiving midwife led and consultant led care. We understand that currently all your SMR02 records are coded to the obstetrics specialty which precludes this.

Specialty – Point to note

For SMR02 records this should reflect the speciality of the person who was responsible for the care for the mother on original admission.
Example 1- If the mother was originally admitted under the care of a midwife in an Alongside Midwifery Unit (AMU) or Freestanding Midwifery Unit (FMU), then the midwifery specialty should be recorded in this section, irrespective of whether the mother was then transferred to an Obstetric unit during labour/delivery. When a transfer has occurred Speciality should **NOT** be attributed to Obstetrics.
Example 2 - If the mother was originally admitted under the care of a Consultant in an Obstetric Unit then the Obstetrics specialty should be recorded here.

Transfer of Responsibility from Midwife to Consultant – Points to note

This field is used to capture the cases when a mother is transferred from midwifery care to a consultant and should be completed when the HCP Responsible for Care and Specialty are both attributed to a midwife. This transfer can only happen from an Alongside Midwifery Unit (AMU) or Freestanding Midwifery Unit (FMU).
When a transfer has occurred Speciality should **NOT** be attributed to Obstetrics.
Where **NO** transfer has taken place then this field should be completed with **No transfer** (mother remains under care of Midwifery) or **Not Applicable** (mother remains under care of Obstetrics).

I would be grateful if you could cascade this information to your colleagues for action to ensure this vital information is captured going forward. We will monitor the data being returned to ISD over the coming months to ensure this change in practice is being implemented.

Thank you for your co-operation in this matter and please contact Lindsay Mathie, 0141 282 2267, lindsay.mathie@nhs.net, should you have any issues with this and we would be happy to discuss your concerns.

Yours sincerely,

Fiona Russell
Head of Service
Data Management

Dr Rachael Wood
Consultant in Public Health Medicine
Information Services Division

Appendix

Terms and definitions on place of birth developed for use in the Birthplace in England research programme
https://www.npeu.ox.ac.uk/birthplace/

Obstetric unit (OU): an NHS clinical location in which care is provided by a team, with obstetricians taking primary professional responsibility for women at high risk of complications during labour and birth. Midwives offer care to all women in an OU, whether or not they are considered at high or low risk, and take primary responsibility for women with straightforward pregnancies during labour and birth. Diagnostic and treatment medical services including obstetric, neonatal and anaesthetic care are available on site, 24 hours a day.

Alongside midwifery unit (AMU): an NHS clinical location offering care to women with straightforward pregnancies during labour and birth in which midwives take primary professional responsibility for care. During labour and birth diagnostic and treatment medical services, including obstetric, neonatal and anaesthetic care are available, should they be needed, in the same building, or in a separate building on the same site. Transfer will normally be by trolley, bed or wheelchair.

Freestanding midwifery unit (FMU): an NHS clinical location offering care to women with straightforward pregnancies during labour and birth in which midwives take primary professional responsibility for care. General Practitioners may also be involved in care. During labour and birth diagnostic and treatment medical services including obstetric, neonatal and anaesthetic care, are not immediately available but are located on a separate site should they be needed. Transfer will normally involve car or ambulance.

Appendix E - NHS Board Patient Management and Maternity Systems

NHS Board	Source Evidence
Ayrshire and Arran	TrakCare, Eclipse and Case notes
Borders	BadgerNet Maternity, TrakCare and Case notes
Dumfries and Galloway	BadgerNet Maternity, TOPAS, Clinical Portal and Case notes
Fife	OASIS, Clinical Portal and Case notes
Forth Valley	MATSYS and Casenotes
Grampian	BadgerNet Maternity, TrakCare and Case notes
Greater Glasgow &Clyde	SBR, PNBS, Clinical Portal and TrakCare.
Highland	SBR, TrakCare, SCI Store and Case notes
Lanarkshire	BadgerNet Maternity, TrakCare and Case notes.
Lothian	SMR02 TRAK (MAT_TRAK)
Orkney	BadgerNet Maternity and TrakCare
Shetland	BadgerNet Maternity and TrakCare
Tayside	PROTOS, TOPAS and Case notes
Western Isles	TOPAS and Case notes

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Background Information

The Data Quality Assurance (DQA) team is responsible for evaluating and ensuring that the Information Services Division's (ISD) Scottish Morbidity Record (SMR) datasets are accurate, consistent and comparable across time and between sources. Evaluation of quality of data in any information system involves a comparison of data against an agreed set of standards. This is conducted retrospectively in order to support the credibility of ISD's national patient based data.

The quality of national data is key to all those who use it both externally and internally at ISD as, without it, it would be impossible to interpret results with any accuracy or confidence. Without this assurance in the data it would undermine the use of information in a range of areas such as service planning, epidemiological research, contributions to evidence based medicine, generation of healthcare costs and the support of quality improvement and performance management.

This report contains the findings on the quality of selected SMR02 data items at both a Scotland level and for individual hospitals.

Further information can be found on the Data Quality Assurance web pages.

Glossary of Data Definitions for Data Items Assessed

Birthweight	The weight of the baby at birth specified in grams.
Booking Date	The "Date of booking appointment" as recorded just below the "history taken by" field on page 5r of the Demographic Information and EDD page in the SWHMR Combined Pregnancy and Postnatal Record.
Diabetes	Mother's status of diabetes.
Drugs Misuse During this Pregnancy	Drug misuse at any time during the current pregnancy. Includes use of illegal drugs, solvents and gases, drugs prescribed for someone else's use. Also includes prescribed substitutes for drugs of addiction or to alleviate withdrawal symptoms.
Drugs Used	Illegal drugs, solvents and gases, drugs prescribed for someone else's use. Also includes prescribed substitutes for drugs of addiction or to alleviate withdrawal symptoms.
Estimated Gestation	The number of completed weeks of pregnancy, as judged by the clinician (doctor or midwife, usually on the basis of ultrasound measurement).
Ethnic Group	Classifies the person according to their own perceived ethnic group and cultural background. (Scotland Census)
Ever Injected Drugs	'Ever' been administered illegal drugs by self or another using a hypodermic needle/syringe. Also includes inappropriate injection of prescribed drugs.
Feed on Discharge	The method of feeding at the time of the mother's discharge.

First Feed Given	The first feed given to the baby immediately following delivery.
FDL	Final Discharge Letter
Height	Height of the mother measured in centimetres.
IDL	Immediate Discharge Letter
Indication for Operative Delivery	The reason given for an assisted delivery coded to ICD-10.
Induction of Labour	Indicates the type of induction used actively to start labour by clinical intervention.
Main Condition	The main medical (or social) condition managed/investigated during the patients stay.
Neonatal Indicator	Length of admission (or non-admission) to a neonatal unit following delivery.
Mode of Delivery	The method by which the baby is delivered.
Original Booking	The location at which the patient originally intended to deliver her baby.
Other Conditions	In addition to the main condition, the record should, whenever possible, also list separately other conditions or problems dealt with during the episode of health care. Other conditions are defined as those conditions that co-exist or develop during the episode of healthcare and affect the management of the patient.
Presentation at Delivery	The part of the foetus which is lowest in relation to the position within the maternal pelvis.
Smoking History at Booking	History of smoking recorded at the booking clinic.
Smoker During Preg-nancy	History of smoking at any point during the pregnancy.
SMR	Scottish Morbidity Record
Specialty/Discipline	A division of medicine or dentistry covering a specific area of clinical activity and identified within one of the Royal Colleges or Faculties.
Transfer of Responsibility Midwife to Consultant	When a midwife formally and definitively passes responsibility for a woman's obstetric care to a consultant during an EPISODE of CARE with no expectation that the midwife will resume responsibility during that episode.
Typical Weekly Alcohol Consumption	Number of units of alcohol consumed in the course of a typical week.
Weight of Mother at Booking	The weight of the woman in kilograms recorded at the booking clinic.