NHS
Business Services Authority

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Prescription Cost Analysis – England 2019

Background information and methodology

Document release note

Document name: Prescription Cost Analysis – Background Information and Methodology

Document details name	Version number	Description
Prescription Cost Analysis – Background Information and Methodology	v002	Document providing background information and details on methodologies used for the annual PCA National Statistic publication.

Revision details revision number	Revision date	Revision description	Page number	Previous page number	Action taken	Addenda / new page
v002	05/02/2021	Amended section 6 on UK comparability.	16		Added wording to expand on comparability.	
v002	05/02/2021	Added in new chapter in section 3 on suitable PCA use cases.	9		Added wording to explain PCA use cases.	

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About this document

This document is intended to provide detailed information about prescription data, including the processes carried out to transform a prescription issued by a prescriber into a figure included in these statistics. This document also provides information on the methodologies used in these statistics and used in an operational context to ensure the accuracy and trustworthiness of these data.

This is a living document that will evolve and be updated over time to ensure that the most up to date and relevant information is included.

About these statistics

The Prescription Cost Analysis (PCA) publication shows the total cost for drugs, dressings and appliances, and number of prescription items, for prescriptions that have been dispensed in the community in England. These statistics are designed to be able to be used to give the total number of items and spend for any individual presentation, or at any other level of the British National Formulary (BNF) hierarchy, for example, antibacterial drugs or antidepressant drugs. They can also be used to give the proportion of prescription items and spend that are prescribed and dispensed generically.

This publication can have a wide range of uses including informing government policy, allowing public scrutiny of national prescribing habits, and use by industry to monitor uptake of proprietary presentations.

1. Background information

A prescription goes through a number of stages before the data extracted from it ends up in our administrative data warehouse and subsequently in this publication.

The prescription starts its journey when being issued by a GP, nurse or other authorised prescriber within a primary care setting. A prescription can be issued in paper form or as an electronic prescription via the Electronic Prescription Service (EPS). At the time of publishing, EPS prescription items account for approximately 75% of all prescription items. This prescription is then taken, or in the case of EPS sent, to a dispensing contractor to be dispensed. A contractor submits their prescriptions at the end of every month for reimbursement to the NHS Business Services Authority (NHSBSA), for EPS a contractor submits their electronic messages to the NHS Spine maintained by NHS Digital, and from there it is sent to the NHSBSA for processing.

Once received by the NHSBSA paper prescriptions are scanned and transformed into digital images, which are then passed through Intelligent Character Recognition (ICR) to extract data from the paper form. The majority of paper forms go through ICR without any manual intervention. However, there are cases when operator intervention is required in order to accurately capture the relevant information from the prescription form. This manual intervention can be required for a multitude of reasons, such as if a form is handwritten or information is obscured by a pharmacy stamp.

All prescription data, paper and electronic, is processed via the Capacity Improvement Program (CIP) database. This is the main transactional database for all prescription data

that is used for the reimbursement of dispensing contractors. Data is then passed to the Dedicated Payment of Contractors (DPC) database to calculate the final payments that are to be made to dispensing contractors.

Prescription data is also extracted from CIP and loaded into the NHSBSA Information Services Data Warehouse. During this extract, transform and load (ETL) process business logic is performed on the raw transactional data to transform it into easier to use information for NHSBSA information systems. The data held in the NHSBSA Information Services Data Warehouse then has further business logic applied to it, explained in the methodology below, to form the tables that are used in these statistics.

2. Methodology

Generic (unbranded) prescribing is encouraged and many drugs are now prescribed generically even when they are not available in generic form. Within PCA data prescriptions for drugs are classified in four ways:

Class 1 – Drugs prescribed and available generically

Class 2 – Drugs prescribed generically but only available as a proprietary product

Class 3 – Drugs prescribed and dispensed by proprietary brand name

Class 4 – Dressings, appliances and medical devices

In 2019, 84% of all prescription items dispensed in England in 2019 were prescribed generically. However, some presentations can be prescribed generically where an actual generic does not exist, these presentations are given a preparation class of 2, which describes them as a drug able to be prescribed generically but only available as a proprietary presentation. In order to represent these preparation class 2 presentations more in real world terms the NHSBSA have applied an apportionment methodology to the data to share items prescribed in this manner across their proprietary equivalents. This methodology is used as the NHSBSA is unable to determine the presentation that has actually been dispensed by the dispensing contractor and therefore cannot be certain what proprietary drug has been issued in these instances.

A generic preparation class 2 presentation with only one proprietary preparation class 3 equivalent will have all generic items and costs assigned to the proprietary presentation, provided there has been prescribing for the proprietary presentation.

Where a preparation class 2 presentation has multiple preparation class 3 equivalents an apportionment of the generic items and costs has occurred across all of the proprietary drugs. This apportionment is based on the proportion of prescribing that each proprietary presentation is responsible for. Due to this apportionment a presentation may be reported as having a fraction of items dispensed where this has not occurred in reality i.e. 10.5 or 16,567.7.

For preparation class 1 presentations the NHSBSA is also unable to determine the supplier of the actual generic product that was dispensed, but sometimes a presentation is prescribed as an actual generic preparation class 5 presentation rather than its virtual

equivalent. Where this has occurred we have aggregated all data under the virtual preparation class 1 record.

Presentations can change preparation class throughout the year e.g. if a presentation is no longer on patent and generic versions are able to be produced the drug would change from class 2 to class 1. New drugs are expensive to develop; therefore when a new medicine comes to market they are initially available as proprietary products only, exclusively from the pharmaceutical company that developed them with a higher price for a number of years. This is known as being 'in patent'.

To avoid disaggregation of data these statistics use the latest preparation class of each presentation available within the dataset i.e. from December or the latest month the presentation was a valid prescribable product. NHSBSA Information services releases an administrative data feed of monthly Prescription Cost Analysis data. The monthly Prescription Cost Analysis data files available on the NHSBSA website use the preparation class of the drug as it was at the end of the month the data relates to.

Examples of methodology in practice

Following are some generalised examples of the apportionment methodology:

A generic preparation is prescribed which is a class 2 presentation, and where these is only one proprietary equivalent

Generic drug A is a preparation class 2 presentation with only one preparation class 3 equivalent, proprietary drug A. 80% of prescription items have been prescribed generically, with the remaining 20% prescribed as the proprietary presentation, we have then apportioned all items and costs for the generic presentation to the proprietary presentation in these statistics.

Table 1a: Raw data before apportionment applied – one to one mapping

Presentation	Preparation Class	Items	NIC (£)
Generic drug A (e.g. Paracetamol 500mg tablets)	02	80,000	120,000.00
Proprietary drug A (e.g. Panadol Advance 500mg tablets)	03	20,000	30,000.00

Table 1b: Data after apportionment applied, as displayed in these statistics – one to one mapping

Presentation	Preparation Class	Items	Items (of which class 2)	NIC (£)	NIC (£) (of which class 2)
Proprietary drug A (e.g. Panadol Advance 500mg tablets)	03	100,000	80,000	150,000.00	120,000.00

Generic preparation class 2 presentation with multiple proprietary equivalents

Generic drug B is a preparation class 2 presentation with three preparation class 3 equivalents, proprietary drugs B1, B2 and B3. 50% of prescription items have been

prescribed generically with the remaining 50% prescribed between the proprietary presentations. We have then apportioned the generic items between these proprietary presentations based upon the percentage share they have of the remaining prescribed items.

Table 2a: Raw data before apportionment applied – one to many mapping

Presentation	Preparation Class	Items	NIC (£)
Generic drug B	02	500,000	1,000,000.00
Proprietary drug B1	03	250,000	500,000.00
Proprietary drug B2	03	150,000	300,000.00
Proprietary drug B3	03	100,000	200,000.00

Table 2b: Data after apportionment applied, as displayed in these statistics – one to many mapping

Presentation	Preparation Class	Items	Items (of which class 2)	NIC (£)	NIC (£) (of which class 2)
Proprietary drug B1	03	500,000	250,000	1,000,000.00	500,000.00
Proprietary drug B2	03	300,000	150,000	600,000.00	300,000.00
Proprietary drug B3	03	200,000	100,000	400,000.00	200,000.00

Changes to the way drugs and appliances are displayed

For many years the NHSBSA has maintained two databases as the source of our drug information for prescription data. These are Master Data Replacement (MDR) which holds drug information used for reporting purposes, and Common Drug Reference (CDR) which holds information used for the processing and reimbursement of prescriptions, and is used to populate the Dictionary of Medicines and Devices (DM+D)[1]. These databases were becoming increasingly difficult to maintain and reconcile, with each have differing authoring policies and naming conventions for presentations. Therefore a decision was made to transition to a single source of drug information, with the project being coined internally as the 'One Drug Database' project.

In March 2020 we successfully decommissioned the legacy MDR system and transitioned all of our drug information to CDR to have a single source for reporting and processing purposes. This has resulted in changes to the naming conventions used for presentations in this publication compared to previous publications released by NHS Digital. Presentations are now aligned with DM+D naming conventions, meaning we have moved from the format of *Paracet_Tab 500mg* to *Paracetamol 500mg tablets*.

BNF Hierarchy changes

As part of the changes brought about by our move to a single source of drug information a number of presentations that have appeared in previous releases in these statistics have been removed. The items and costs associated with these presentations have been mapped to other existing presentations. This particularly affects inhalers and presentations that

[1] DM+D is maintained by NHS Prescription Services with support from NHS Digital.

contained the pack size of the presentation within the drug name, such as *Glyceryl Trinit_Sub P/Spy 400mcg (180D)* and *Glyceryl Trinit_Sub P/Spy 400mcg (200D)*. These presentations and any data they contained will now be aggregated under a single presentation called *Glyceryl trinitrate 400micrograms/dose pump sublingual spray*.

In some cases presentations have been recoded and changed chemical substance / paragraph / section / chapter that they sit under in the BNF hierarchy. Therefore, the distribution of data between BNF chapters / sections / paragraphs / chemical substances will have changed between this publication and historical publications.

Some items which were previously captured as unspecified (unknown) are now captured against a presentation.

Quantity changes

Some presentations were listed on our legacy MDR system with a special container pack size included as part of the drug name. For these presentations the quantity captured was typically represented as the number of special container packs. As discussed above, these presentations are no longer authored this way after our transition to a single source of drug information, therefore the quantity captured for these items will now be represented as the total quantity i.e. the total number of grams, millilitres etc. rather than the number of containers.

3. Strengths and Limitations

Strengths

The main strength of these statistics is the completeness of the dataset and accuracy of information captured during processing activities carried out by the NHSBSA. This dataset covers all primary care prescribing that has been dispensed in the community in England, with consistency in the way data has been captured applied across the whole dataset. All of the data has come from the same administrative source. This administrative data is required to be as accurate as possible as it is used for paying dispensing contractors for services provided to NHS patients.

The NHSBSA's decision to transition to a single source of drug information also means that the accuracy of these statistics has increased, with known issues and limitations with the previous legacy system being eliminated. These limitations included presentations that were incorrectly listed as preparation class 1. This includes items previously captured as unspecified drugs now being capture correctly and an increase in the accuracy of capture of quantity information about prescribed drugs. Also due to the editorial policy of DM+D, there is now greater consistency in the naming of presentations.

This move also means that these statistics are also aligned with the DM+D, allowing easier linking and comparisons to be drawn between other drug related datasets.

Limitations

The NHSBSA is unable to determine the true actual medicinal product that is dispensed, and therefore uses the methodology stated above. This means that figures quoted in this publication for some presentations are estimations rather than true reflections of the volumes

of dispensing. We are also unable to determine the individual suppliers of generic presentations that are dispensed.

These statistics exclude prescriptions that were issued but were not presented for dispensing and prescriptions that were not submitted to the NHSBSA for processing and reimbursement. Prescriptions issued and dispensed in prisons, hospitals and private prescriptions are also excluded.

Uses of PCA

When using the Prescription Cost Analysis (PCA) statistical publication, users should take into account the considerations outlined in this document.

PCA serves a clear function, and as such, does not satisfy all use cases. See our Official Statistics guidance table [link] for a short summary of the key criteria covered by PCA. To expand on the points outlined in that document, see the below summaries for suitable / unsuitable uses for PCA.

PCA can be used for:

- Obtaining a national view of costs and volumes for prescriptions dispensed in the community in England across the calendar year.
- Analysis of cost and volume trends across various levels of the BNF hierarchy.
- Allowing public scrutiny of national prescribing habits.
- Monitoring uptake of new to market proprietary presentations.
- Monitor the proportion of prescriptions dispensed generically.

Additional data tables have also been supplied as part of the release which enable analysis of some key areas of interest.

PCA cannot be used for:

- Providing breakdowns across any level of geography.
- Providing a final figure representative of the total cost to the NHS. The final cost measure used in this publication, net ingredient cost (NIC), does not consider all elements that contribute towards the final cost to the NHS, for example remuneration to contractors, discounts, advance payments, and patient charges. Additionally, the data only includes items prescribed in multiple health care settings including secondary care, and subsequently dispensed in the community. Items issued and dispensed in secondary care are not included.
- Viewing items dispensed outside of England. The PCA dataset is limited to a view of items dispensed only in the community in England, regardless of whether they were prescribed in England, Scotland, Wales, Northern Ireland, and State authorities such as Guernsey, Jersey, Alderney, and Isle of Man.

- Viewing items and trends that have been prescribed. PCA uses a dispensing view, in which only items that English dispensing contractors including PADM claims submitted to the BSA have been reimbursed for will be shown.

- Investigating flu data. Flu vaccines that have been administered by a dispensing doctor or via personal administration and submitted to the BSA via FP10 will appear in PCA, but this only accounts for a small amount of flu claims. Any administered via pharmacy advanced flu service will not be available in PCA.

- Providing analysis of the method of dispensing. PCA National Statistics provides no distinction between community pharmacies, appliance contractors, dispensing doctors, or PADM's.

Users should note that it is only assumed that the items claimed for on the prescription forms are the same as those dispensed to patients. Whilst it would break the dispensing contractor terms of service to dispense another item (except in instances where a Serious Shortage Protocol is in place), the NHS BSA has no way of confirming this.

4. Revisions

Any revisions that we make to these statistics will be made in line with our Revisions and Corrections Policy. Any significant errors that are identified within these statistics after their publication that would result in the contradiction of conclusions previously drawn from the data will be; notified of prominently on our website and any other platforms that host these statistics; corrected as soon as possible; and communicated clearly to users and stakeholders.

After the release of this publication we will be launching a public consultation on proposed changes to our statistical methodology and will be looking for feedback from users and stakeholders.

In line with our Revisions and Corrections Policy we have released PCA England presentation level data from 2014 to 2018 with this publication to maintain as consistent a time series as possible to accommodate changes within the data necessitated by business process needs. We believe these changes to have increased the quality and usefulness of these statistics by providing consistency in naming conventions between this and other drug data sources, improvements in accuracy of capturing items previously captured as unspecified and improvements to the capture of quantity information.

5. Quality of the statistics

We aim to provide users of this publication with an evidence based assessment of its quality and of the quality of the data from which it is produced. We do so to demonstrate our commitment to comply with the UK Statistics Authority's Code of Practice for Statistics, particularly the pillar of Quality, and its principles that:

Q1 Suitable data sources – Statistics should be based on the most appropriate data to meet intended uses. The impact of any data limitations for use should be assessed, minimised and explained.

Q2 Sound methods – Producers of statistics and data should use the best available methods and recognised standards, and be open about their decisions.

Q3 Assured quality – Producers of statistics and data should explain clearly how they assure themselves that statistics and data are accurate, reliable coherent and timely.

Details of how we define statistical quality can be found in our Statement on Statistical Quality: Guidelines for Official and National Statistics. This is an assessment of the quality of these statistics against the European standard for quality reporting and its dimensions specific to statistical outputs, particularly:

- Relevance
- Accuracy and reliability
- Timeliness and punctuality
- Accessibility
- Coherence and comparability

These principles guide us, and are complimented by the UK Statistics Authority's Regulatory Standard for the quality assurance of administrative data.

Relevance

This dimension covers the degree to which the product meets user need in both coverage and content

The Prescription Cost Analysis publication, released annually, summarises all prescription items dispensed in the community in England for the preceding calendar year, highlighting the high level changes from the previous year and providing the detail for each item prescribed. These statistics have been, and continue to be, used to help inform and monitor the impact of policy relating to community pharmacy and prescribing practice. Additionally these statistics are utilised by academic and applied health researchers, pharmacy contractors and the pharmaceutical industry for a variety of reasons, from investigating public health to calculating market share.

As data that is used to drive policy these statistics are of public interest, to allow public scrutiny of policy decisions made.

Accuracy and reliability

This dimension covers the statistics proximity between an estimate and the unknown true value

Accuracy

These statistics are derived from data collected during processing activities carried out by the NHSBSA to reimburse dispensing contractors for providing services to NHS patients. Prescriptions are scanned and subject to rigorous automatic and manual validation processes to ensure accurate payments are made to dispensing contractors. Where electronic prescriptions are used the scope for manual intervention and input into data is reduced.

The figures used are collected as an essential part of the process of reimbursing dispensing contractors (mainly pharmacists and dispensing doctors) for medicines supplied. All prescriptions which are dispensed in England need to be submitted to NHS Prescription Services within the NHSBSA if the dispenser is to be reimbursed, and so coverage should

be complete. NHS Prescriptions internally quality assures the data that is captured from prescriptions to a 99.50% level via a statistically valid random sample of 50,000 items that are reprocessed on a monthly basis. The latest reported Prescription Processing Information Accuracy from NHS Prescriptions services, which covers the 12 month period October 2018 to September 2019 is 99.74%. Due to the manual processes involved in the processing of prescriptions there may be random inaccuracies in capturing prescription information which are then reflected in the data.

Reliability

As there is a manual data entry element to this system then inevitably some small errors may occur in the data. The NHSBSA and NHS Prescription Services take measures to minimise these errors. This includes the presence of a permanent dedicated accuracy team within NHS Prescription services which provides feedback to operators around any errors identified to help prevent regular occurrence.

Timeliness and punctuality

Timeliness refers to the time gap between publication and the reference period. Punctuality refers to the gap between planned and actual publication dates

The Prescription Cost Analysis is published annually. The publication date is determined by the availability of the data, dependent on the completion of processing by NHS Prescription Services, allowing adequate time for the compilation, and quality assurance, of the publication. The data is usually available six weeks after the end of the month that the data relates to. In future releases the date of release will be scheduled for the beginning of April and the date of release will be announced in advance in line with our statistical release calendar.

Accessibility and clarity

Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice

Accessibility

This publication is presented in an HTML file, with supporting documentation released in PDF format.

Summary data and additional analysis is presented in tables in Excel files, and released in CSV format.

The presentation level data from the summary tables are available via the NHSBSA Open Data Portal, and can be queried via API.

The R code used to produce the publication is also available from the NHSBSA GitLab.

Clarity

A glossary of terms is included in this document.

Coherence and comparability

Coherence is the degree to which data which have been derived from different sources or methods but refer to the same topic or similar. Comparability is the degree

to which data can be compared over time and domain

Comparability and coherence
The PCA publication contains data for all prescriptions dispensed in England. This differs to data provided in the English Prescribing Dataset (EPD), which details prescription items issued in England in primary care, including those dispensed elsewhere in the UK. NHSBSA Information Services provide the monthly EPD administrative data feed, this feed is not an Official Statistic. The PCA data is also a 'dispensing' view of prescription data, apportioning items to products that were most likely dispensed, whereas EPD is strictly a 'prescribing' view of prescription data, showing the item that was written on the prescription form.

We recognise that there is a possibility that users could misinterpret information within the PCA publication as including all prescriptions issued in England, or as relating to numbers of patients, care should be taken as these statistics only relate to items dispensed in the community in England.

The unifying of sources of drug information by the NHSBSA detailed elsewhere in this document have improved the comparability of these statistics between other sources of drug information, such as those in secondary care.

UK Comparisons

The NHSBSA releases the Official Statistics publication on Prescription Cost Analysis in England. Similar releases are produced by the devolved administrations for Scotland, Wales and Northern Ireland. There are a number of important differences between the countries in the way that data measure are collected and classified, and because of differences between countries in the organisation of health and social services. For these reasons, any comparisons made between PCA data produced by different devolved authorities should be treated with caution. However, the main measures of drug cost and volumes of items dispensed in the community are comparable across the different regions.

Comparisons over time
This publication represents the first in a new series by the NHSBSA, and the first PCA England publication with the new data format as result of aligning naming conventions to DM+D. Therefore as part of the 2019 release of Prescription Cost Analysis we have release data from 2014 to 2018 also to allow comparisons over time to be made more easily. Data from the previous series hosted by NHS Digital is available from 2004 to 2018.

Changes to the figures over time should be interpreted in the wider context of the prescribing system as a whole, including in the availability of medicines, release of new medicines, theirs costs and changing prescribing guidelines. All medicines are shown by their latest BNF classification.

Changes to BNF classifications
These statistics use the BNF therapeutic classifications defined in the British National Formulary (BNF) using the classification system prior to BNF edition 70. Each January the NHSBSA updates the classification of drugs within the BNF hierarchy which may involve some drugs changing classification between years of PCA data. The NHSBSA publishes the latest BNF information each year via its information systems. This is currently done via the Information Services Portal (ISP) but, may, in the near future be transitioned to the NHSBSA Open Data Portal (ODP).

Trade-offs between output quality components

This dimension describes the extent to which different aspects of quality are balanced against each other

The main trade-off in this publication is the balance between timeliness and data quality. Sufficient time is allowed from the data being made available to allow for the information to be produced and quality assured.

Assessment of user needs and perceptions

This dimension covers the processes for finding out about users and uses and their views on the statistical products

Following the release of these statistics the NHSBSA will be conducting a public consultation and inviting users to provide feedback on the PCA data. This feedback will be used to shape the future content and style of future PCA publications and statistical products from the NHSBSA. This publication also has a detailed user engagement plan specific to PCA.

Performance, cost and respondent burden

This dimension describes the effectiveness, efficiency and economy of the statistical output

There is no respondent burden for PCA data, as all data are extracted from existing NHSBSA information and transactional systems.

This initial release has been developed with a reproducible analytical pipeline (RAP) in mind and RAP principles applied where possible. This development has been done in R and the code used will be made publicly available at the NHSBSA GitLab. Further development is planned to the RAP used for this publication to automate as many tasks as possible. This RAP, and the code used, will also be peer reviewed by other members of the Government Statistician Group from a different department.

Confidentiality, transparency and security

The procedures and policy used to ensure sound confidentiality, security and transparent practices

Trustworthy statistics and the data behind them are an important part of well informed decision making, and are vital to support improvement across the wider health and social care system. It is accepted, however, that where statistics provide information on small numbers of individuals, the NHS Business Services Authority have a duty, under data protection law, to avoid directly or indirectly revealing any personal details. In addition, NHSBSA staff members are required to adhere to relevant NHS data confidentiality guidelines.

The NHSBSA has robust confidentiality and security policies that were adhered to during the production of these statistics. More information on these policies and how we follow them can be found in our Confidentiality and Access Statement.

A risk assessment around potential disclosure of personal identifiable information through these statistics was carried out during their production. In light of the pre-existing monthly PCA administrative data feed released by NHSBSA Information Services, and these statistics being a compendia of that data, a decision was taken not to apply statistical disclosure control to these statistics.

Quality assurance of administrative data

In addition to the assessment we have followed the Quality Assurance of Administrative Data (QAAD) toolkit, as described by the Office for Statistics Regulation (OSR). Using the toolkit we established the level of assurance we are seeking (or "benchmark") for each source. The assurance levels are set as basic, enhanced, or comprehensive depending on the risk of quality concerns for that source, based on various factors.

We have made a judgement about the suitability of the administrative data for use in producing this publication, this is designed to be pragmatic and proportionate, and so in the light of an evaluation of the likelihood of quality issues that may arise in the data that may affect the quality of the statistics, and of the nature of the public interest served by the statistics.

We believe this publication and the data from which it has been formed meets the criteria of the UKSA's QAAD toolkit to level A2 – Enhanced assurance *"statistical producer has evaluated the administrative data QA arrangements and published a fuller description of the assurance"*. What follows explains the basis of our judgements of the chosen level of assurance.

The QAAD toolkit has some crossover with the European Standard for Reporting, particularly the Accuracy and Reliability dimension.

Operational context and administrative data collection

Data is captured from prescriptions for the reimbursement of dispensing contractors. This process has a manual element and therefore inevitably some small errors may occur in the data. This impacts handwritten prescribing the most, which always requires manual operator intervention to process. Handwritten prescribing is anecdotally mostly carried out by nurse prescribers and primary care prescribing done by hospital trusts.

There are many manual and automated checks carried out during the processing of a prescription, including re-processing a random 50,000 sample to find errors. Operators are also provided with additional guidance and training if it is identified as being responsible for an error.

During the extract, transform and load (ETL) process to load prescription data from the transactional systems into the NHSBSA Information Services Data Warehouse, a series of verification checks are carried out to ensure that the process is successful, and the business logic applied to the data, has been applied correctly. If any off the verification checks fail, these are investigated immediately and errors rectified before the data is made available to statistics producers and users of NHSBSA Information Systems.

Communication with data supply partners

The data used in these statistics is all collected, processed, managed and maintained by the NHSBSA and its directorates. The data supplier to Official Statistics Team is the NHSBSA Insight Data Warehouse Team.

Statistical staff have strong links with Data Warehouse staff, regularly using formal and informal communication routes to raise any issues identified with statistical data. JIRA software is used to track progress with these issues. NHSBSA statisticians are involved in the change control process that relates to information systems to ensure that as far as

possible statistical needs are taken into account in any decision-making around changes in the data collected or its format. NHSBSA statisticians are also consulted about the data content of new systems when they are produced.

Administrative data is transferred between the Data Warehouse Team and statistics producers via database tables stored within a secure cloud based environment, only accessible via NHSBSA devices with valid credentials. Table access within the Data Warehouse is managed by the Data Warehouse Team, with access only being granted to tables required to perform your role.

QA principles, standards and checks applied by data suppliers
The NHSBSA Insight Data Warehouse Team has a comprehensive set of verification checks that are carried out during the monthly ETL process to populate the administrative data source that PCA data is taken from. These checks ensure that the data that is being extracted from the NHSBSA transactional systems are valid and complete. Any errors identified by these checks are investigated and resolved immediately before the load process is allowed to continue.

The code that applies the business logic to the transactional data as part of this ETL process has been developed and quality assured by Data Warehouse staff and is a mature codebase. All code is version controlled and development work is tested and reviewed before being pushed into the production system.

Producer's QA investigations and documentation
A series of QA checks have been carried out on administrative data within these statistics by the statistics producers. As part of the RAP process that has been developed for this publication automated checks have been built in to flag any issues with the data early in the production process. Checks against the previous year's data are carried out to ensure that totals are within expected tolerances. Checks are also carried to ensure that no null values appear in fields that should be populated, and that the present values are valid. For example, names of drugs and appliances are verified against the published list of NHSBSA BNF drug data. If these automated checks are failed then the producer is alerted to enable them to take action.

The code written to produce this publication is also quality assured by another Senior Statistical Officer (SStO) or higher in within the organisation. The NHSBSA is collaborating with the Department for Education (DfE) as part of the Government Statistical Service (GSS) RAP champion network to review this pipeline that has been created.

The outputs of this publication are also reviewed by an SStO prior to release before being sent for final sign off by the Lead Official for Statistics at the NHSBSA.

6. Related statistics, comparability and useful resources

NHSBSA releases Prescription Costs Analysis (PCA) – England, a publication with National Statistics designation. Similar releases are produced by the devolved administrations for Scotland, Wales, and Northern Ireland. There are numerous differences between these releases including in the way that data measures are collected and classified, the different structures of the health and social care systems in each country, and methodological differences. For these reasons, any comparisons made

between PCA data produced by different devolved authorities should be treated with caution. However, the main measures of drug cost and volumes of items dispensed in the community are comparable across the different regions. Some differences that should be taken into consideration are:

1. Whilst the reporting period for England uses calendar year, all other devolved administrations use financial year for their annual publication.

2. Users should be aware of differing naming conventions used between the devolved administrations. For the cost of items dispensed and reimbursed before deduction of any dispenser discount, England and Wales both use the term 'Net Ingredient Cost' (or 'NIC'), whereas Scotland use 'Gross Ingredient Cost', and Northern Ireland use 'Ingredient Cost'. Similarly, for the cost of items dispensed and reimbursed after deduction of any dispenser discount, England use the term 'Actual Cost', whereas Scotland use 'Net Ingredient Cost'. Wales and Northern Ireland do not report on these measures. Scotland use a further two reporting measures, 'Gross Cost' and 'Total (Net) Cost', which England do not report on.

3. Each devolved administration produces statistics in a way that most effectively suits their needs. This includes grouping PCA with other similar publications in some cases.

4. England utilise an apportionment methodology outlined in the Background Information and Methodology Note, which is not utilised by any other devolved administration. This methodology does not impact national total comparisons between England and devolved administrations, but does impact comparisons made between some individual presentations at the lowest level granularity.

5. Broader differences amongst the health and social care system structures for each devolved administration exist that should be taken into consideration, such as the provision of free prescriptions.

Dictionary of Medicines and Devices (DM+D)

The DM+D can be accessed via a web based browser on the NHSBSA website. On the website are also the DM+D editorial policy and the data model of the database that feeds the browser. These are key resources in understanding the drug data that the NHSBSA holds.

Code of Practice for Statistics

These statistics have been produced in compliance of the Code of Practice for Statistics. You can find more on the code of practice and its pillars, principles and practices from the UK Statistics Authority website.

NHSBSA Open Data Portal

The NHSBSA Open Data Portal is the platform where we host our open data products, including the presentation level data tables released as part of these statistics.

Glossary of terms used in these statistics

Actual medicinal product (AMP)

This is a product that has been made available by a supplier. This is a physical entity but is devoid of pack size information e.g. *Panadol Advance 500mg tablets* or *Paracetamol 500mg*

tablets (A A H Pharmaceuticals).

British National Formulary (BNF)

PCA data uses the therapeutic classifications defined in the British National Formulary (BNF) using the classification system prior to edition 70. Information on why a drug is prescribed is not available in this dataset. Since drugs can be prescribed to treat more than one condition, it may not be possible to separate the different conditions for which a drug may have been prescribed. NHS Prescription Services have created pseudo BNF chapters for items not included in BNF chapters 1 to 15. The majority of such items are dressings and appliances, which have been classified into six pseudo BNF chapters (18 to 23)

The BNF has multiple levels, in descending order from largest grouping to smallest; chapters, sections, paragraphs, sub-paragraphs, chemical substances, products, presentations. Presentations in chapters 20-23 do not have assigned BNF paragraphs, sub-paragraphs, chemical substances or products.

Chemical substance

A chemical substance is the name of the main active ingredient in a drug. Appliances do not hold a true chemical substance. It is determined by the British National Formulary (BNF) for drugs, or the NHSBSA for appliances. An example is Amoxicillin.

Cost

The amount that would be paid using the basic price of the prescribed drug or appliance and the quantity prescribed, sometimes called 'Net Ingredient Cost' (NIC). The basic price is given either in the Drug Tariff or is determined from prices published by manufacturers, wholesalers or suppliers. Basic price is set out in Parts 8 and 9 of the Drug Tariff. For any drugs or appliances not in Part 8, the price is usually taken from the manufacturer, wholesaler or supplier of the product.

Dispensed in the community

When a prescription item is dispensed in the community this means that it has been dispensed in a primary care setting by a community pharmacy or other dispensing contractor.

Dispensing contractor / dispenser

A dispensing contractor or dispenser can be a community pharmacy or appliance contractor (a dispenser that specialises in dispensing dressing, appliances and medical devices). Prescriptions can also be dispensed by the dispensary of a dispensing practice or personally administered at a practice. Dispensing practices usually exist in more rural areas where the need for a dispenser is deemed necessary but it is not deemed financially viable to establish a community pharmacy.

Items

The term Items refers to the number of times a product appears on a prescription form. Prescription forms include both paper prescriptions and electronic messages.

Prescription / prescription form

A prescription (also referenced as a prescription form) has two incarnations, a paper form, and an electronic prescription available via EPS. A paper prescription can hold up to a maximum of ten items. A single electronic prescription can hold a maximum of four items.

Presentation

A presentation is the name given to the specific type, strength, and formulation of a drug; or, the specific type of an appliance e.g. *Paracetamol 500mg tablets*. A presentation is equivalent to an actual medicinal product or a virtual medicinal product.

Preparation class

Generic prescribing is encouraged and many drugs are now prescribed generically even when they are not available in generic form (principally because the branded product is still in patent). Within the PCA data prescription items are classified in four ways.

Class 1

A preparation class 1 presentation is a virtual generic drug, where actual generic equivalents are available e.g. *Paracetamol 500mg tablets*. These drugs can be prescribed and dispensed generically

Class 2

A preparation class 2 presentation is a virtual generic drug, where actual generic equivalents are not available e.g. *Oxycodone 15mg modified-release tablets*. No actual generic exists, only proprietary presentations are available such as *OxyContin 15mg modified-release tablets*. However Oxycodone can still be prescribed generically. These drugs can be prescribed generically but are only available as a proprietary product.

Class 3

A preparation class 3 presentation is an actual proprietary drug. The terms proprietary and branded can used interchangeably for class 3 presentations e.g. *Panadol Advance 500mg tablets*. These drugs are prescribed and dispensed by proprietary brand name.

Class 4

A preparation class 4 presentation is a dressing, appliance or medical device. These can be generic or proprietary. In the vast majority of cases class 4 presentations are proprietary e.g. *FastClix lancets 0.3mm/30gauge*.

Total Quantity

This is the total quantity of a drug or appliance that was prescribed. This is calculated by multiplying Quantity by Items. For example, if 2 items of Amoxicillin 500mg capsules with a quantity of 28 were prescribed, total quantity will be 56.

Virtual medicinal product (VMP)

A VMP is an abstract concept representing the properties of one or more clinically equivalent Actual Medicinal Products, where clinical is defined as relating to the course of a disease e.g. *Paracetamol 500mg tablets*.

Feedback

Feedback is important to us; we welcome any questions and comments relating to this document.

Please quote ‘Prescription Cost Analysis – Background and Methodology Note’ in the subject title of any correspondence.

A public consultation with be conducted to inform developments and changes ahead of the

subsequent PCA publication in 2021. The dates of this consultation will be released in due course.

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