2022

General Pharmaceutical Services Statistics for Northern Ireland – Quality Assurance of Administrative Data (QAAD) Report

This initial report highlights and seeks users' views on the key outcomes of an in depth data quality assessment of administrative systems from which General Pharmaceutical Services Statistics for Northern Ireland are sourced and produced. Assessment outcomes are detailed in terms of key strengths and weaknesses, and potential sources of error and bias relating to these statistical series.

NISRA
Northern Ireland Statistics and Research Agency
Gníomhaireacht Thuaisceart Éireann um Staitisticí agus Taighde

Information Unit
Business Services Organisation
Version 1
February 2022

Contents

User views

Dear User of Family Practitioner Services Statistics in Northern Ireland,

Your views are being sought on our quality assessment report of administrative sources from which General Pharmaceutical Services Statistics for Northern Ireland are produced. This first assessment of administrative sources is based on quality standards published by the UK Statistics Authority. The statistical production team are continuing to ask for your views on our updated assessment, in terms of process, outcomes and presentation. The official statistics publications to which this assessment report relates can be found on the BSO website.

Please forward your views on our assessment to:

Information Unit

HSC Business Services Organisation

2 Franklin Street

Belfast

BT2 8DQ

Tel: 028 95363674

E-mail: info.bso@hscni.net

Background

Quality Assurance of Administrative Data

This assessment report highlights and continues to seek users' views on the key outcomes of our data quality assessment of administrative systems from which HSCNI Business Services Organisation/Family Practitioner Services General Pharmaceutical Services Official Statistics are sourced and produced. Assessment outcomes are detailed in terms of key strengths and weaknesses, and potential sources of error and bias.

UK Statistics Authority (UKSA): Assessment of Administrative Sources

This assessment was carried out to help users of our statistics better understand the range of administrative sources and processes from which our pharmaceutical statistics are sourced and produced. As our pharmaceutical statistics are classified as Official Statistics, the assessment was carried out in line with the UKSA Regulatory Standard for the Quality Assurance of Administrative Data, as published on 29th January 2015.

To quote directly from the standard:

"*The Authority produced this Standard in response to concerns about the quality of administrative data that emerged during its assessments of statistics on police recorded crime. The Standard recognises the increasing role that administrative data are playing in the production of official statistics and clarifies the Authority's expectations for what producers of official statistics should do to assure themselves of the quality of these data*."

As explained within the UKSA standard:

"*Quality assurance of administrative data is more than simply checking that the figures add up. It is an ongoing, iterative process to assess the data's fitness to serve their purpose. It covers the entire statistical production process and involves monitoring data quality over time and reporting on variations in that quality. Post collection quality assurance methods, such as data validation, are an important part of the quality assurance process, but can be of limited value if the underlying data are of poor quality. The Authority encourages the application of critical judgment of the underlying data from administrative systems before the data are extracted for supply into the statistical production process. As with survey data, producers need to: investigate the administrative data to identify errors, uncertainty and potential bias in the data; make efforts to understand why these errors occur and to manage or, if possible, eliminate them; and communicate to users how these could affect the statistics and their use.*"

Business Services Organisation (BSO) - Family Practitioner Services (FPS)

FPS sits within BSO's Operations Directorate and provides a range of essential business services to Health and Social Care (HSC) organisations, primary care contractors and patients. It plays a critical role in making payments to health professionals in the dental, pharmacy, GP and ophthalmic sectors who are under contract with the Health and Social Care Board (HSCB). In 2020/21 this figure was in excess of £965 million, and included additional support to contractors related to the covid-19 pandemic.

The FPS Information Unit is made up of statisticians seconded from the Northern Ireland Statistics and Research Agency (NISRA). The in-house statistical team are responsible for producing quarterly and annual Official Statistics for Family Practitioner Services, in accordance with the Code of Practice for Statistics.

FPS Administrative Systems and Assessment

Almost all of the statistics detailed within the FPS quarterly and annual official statistics reporting are derived from in-house BSO administrative systems. These systems and the business areas to which they relate are detailed below in summary:

- Medical Registration – National Health Application Infrastructure System (NHAIS)
- Pharmacy – Family Practitioner Services Pharmacy Payment System
- Dental – Family Practitioner Services Dental Payment System
- Ophthalmic – General Ophthalmic Payment System
- General Medical Services – Family Practitioner Services GMS Payment System

The assessment of in-house BSO administrative systems was carried out using the Quality Assurance Toolkit as detailed within the UKSA standard. The matrix approach to assessment advised by the UKSA has two components; namely, separate assessments of public interest in our statistics (low, medium, high) and data quality concern about our statistics (low, medium, high). The outcome of our assessment then determines the types and level of assurance and documentation required to keep our users informed about the quality assurance arrangements in place for the administrative systems from which our statistics are sourced.

As explained within the standard (page 4), *"The need for investigation and documentation increases at each level of assurance 'Basic' (A1) to 'Enhanced' (A2) to 'Comprehensive' (A3)."* There is also a 'No assurance' A0 level to indicate that, *"Operational context and administrative data collection by supplier not investigated, managed or documented".* Assessment at this level means that statistics are not being produced in accordance with the Code of Practice for Statistics.

The outcomes of our completed assessment for our pharmaceutical statistical series sourced from in-house BSO administrative systems are detailed in the sections that follow. Following assessment using the QA Toolkit, the level of assurance was assessed either as 'Basic' (A1) or 'Enhanced' (A2).

From the UKSA standard, summaries of each of the three possible assessment levels are detailed below:

- A1: Basic assurance Statistical producer has reviewed and published a summary of the administrative data QA arrangements
- A2: Enhanced assurance Statistical producer has evaluated the administrative data QA arrangements and published a fuller description of the assurance
- A3: Comprehensive assurance Statistical producer has investigated the administrative data QA arrangements, identified the results of independent audit, and published detailed documentation about the assurance and audit

These three levels of assurance are applied across a range of four areas relating to administrative data provided for producing official statistics as outlined below:

- Operational context & administrative data collection
- Communication with data supply partners
- QA principles, standards and checks applied by data suppliers
- Producer's QA investigations & documentation

This report provides our assessed level of assurance for our statistical series, as well as detail and supporting evidence for each administrative source used across the four areas detailed above.

Review and Updates

As part of our ongoing commitment to maintain user and public confidence in our pharmaceutical statistics, the administrative systems from which we source our data will be reviewed annually, or as required in line with planned changes to administrative systems. Reviews will be through formal consultation with data providers regarding changes/amendments to administrative systems which might then impact on our assessment of data quality concerns and changing public interest in our statistics. Should a revised assessment result in an increased or a decreased level of assurance, we will then update our assessment report for relevant statistical series. Users will be notified of revisions/updates to this report at the earliest opportunity, probably at the same time as publication of the next release of our quarterly or year-end statistical report.

General Pharmaceutical Services Statistics

The General Pharmaceutical Services Statistics provide information on dispensed prescription items that have subsequently been processed and reimbursed by BSO on behalf of the HSCB. The presented information includes number of items along with cost, patient attributes, British National Formulary (BNF) Drug classifications, and analysis of pharmacy provision across Northern Ireland. Most information is provided at Local Government District (LGD) and Trust/Local Commissioning Group (LCG) area level and also includes some comparator statistics from Great Britain. Four administrative sources are used in the production of this publication and each is introduced below.

Data source: Pharmaceutical Family Practitioners Payment System (PFPPS)

The Pharmaceutical Family Practitioners Payment System (PFPPS)[1], which resides within FPS, enables BSO to make payments to pharmaceutical contractors for dispensing items that have been prescribed by primary care prescribers (e.g. General Practitioner, Nurse Practitioner, Dentist, Podiatrist etc.), as well as through the minor ailments scheme available in a number of pharmacies. Approximately 2 million prescription forms are processed by the BSO each month.

The payments team within FPS is responsible for:

- Scanning all prescriptions received from community pharmacies in NI;
- Validating the data to ensure accuracy; and
- Processing correct monthly payments to contractors

Statisticians in the FPS Information Unit use PFPPS data as the main source for published statistical outputs on prescriptions dispensed (item volumes and ingredient cost) in Northern Ireland. Information gathered via payment processing is also used to link to other data sources – for example, where a valid Health and Care Number (HCN) is recorded, this is used to link to NHAIS data to gather patient information, such as gender, date of birth, home postcode. Such information can be combined with information from NISRA's Central Postcode Directory or the Northern Ireland Multiple Deprivation Measure. In this way it is possible to provide breakdowns of prescribing by patient attributes or location, or more detailed information on the demographics of patients on particular medications.

Data source: National Health Application and Infrastructure Services (NHAIS)

The NHAIS system, which resides within the FPS, manages GP registrations and payments, and GP patient lists and their demographics, including a record level list of all persons on the GP registered patients index (whether living, dead or gone away). It also holds information on a patient's entitlement to primary care in Northern Ireland.

The registration team within FPS is responsible for:

- the registration and transfer of patients onto and between GP Practices within Northern Ireland and the rest of the UK;
- the transfer of medical records between GP Practices within Northern Ireland and the rest of UK; and

[1] Also referred to as the FPS Pharmacy Payment System.

- the archiving of Medical Records of patients no longer registered with a GP Practice in Northern Ireland.

Statisticians in the FPS Information Unit link prescription and NHAIS data to produce demographic breakdowns, including age, gender and geographical location, on prescription dispensing, as well as data on individuals' prescribed specific medications.

Data source: Pharmaceutical List

The Pharmaceutical List, which is administered by the Professional Support Team within the BSO, provides an up-to-date list of all prescription dispensing contractors (community pharmacists, dispensing doctors and appliance contractors). Updated by the Professional Support Team at the beginning of each month, it includes up-to-date information on contractors, including contractor name, trading name, address, unique chemist and premises numbers, as well as information on when the contractor was added to the list (i.e. commenced operation) and, if relevant, when it ceased operation.

Plans are in place to commission Common Practitioner Model (CPM) Pharmacy to update the live Pharmaceutical List as part of the CPM suite (alongside GP, Dental and Non-Medical Prescribing). This QAAD will be updated to reflect any changes and their impact on the General Pharmaceutical Statistics.

Statisticians in the FPS Information Unit combine the Pharmaceutical List data with information from NISRA's Central Postcode Directory to produce geographical analysis on community pharmacy provision in Northern Ireland. Data from this source is also combined with NISRA Mid-Year Population Estimates and Population Projections to produce the number of pharmacies per 100,000 population.

Data source: Drug Tariff Masterfile

The Drug Tariff Masterfile provides up-to-date information on the Drug Tariff, which sets out the levels of remuneration contractors receive for dispensed prescriptions. The current Masterfile adopts the rule set designed for the English Drug Tariff[2]. The Data Analyst team within BSO are the administrators of the Drug Tariff Masterfile for Northern Ireland.

Data from the Drug Tariff Masterfile feeds directly into the PFPPS – this payment information is then used by statisticians with the FPS Information Unit in their published outputs. Information for drugs corresponding to British National Formulary (BNF) sections and chapters is derived from the Masterfile. This information is then used by Information Unit in the published statistics.

Plans for re-development of the Northern Ireland Drug Tariff Masterfile

The HSBC and BSO are at the early stages of a project to develop a new Northern Ireland Drug Tariff Masterfile, aimed at taking into account Northern Ireland-specific priorities and objectives, and introducing more automation into the process. This project is at the early stages of development; future revisions of this QAAD document will provide updates on the development progress and potential impacts on the General Pharmaceutical Services Statistics.

[2] Historically, there were a few exceptions to this rule, but from 2021/22 onwards, full alignment between BNF chapters in England and Northern Ireland exists. Further information is provided later in the report.

Quality Assessment

Table 1 below details the outcome of our assessment of the General Pharmaceutical Services Statistics using the matrix assessment toolkit. In terms of data quality concern and public interest, the pharmaceutical statistics were, with a couple of exceptions for each category, generally assessed as low for data quality concern and medium for public interest. **This gives a matrix profile of A1/A2. As a result, this report provides a level of assurance in line with A2 level.**

Table 1: Assessment of General Pharmaceutical Services Statistics

Statistical theme	Admin Source	Data Quality Concern	Public Interest	Matrix Classification
Pharmacies per 100,000 population	PFPPS, PL, MYE	Low	Medium	A1/A2
Pharmacy proximity statistics	PFPPS, NHAIS, PL, CPD	Low	Medium	A1/A2
Pharmacies by monthly dispensing volume	PFPPS, PL	Low	Low	A1
Pharmacies by average annual items dispensed and associated ingredient cost	PFPPS, PL	Low	Low	A1
Prescription items and cost	PFPPS	Low	Medium	A1/A2
By patient attribute	PFPPS, NHAIS, CPD, MDM	Low/Medium	Medium	A2
By BNF chapter	PFPPS, DTMF	Low	Medium	A1/A2
UK comparisons	PFPPS, GB data	Low	Medium	A1/A2
Detailed analysis - individuals by medication class	PFPPS, CPD, MYE	Low	Medium/High	A2

Pharmaceutical Family Practitioners Payment System (PFPPS); NHAIS - National Health Application and Infrastructure Services; PL – Pharmaceutical List; DTMF - Drug Tariff Masterfile; CPD – NISRA's Central Postcode Directory – not assessed in this QAAD; MYE – NISRA's Mid-Year Population Estimates - not assessed in this QAAD; and MDM - NISRA's .Multiple Deprivation Measure - not assessed in this QAAD.

Operational Context and Administrative Data Collection

Data source: Pharmaceutical Family Practitioners Payment System

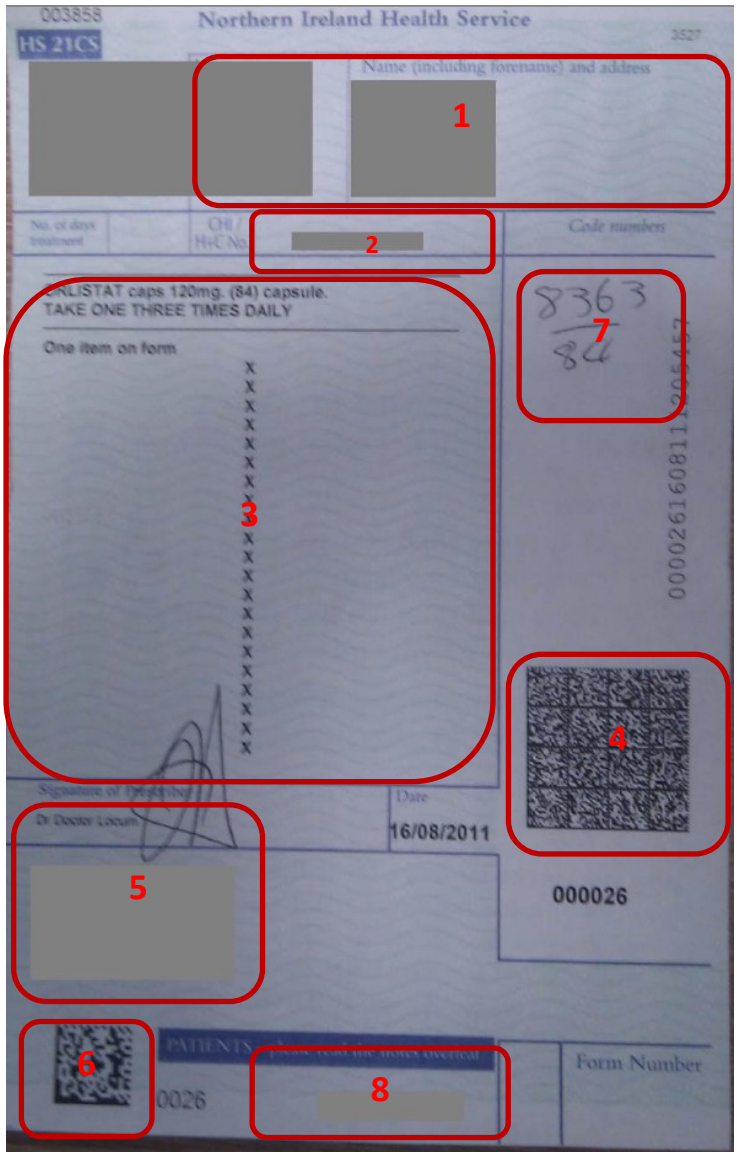
Prescription Processing

The key stages of prescription processing are detailed below.

Stage 1: Patient – GP

Typically the life cycle of a prescription begins with a patient visiting a health practitioner, usually their GP[3] and receiving a prescription for their ailment. Figure 1 is an example image of a GP-prescribed form along with reference to key information it contains.

Figure 1: Prescription Example



Key Information:

1 – Patient name, address, age and date of birth

2 – Patient Health and Care Number

3 – Prescribed item details

4 – Large printed barcode containing patient, prescriber and drug information, along with the 19 digit reference number.

5 – Registered prescriber information

6 – Pre-printed barcode containing the prescriber, prescription form type and unique 11 digit reference number.

7 – Dispensed drug code and quantity prescription item code

8 - unique 11 digit reference number

[3] Other authorised prescribers can include Dentist, Community Nurse, Supplementary Prescriber or Consultant working in the community. Form types vary, depending on who the prescriber is.

Stage 2: Patient – Community Pharmacy

The patient then takes their prescription to a community pharmacy[4] of their choice at which the pharmacist takes the prescription and dispenses the prescribed items to the patient. To aid the drug payment process, the pharmacist manually endorses the drug code/s and quantity of the dispensed items onto the prescription. An example of this can be seen in box 7 of Figure 1.

Stage 3: Community Pharmacy – BSO, FPS

For a pharmacy contractor to receive reimbursement for the dispensed items and any associated item fees, they must provide BSO with the dispensed prescription forms. The contractor submits these twice a month to allow BSO to meet their 30 day payment schedule. The contractor bundles the prescriptions into varying categories (fully coded, part coded, multiple dispensing etc.) and fills out a HS30 recording document to accompany the prescriptions. The information captured in a HS30 is used at various stages throughout the process, from informing scanning requirements to ensuring that all prescriptions can be accounted for during processing.

Stage 4: BSO, FPS

Scanning

To enable scanning, the prescriptions are prepped. This work includes, for example, straightening forms and removing staples. The forms are then scanned during which an image of the prescription form is captured and, where possible, the large barcode (box 4 in Figure 1) is scanned and read along with the small barcode (box 6 in Figure 1).

As mentioned previously, the large barcode contains all the information from the prescription and if it has **successfully** been read, the captured information will include:

a) Prescription items;
b) patient details including name, address, date of birth, Health and Care Number;
c) patient's registered GP;
d) prescriber information;
e) form type; and
f) issue date

If the large barcode has **not been read** then the captured information will only include information read from the small barcode (box 6 in Figure 1).

Note: Patient information will NOT be available for prescriptions where the large barcode has not been read.

[4] Prescription can also be fulfilled by dispensing doctor or appliance contractor.

Table 2 below outlines the proportion of prescription forms processed by BSO that were successfully read when submitted for scanning. Further, it also details how these 'read rates' translate into the proportion of prescription items with attributed patient information (i.e. the 'scan rate' – see Background Quality Report for more information on this).[5]

Table 2: Proportion of prescription forms processed by BSO successfully read and proportion of prescription items with attributed patient information

Financial year	% of prescription forms read	% prescription items with attributed patient information
2013/14	90.6%	88.5%
2014/15	90.0%	86.7%
2015/16	88.8%	84.9%
2016/17	87.0%	82.4%
2017/18	81.2%	75.2%
2018/19	80.5%	74.9%
2019/20	88.5%	87.6%
2020/21	91.0%	90.2%

Auto-coding

The Drug Tariff Masterfile and auto-coding rules are built into the scanning process. This process allocates a reimbursement price to the valid prescription item.

For an item to be auto-coded it must pass a series of validation rules that looks at quantities, cost and prescriber information. If the large barcode fails to read, the prescription is highlighted for processing to the Manual Data Entry team to manually input the drug code and quantity.

Auto-coding rates currently sit around 80.20% but have been as low as 65% in the past – the current target is to auto-code 70%.

Manual Data Entry (MDE)

For those prescription items not auto-coded, the BSO FPS Pharmaceutical payments team manually enter the drug code and quantities endorsed by the pharmacist. This process is referred to as Manual Data Entry (MDE).

It is important to note that **patient information, including the HCN number, is not captured** during MDE as it is not required to make the payment. As a result, it is not possible to use the HCN number to obtain demographic information for the patients who were dispensed these prescriptions.

[5] Information Unit are involved in a project, still at the very early stage, aimed capturing unscanned HCNs from historic prescription images using Optical Character Recognition (OCR). Although 100% coverage is not possible, due to handwritten scripts and other technical issues, this initiative has the potential to greatly improve data quality both of existing pharmaceutical datasets used in the production of the General Pharmaceutical Statistics, as well as increase HCN capture rates on an ongoing basis.

Pricing

For those prescription items which have broken auto-coding and manual data entry validation rules, the BSO FPS Pharmaceutical payments team manually enter a price based on the drug information and/or endorsements on prescriptions/invoices submitted.

The current levels of pricing interventions are just under 3%.

Quality assurance

Quality assurance checks are carried out at each stage throughout the pharmaceutical payment process, both pre-payment and post-payment. This includes a range of KPIs/targets that are in place to measure the accuracy and efficiency of the system. More information can be found in the QA principles, standards and checks by data suppliers section.

Data History/further information

- Prescription data is available back to 1999 at drug level
- Over time the collected information has evolved from a relatively simplistic format to a much more complex system today
- HCN information, which enables linkage to demographic data from NHAIS, only available from January 2010 onwards.

Data source: NHAIS

In Northern Ireland residents can register with a GP for the provision of general medical services and advice, depending on their settlement status. For example, those born in Northern Ireland provided with a medical card at birth are normally entitled to register with a GP and move between GPs in Northern Ireland without any restrictions.

Persons coming to Northern Ireland to live are required to meet the 'Ordinarily Resident Test' in Northern Ireland, i.e. you must be lawfully residing in Northern Ireland and have an identifiable and settled purpose here. To satisfy this test you must have indefinite leave to remain in the United Kingdom (UK), and provide proof of your settled purpose e.g. to work, and confirmation of your Northern Ireland address. An eligible visitor is a visitor to Northern Ireland who is lawfully present in Northern Ireland and satisfies a relevant exemption from charges such as students, workers and asylum seekers in accordance with the Health and Personal Social Services Provision of Health Services to Persons Not Ordinarily Resident Regulations (Northern Ireland) 2015.

NHAIS is the system used to register the entitled patients/clients to state funded health and care services in Northern Ireland, the management of GP lists and to calculate the Global Sum payments[6] each quarter. It captures details of the relationship between patients, GPs and their practices. Registrations are collected from GP systems through dedicated links and/or by contacting BSO directly. The registration team within FPS is responsible for maintaining the GP Registered Patients Index. NHAIS also contains data on previously registered patients, however this is incomplete due to historical data migration issues.

[6] The Global Sum Payment is the payment to GP practices for services provided to their registered patients.

A significant number of bodies such as NISRA, ONS, The Electoral Office and the GRO rely on data from NHAIS to perform their functions; extracts of the NHAIS index are used to provide these bodies with the data they need to inform decision making.

The main source of data is from GP systems via GP Links. This is a two way flow of information via an Electronic Data Interchange between the BSO and the GP Practice with the ability to add, delete and amend patient records at either side subject to validation. Registration Links has sufficient functionality to ensure that both the GP Practice and NHAIS systems are kept in line with one another.

The Health and Social Care Board (HSCB) also operate two way information flow with BSO by way of emails, spreadsheets and databases to inform medical registration data. The General Register Office (GRO) provide death data to BSO; notification of these deaths may already have occurred from other sources but the GRO data is the official source. The Health and Care team operate a two way flow of patient information with the BSO including registration status. NHS Scotland and England also operate a two way flow of information with the BSO in relation to patients who have moved between jurisdictions.

The registration team within FPS is responsible for maintaining GP Registered Patients Index. To ensure all registration data is updated and recorded accurately, the BSO have detailed process maps and accompanying Standard Operating Procedures (SOP's) outlining the steps for completing medical registrations, adjustments, deductions etc. These process maps and SOPs have been made available to statisticians.

At the end of any given month there are between 2,000 and 3,000 registrations that are outstanding (have been entered on to the system but have not been completed). Of these approximately 80% are from either GB or non-UK countries. This lag is normally as a result of additional documentation that is required to complete the registration and a number of these may be deemed not entitled. Less quantifiable is the number of registered patients who no longer reside in Northern Ireland but have left without notifying their GP or BSO.

Data source: Pharmaceutical List

The Pharmaceutical List provides an up-to-date list of all prescription dispensing contractors (community pharmacists, dispensing doctors and appliance contractors).

This data feeds directly into the Pharmaceutical Family Practitioners Payment System – ensuring that the correct contractors receive the correct payments each month. A summary version of the list, updated on a monthly basis and including only community pharmacists, is also publicly available. In addition, the list is used to ensure published details of community pharmacies that are open during weekends and public holiday periods across different areas in Northern Ireland is accurate and up-to-date.

Information from the Pharmaceutical List is used by Information Unit to produce analysis on community pharmacy provision in Northern Ireland.

The Professional Support Team within FPS are the administrators of the Pharmaceutical List and are authorised to make changes (e.g. adding, amending and removing contractors). For these updates

and amendments to 'go live' assistance is required from the BSO's Information Technology Services (ITS) team, who also make backend changes when required.

The key stages of the process of how and why the Pharmaceutical List is updated are outlined below.

Contractor applications forms

Contractors and prospective contractors submit application forms to the BSO for a change of circumstance. These forms vary depending on the circumstance and contractor type, and each form and associated guidance is available on the BSO website. Types of change of circumstance include:

- New contract, i.e. addition to the Pharmaceutical List;
- change of ownership (requiring a name change);
- minor relocation;
- temporary relocation; and
- variation in opening hours.

These forms are then submitted to the BSO.

Processing of application forms

The Professional Support team within the BSO then check to ensure the forms have all necessary information included, liaising with the applicant if required, before forwarding to the Health and Social Care Board for consideration and decision.

Once a decision on the application has been made, this information is sent back to the Professional Support team who then inform the relevant internal and external stakeholders, and update the Pharmaceutical List.

Updating the Pharmaceutical List

Amendments to the list are made at the start of every month. The Professional Support Team update a Microsoft Access database (the Chemist List) which then is used to update the Pharmaceutical List. In order for these updates to go live, a request is sent to ITS.

Once this has been updated, relevant internal stakeholders are notified, including staff responsible for updating the published information informed by this list.

Amendments to the list are carried out as necessary during the month (for example, if an error is identified). A change request is sent to the Professional Support Team who update. Again, a request to ITS is required to activate these updates.

Detailed process guidance, including information on validation checks, is available to staff within the Professional Support team.

Data source: Drug Tariff Masterfile

The Drug Tariff Masterfile provides up-to-date information on the Drug Tariff, which sets out the levels of remuneration contractors receive for dispensed prescriptions. The current Masterfile adopts the rule set designed for the English Drug Tariff.

Data from the Drug Tariff Masterfile feeds directly into the Pharmaceutical Family Practitioners Payment System – during the auto-coding process prescription items are automatically linked to the

Masterfile, which in turn allocates a reimbursement price to the prescription items. This payment information is then used by statisticians with the FPS Information Unit in the published General Pharmaceutical Services Statistics.

Information from the Masterfile is also used by Information Unit to assign British National Formulary (BNF) chapters to specific drugs, for analysis in the published statistics.

The Data Analyst team within BSO are the administrators of the Drug Tariff Masterfile. The process for producing an updated Northern Ireland Masterfile on a monthly basis is outlined in Figure 3.

Figure 3: Monthly process for producing an updated Northern Ireland Drug Tariff Masterfile

The steps outlined above provide a robust and accurate Drug Tariff Masterfile on a monthly basis. However, the process is entirely dependent on the expertise of the Data Analyst team within BSO. It is recognised that the reliance on specific individuals carries a risk in terms of potential quality issues. For example, if a member of the data analyst team becomes unavailable this could cause major issues in relation to the running of the monthly automation process, and subsequently to the

payment run. Although a secondary concern, this would also have the potential to impact on the statistical reporting process.

It is, however, important to state that there are no current concerns over the accuracy of the Drug Tariff Masterfile and assurance is derived from the importance of the data source in ensuring the accurate levels of reimbursement provided to prescription contractors. In addition, training has now been facilitated to the extent that there are now two additional analysts within the team, without jeopardising the necessary compartmentalization, who are capable of running the Masterfile Build process to a high degree of accuracy should the primary data analyst be unavailable.

Validation checks are also carried out throughout the process outlined in Figure 3, with further checks at the end. A file documenting these checks gets updated each month. In addition, detailed production notes are made throughout the process, which will highlight anomalous results should they arise; for example, where an unexpected number of rows are returned after a specific query is run.

After the completion of the build process, the current month's Masterfile is audited by the Drug Tariff team who exist independently of the Data Analyst team. They pull reports that provide extensive quality control checks, and ensure all changes on the drug tariff have been captured by the data analyst running the build. This not only increases the accuracy of the data, but as they are independent of the Data Analysts, reduces the chances of the falsification of data due to confirmation bias.

After the feedback from the Drug Tariff team has been applied, and following the completion of the auto-coding build process, a report is generated in Excel format showing pack deletions from multipacks, new packs and pack size changes in the current month Masterfile. This report is sent to the pharmaceutical advisor, or in case the pharmaceutical advisor is unavailable, the Drug Tariff co-ordinator, both of whom operate independently of the Data Analyst team. Quality checks are provided regarding to Special Container status, and minimum and maximum quantities; ensuring strict adherence to the payment rules. This feedback is then incorporated into the build prior to the extracts being sent to DXC, ensuring error is not compounded by automation.

The current change request process happens manually and is usually undertaken by a member of the data analyst team.

Communications with Data Supply Partners

Data source: Pharmaceutical Family Practitioners Payment System

NISRA Statisticians within BSO can access Pharmaceutical Services Payment information directly via tables held in Microsoft SQL Server Management Studio which sits on a secure network server within BSO. This data is only accessible following a written request to IT within BSO and is only granted following managerial approval. These SQL tables are created by IT staff within BSO in conjunction with other BSO business areas and tested prior to being used.

Statisticians within FPS Information Unit work closely with the BSO FPS Pharmaceutical Payment team, BSO Data Analysts and relevant IT staff which helps facilitate frequent informal and formal contact to discuss/review statistical methodology and requirements (including advice on variable list and functionality), as well as data quality issues. Tailored guidance has been circulated and formal presentations given to ensure that data providers are aware of their responsibilities under the Code of Practice for Statistics, particularly with regard to pre-release practices.

Statisticians within FPS Information Unit are also represented on the FPPS Service Review Group. This was formed to coordinate the FPPS solutions maintenance and management going forward when the new system was introduced. Some objectives of this are:

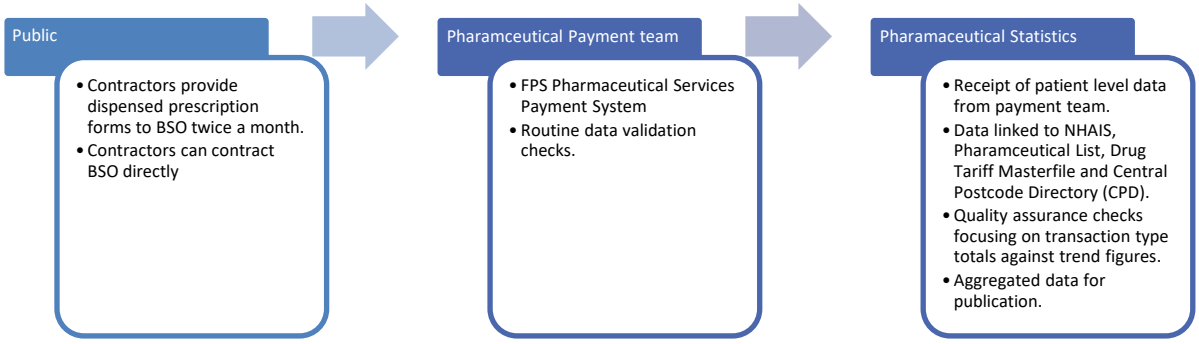
- Work with FPS Solutions Team in the recording, monitoring and resolution of issues and problems with FPPS System as and when they arise
- Identify and agree changes to FPPS System and establish business justifications for any additional spend
- Prioritise system developments in conjunction with business need
- Co-ordinate any updates and changes to FPPS System as and when necessary
- Compile and deliver a report of their activities to the FPS and ITS ADs on at least an annual basis.

Also the BSO Analysts Liaison Group (ALG) provides an information sharing forum between the NISRA statisticians based in FPS Information Unit and the Data Analysts embedded in each of the FPS payment teams. It can also be used to commission and take forward projects that will be of mutual benefit to the information function within FPS. Some objectives of this group are:

- To inform each other with regard to any planned changes to existing data tables, development of new data tables or implementation of new/updated coding classifications.
- To highlight any data quality issues that may have been unearthed, consider possible resolutions and to discuss ways to improve FPS data quality in general.
- To update each other as to how FPS information is being used both within the payment teams, as part of projects and to develop Official Statistics.

Communication between the BSO FPS Pharmaceutical Payment team and contractors (community pharmacies, dispensing doctors and appliance contractors) is regular. Detailed guidance on submitting prescription forms for payment is provided to contractors. The BSO FPS Pharmaceutical Payment team also monitor volumes and processing times to ensure processes are efficient and KPI targets are met.

Flow:



Data source: NHAIS

NISRA Statisticians within BSO can access GP Registration information directly via tables held in Microsoft SQL Server Management Studio which sits on a secure network server within BSO. This data is only accessible following a written request to IT within BSO and access is only granted following managerial approval. These SQL tables are created by IT staff within BSO in conjunction with other BSO business areas and tested prior to being used. IT staff have also set up an automated process so that certain SQL tables are updated nightly.

Statisticians within FPS Information Unit work closely with the BSO FPS Registration team and relevant IT staff which helps facilitate frequent informal and formal contact to discuss/review statistical methodology and requirements (advice on variable list and functionality for future NHAIS replacement, for example), as well as data quality issues. Tailored guidance has been circulated and formal presentations given to ensure that data providers are aware of their responsibilities under the Code of Practice for Statistics, particularly with regard to pre-release practices.

Communication between the BSO FPS Registration Team and GP Practices is regular. Detailed guidance on the registration process is provided to GP Practices with volumes and processing times monitored to ensure processes are uniform and efficient.

Data source: Pharmaceutical List

NISRA Statisticians within BSO can access information on the latest dispensing contractors list directly via tables held in Microsoft SQL Server Management Studio which sits on a secure network server within BSO. This data is only accessible following a written request to IT within BSO and is only granted following managerial approval. These SQL tables are created by IT staff within BSO in conjunction with other BSO business areas and tested prior to being used.

Statisticians within Information Unit maintain good lines of communication with the Professional Support team who administer the Pharmaceutical List. Dedicated staff within this team are responsive to any queries or issues relating to Information Unit's use of data relating to prescribing contractors.

Statisticians within FPS Information Unit are also represented on the FPPS Service Review Group. If any changes are required to Pharmaceutical List, this group will agree, monitor and resolve problems with it as and when they arise. If at any point the HSCB changed their process regarding how

contractors are added to the Pharmaceutical List, BSO would ensure their processes are adapted accordingly. These changes would go through this FPPS Service Review Group and prioritise system developments in conjunction with business need.

Data source: Drug Tariff Masterfile

NISRA Statisticians within BSO can access information derived from the Drug Tariff Masterfile directly via tables held in Microsoft SQL Server Management Studio which sits on a secure network server within BSO. This data is only accessible following a written request to IT within BSO and access is only granted following managerial approval. These SQL tables are created by IT staff within BSO in conjunction with other BSO business areas and tested prior to being used.

Statisticians within FPS Information Unit work closely with the Data Analyst team which helps facilitate frequent informal and formal contact to discuss/review statistical methodology and requirements as well as data quality issues.

Quality Assurance Principles, Standards and Checks by Data Supplier

Data source: FPS Pharmaceutical Services Payment System

Quality assurance checks are carried out at each stage throughout the pharmaceutical payment process, both pre-payment and post-payment.

Various checks are carried out during the form collection process – between the contractor and authorised courier on point of collection (if applicable), and between the courier and BSO staff on receipt of forms.

During the payment process, rigorous quality checks are in place to ensure accurate processing. Examples include:

- Valid prescription forms are printed on distinct secure paper that makes them very difficult to be used in fraudulent activity.
- The auto-coding of drug items, built into the scanning process, includes a series of validation checks. Prescription items are automatically linked to GP prescribing information and a series of rules must be passed around quantities, cost and prescriber information. There are additional validation rules in place to highlight any irregularities or to manually check certain prescriptions such as high valued items.
- Prior to payments being made, a series of high level checks are carried out – this includes checking that all forms received have been processed and examining monthly payment tolerances.
- Checks are carried out to ensure that the prescriber noted on the prescription is authorised to do so. BSO hold live information on authorised prescribers, for example GPs and Dentists (sourced from the Common Practitioner Model).
- BSO also retain up-to-date information on licenced contractors and dispensers (sourced from the Pharmaceutical List). This information is used to validate and make reimbursement payments for dispensed items.
- A number of internal KPIs/targets are in place to measure the accuracy and efficiency of the system.

Post-payment, contractors are provided with an electronic payment report. This enables them to effectively validate the payments they receive.

In a small number of cases, an error is identified whereby a reimbursement has been incorrectly made (either over or under). These payments are corrected on identification, and data is amended accordingly.

Note: At the dispensing and reimbursement stage, no checks are carried out to assess the eligibility or validity of the receiving patient. It is assumed that a patient in receipt of and presenting a valid prescription for dispensing is entitled to that prescription.

Data source: NHAIS

There are numerous checks carried out on patient registration data to minimize the risk to data quality both at source e.g. GP Practice and upon receipt of data in the BSO. Types of checks include checking for duplication against pre-existing registration details on internal and external systems, checking that all required fields are complete and checking supporting documentation such as proof of address where appropriate. Issues that arise are duplicate registrations, poor data entry, incorrect demographic details e.g. postcode etc. Quality indicators include no duplication of patients, 100% check of all new patient registrations at BSO side, and, validation of registration work by management.

Further to checks carried out at time of transaction as detailed above data are cleaned at the end of each quarter by the BSO using, for example, the following checks:

- checking countries of origin/destination are complete and the correct codes have been assigned;
- ensuring dates are in the correct format;
- ensuring that information has been collected for all records; and
- checking that reasons for movements are standardized across the records.

When NHAIS was first implemented in NI in 2004-2006, BSO established a Data Quality Team to help tackle GP list inflation. Using NHAIS information, Dental information and the Electoral Roll, GP Practices were visited to establish if registered patients were accessing NHS treatment. Outcomes included patient detail changes such as address updates, patients being classified as 'whereabouts unknown/left NI' and subsequent removal, and, BSO writing directly to the patient with removal being a potential outcome. Unfortunately, no documentation exists quantifying the number of records that were cleaned/removed as a result of this exercise. Currently the BSO do not currently have a data quality team. A project is underway to replace the NHAIS system and as part of this project FPS Statisticians and FPS Registration team have sought assurances that a data cleanse exercise will take place after migration of data to the new system to ensure data held and future data input is in a consistent format.

The BSO Registrations team along with external consultants carried out a Kaizen (lean) Project in 2018 with focus on improving the processing of patient registrations. Actions that followed included data collection guidance booklets and posters being issued to GP Practices, ongoing training provided to GP Practice Managers, and, actively monitoring registration processing times through Key Performance Indicators.

A Counter Fraud Unit within BSO look into fraudulent registrations and claims, and the Access to Health Team in BSO carries out further post registration eligibility checks.

Statisticians within FPS provide high level aggregated data to feed into Key Performance Indicators (KPI's) to direct attention to areas of the registration process that require attention/intervention. This includes information on volumes and processing times of both complete and incomplete registrations (available at practice level and by registration type).

Data source: Pharmaceutical List

Before entering information based on a pharmacy application onto the Pharmaceutical List, the Professional Support Team in BSO are provided with signed email authorisation from HSCB. If this is not provided it is referred back to the HSCB. If data such as address or details of the contractor are not correct these are also referred back to HSCB.

In order to minimise risk, when Professional Support Team register a dispensing contractor or edit changes on the Pharmaceutical List, this is checked by another member of staff for accuracy. Detailed process guidance is in place for updating the list and this includes details on validation checks and a quality control check list.

If data issues are encountered during routine business e.g. address or information not matching during the processing of claims, this will be flagged to the Professional Support team who may refer back to HSCB.

Pharmaceutical List users, including NISRA statisticians, also raise any data quality issues encountered and feed back to the Professional Support Team.

In addition, internal audit and external auditors carry out checks on the data within Pharmaceutical List.

Data source: Drug Tariff Masterfile

The steps outlined previously ensure a robust and accurate Drug Tariff Masterfile is produced on a monthly basis.

Validation checks are carried out throughout the process outline above, with further checks at the end. A file documenting these checks gets updated each month. In addition, detailed production notes are made throughout the process, which will highlight anomalous results should they arise; for example, where an unexpected number of rows are returned after a specific query is run.

A series of additional audits and quality checks are carried out each month by the Drug Tariff team and the pharmaceutical advisor/drug tariff co-ordinator, each of whom are external to the data analyst teams.

Producers Quality Assurance Investigations and Documentation

Note on change of database source for the General Pharmaceutical Services Statistics

From Q2 2021/22 onwards (with data revised to the beginning of the 2021/22 financial year), a new SQL database (PRD) has been introduced as the main, immediate, database source for data for the General Pharmaceutical Services Statistics.

This database and associated tables have been designed and produced by the Data Analyst team within the BSO. The underlying sources for this information (the Pharmaceutical Services Payment System, NHAIS, the Pharmaceutical List and the Drug Tariff Masterfile) are unchanged from the previous databases used. However, the new system does include a number of simplifications and improvements in terms of how Information Unit analyses these data, including the table structure and included variables. The Data Analyst team have undertaken a process of pre- and ongoing consultation with Information Unit on this new database system to ensure that any impact on the production of the statistics is minimal.

These changes have enhanced the quality of the statistics produced and have therefore resulted in minor discontinuities with earlier series of data. Analysis for the first quarter of 2020/21 has shown that the enhancements have resulted in quarterly differences to figures of around 0.1-0.2% in respect of geographical breakdown and up to 0.5-0.6% for certain age categories. Differences of this magnitude will not distort any trend analysis.

There have been some more significant differences to some categories in those tables containing a BNF classification (taken from the Drug Tariff Masterfile). The new PRD database removes any historical differences between the BNF chapter classifications used in our publications and those used by the NHS Business Services Authority in England, ensuring consistency when making comparison between Northern Ireland and England. It should be noted that the reporting of BNF has recently been reviewed in England as well to further improve consistency.

Previously over 99.5% of items prescribed and dispensed in Northern Ireland had the same BNF chapter classification as in England. Of the 0.5% of items that originally differed in classification from England, the overwhelming majority (around 99.6%) referred to items previously counted as Appliances (Chapter 21) being reclassified into the Eye (Chapter 11), Ear, Nose and Oropharynx (Chapter 12) and Skin (Chapter 13) chapters - this has now been rectified.

The impact of this change in source database will continue to be monitored with any further changes discovered highlighted in future editions of the General Pharmaceutical Services Statistics and associated quality documentation.

Data source: Pharmaceutical Family Practitioners Payment System

As the main source of pharmaceutical data is independent contractors (via the payment process), statistical producers' ability to influence the data collection quality assurance is more limited than would be the case if we were dealing with other public bodies. Influence is limited to providing advice on data quality issues uncovered and proposing solutions.

The main validation checks on pharmaceutical within BSO are carried out by the Pharmacy Payment and Data Analyst teams prior to import of data into SQL tables used by statistical producers.

On a quarterly basis, analysis on data held in these SQL tables is run to produce dispensing information for the General Pharmaceutical Services Statistics. A series of validation checks are carried out to ensure the data are robust. These include:

- Key totals (number of items, total ingredient cost) are recorded and sensed checked with previous totals – this include trend analysis;
- Checks for internal consistency are carried out.

If anomalies in the data are found, SQL code used is first reviewed and if correct, this is then fed back to the IT Team responsible for producing the SQL tables (and, if required, Payments team) to ensure that all data has been captured correctly and an explanation provided for the change in trend.

Data is validated and edited using primarily SQL code and output and Microsoft Excel. Some manual checks are required which introduces minimal risks to quality and validation of the data. Additional validation checks continue to be built in where a need is identified.

Information Unit statisticians are currently creating detailed Standard Operation Procedures (SOPs) documents for the above processes and checks. In addition, Official Statistics publications include information on data sources, definitions and user guidance for the benefit of users.

Data source: NHAIS

As the main source of GP Patient Registration data is independent contractors, statistical producers' ability to influence the data collection quality assurance is more limited than would be the case if we were dealing with other public bodies.

Influence involves providing advice on data quality issues uncovered and proposing solutions. The HSC R1 form used to capture GP Patient Registrations at contractor side was designed with the aid of statisticians to ensure that all relevant data was captured in a consistent format to serve both primary and secondary purposes.

The main validation checks on GP Patient Registration Data within the BSO are carried out by the registrations team prior to import of data into SQL tables used by statistical producers.

On a quarterly basis data held in these SQL tables is run to produce the demographic analysis included in the General Pharmaceutical Services Statistics official statistic outputs. A series of validation checks are carried out to ensure the data are robust, including trend and internal consistency checks.

Further quality assurance in the NHAIS is derived from the processes followed in the production of the Information Unit's General Medical Services Statistics. On a quarterly basis when data is imported into tables held in Microsoft SQL Server Management Studio from NHAIS, code is run to produce outputs for these statistics. This code includes checks to ensure that data is robust such as comparing counts of registrations, deductions, amendments etc. with trend figures for consistency as well as quantifying data gaps e.g. country of origin for non-UK registrations. While there is no set measure of tolerance in terms of quarterly/annual differences, records of back series comparisons help the statistical producer to judge if particular data is out of kilter with historical trend. If significant anomalies in the data are found, this is first fed back to the IT Team responsible for producing the SQL Tables to ensure that all data has been captured correctly.

Issues identified with individual records are fed back initially to the BSO Registrations team for investigation and if necessary to the data supplier. Examples include:

- Missing country of origin data is quantified and fed back to FPS Registration team to trigger manual searches against registration forms to populate the missing data.
- Issues arising from GRO Death data not matching NHAIS data are fed back to the BSO Registrations team who will investigate and if required communicate back to the data supplier.

Overall counts of Registered Patients are checked against Global Sum payment calculation lists to ensure that all patients are allocated to the correct practice and that relevant practices are included. Practice data comes from the Common Practitioner Model (CPM) which serves many purposes and for administrative or clinical reasons a practice may appear still functional on CPM e.g. to allow for outstanding payments or test results to be returned. Checking against Global Sum data ensures that only active practice data is included in published statistics for a given point in time.

Statisticians in the General Medical Services statistics team also carry out hierarchical matching of NHAIS addresses against the Land and Property Services Pointer Address List to create a Master Address File that includes a Unique Property Reference Number (UPRN) for each address recorded. However, the majority of data cleansing happens outside the NHAIS system. Statisticians in this team have created detailed SOPs for the above processes and checks.

Data source: Pharmaceutical List

As the administrators of Pharmaceutical List are the Professional Support Team and the data suppliers are the HSCB (via the information included in pharmacy applications), statistical producers' ability to influence the data collection quality assurance is somewhat limited.

Influence is limited to providing advice on data quality issues uncovered and proposing solutions.

On a quarterly basis, data originally sourced from the Pharmaceutical List is used in the production of the General Pharmaceutical Services Statistics. Information on the pharmacy contractors is used to produce data for both the quarterly and annual publications. A series of validation checks are carried out to ensure the data are robust. These include trend and internal consistency checks. If significant anomalies in the data are found, SQL code used is first reviewed and if correct, this is then fed back to the Professional Support Team to ensure that all data has been captured correctly and an explanation provided for the change in trend.

Data from this source is also used in other areas of Information Unit's work, including, for example, ad hoc queries. Again, where issues are spotted, these are raised with the Professional Support team who will amend as necessary. This provides further assurance around the quality of the data sourced from the Pharmaceutical List which is used for the General Pharmaceutical Services Statistics.

Data source: Drug Tariff Masterfile

As the administrators of the Drug Tariff Masterfile are the Data Analyst team and the original source is the Dictionary of Medicines and Devices, statistical producers' ability to influence the data collection quality assurance is limited.

On a quarterly basis, data sourced from the Drug Tariff Masterfile is used in the production of the General Pharmaceutical Services Statistics, specifically analysis by BNF Chapter. A series of validation checks are carried out to ensure the data are robust. These include trend and internal consistency checks. If significant anomalies in the data are found, SQL code used is first reviewed and if correct, this is then fed back to the Data Analyst team to ensure that all data has been captured correctly and an explanation provided for the change in trend.

Strengths

Data source: Pharmaceutical Family Practitioners Payment System

- The Pharmaceutical Family Practitioners Payment System processes approximately two million prescription forms, which equates to approximately 3.5m items, per month for payment to dispensing contractors across Northern Ireland. Given the importance of this function, sophisticated processes are in place to ensure accuracy. This process is subject to extensive validation, monitoring (though KPIs/targets) and periodic audit.
- The process includes increasing levels of automation – both through the prescription scanning and auto-coding processes, thus reducing the capacity for human error. When manual data entry is required, experienced and well-trained staff follow established procedures, and extensive quality assurance processes are in place.
- Currently, over 90% of prescriptions are successfully scanned and a valid HCN is captured. This allows linkage to patient level GP registration data via NHAIS – providing a rich source of demographic information, facilitating a wide range of potential analysis to meet existing and future user needs.
- Data suppliers and producers are in regular communication to aid understanding of processes and facilitate resolution of issues.

Data source: NHAIS

- The GP Registered Patients Index is a comprehensive source of information that can be used to present demographic characteristics of patients at geographical level.
- The data are used to inform payments to contractors and hence are subject to extensive scrutiny and periodic audit.
- Data are collected in a consistent format using the HSC R1 form which contains detailed completion guidance along with relevant links and contacts. GP Practices are also provided with additional guidance and training to aid standard completion of the form.
- Unit record data are available, allowing patient level matching and a greater depth of analysis to be undertaken.
- The process for collection, quality assurance and storage of GP Registered Patient data has been recently audited and audit recommendations are being actioned.

Data source: Pharmaceutical List

- A dispensing contractor can be traced using a range of data on the Pharmaceutical List such as name, chemist number, premises number, address etc. In addition, the inclusion of on- and off-list fields facilitates analysis for previous periods.

- Pharmacy contractors are legally required to inform the BSO/HSCB of any change to their circumstances – this information will then be updated on the Pharmaceutical List.

Data source: Drug Tariff Masterfile

- There is a detailed and well-established process in place to adapt the English Drug Tariff to Northern Ireland. This process ensures a robust and accurate Drug Tariff Masterfile is produced on a monthly basis.
- A series of quality control checks are carried out during each month's Masterfile build – by the Data Analyst team itself, and by the Drug Tariff team and the pharmaceutical advisor/drug tariff co-ordinator, each of whom are external to the data analyst teams.

Weaknesses

Data source: Pharmaceutical Family Practitioners Payment System

- For those prescription forms that were not scanned, HCN numbers are not recorded and therefore it is not possible to link to demographic information. The proportion of such forms is small (less than 10%) and has decreased in recent years. It is likely that this will decrease further with the aforementioned OCR project. In addition, analysis of the patient attribute information, for the forms where this information was available in 2020/21, showed no significant bias and is considered to be representative of patient prescribing patterns across Northern Ireland.
- The data collected by BSO only includes prescriptions provided for reimbursement by community pharmacists, dispensing doctors and appliance suppliers. The information does not include prescribing in a secondary care or private setting for example medications received while in hospital.
- The standard lag for dispensed prescriptions to be reimbursed is one month – for example, January 2021 dispensed prescriptions will generally be reimbursed in the February 2021 payment, made towards the end of the month. There will, however, be some that lie outside this timeframe.

Data source: NHAIS

- Not all outflows, or internal patient movements, are measured fully by the GP Registered Patients Index, or can be lagged, as they require the patient to notify the GP or BSO.
- It is assumed that there is a lag between the date of arrival in Northern Ireland and appearing on the GP Registered Patients Index. Similarly, it is assumed that there is a lag between leaving Northern Ireland and deregistration.
- Free text input of data in the existing system can lead to some error and inconsistencies but this will only have minimal impact on the overall statistics.
- The GP Registered Patients Index is subject to list discrepancy of approximately +5%. However this is only a weakness if using to inform Northern Ireland Population counts but remains an accurate count of number of live GP Registrations.

Data source: Pharmaceutical List

- While there are no concerns over the quality of the data, the current process of updating the Pharmaceutical List is somewhat onerous for the Professional Support team. The aforementioned plans to commission Common Practitioner Model (CPM) Pharmacy to update the live Pharmaceutical List will result in improvements to the updating process.

Data source: Drug Tariff Masterfile

- The current process is entirely dependent on the expertise of the Data Analyst team within BSO. It is recognised that the reliance on specific individuals carries a risk in terms of potential quality issues. For example, if a member of the data analyst team becomes unavailable this could cause major issues in relation to the running of the monthly automation process, and subsequently to the payment run. It is, however, important to state that there are no current concerns over the accuracy of the Drug Tariff Masterfile.