A Report from Public Health Wales
Healthcare Associated Infection, Antimicrobial
Resistance & Prescribing Programme (HARP team)

Antibacterial Usage in Primary Care
In Wales 2013/14 - 2017/18
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Section 1: Introduction

In 2014, Lord O’Neill was commissioned by the UK Prime Minister to review the global impact of antimicrobial resistance. He estimated that by 2050, 10 million lives a year and a cumulative 100 trillion USD of economic output would be at risk due to the rise of drug resistant infections if no proactive solutions were found now to slow down the rise of drug resistance.

Antimicrobial resistance is an increasing problem in Wales and has already led to a small number of difficult to treat infections, leading to failed therapy and potential complications. Treatment for most infections is started empirically before antimicrobial susceptibilities are known. A particular problem with the spread of antimicrobial resistance is that it becomes more difficult to select empirical therapy that will have reliable activity.

In Primary Care, the effects are most clearly seen in increasing resistance to empirical therapy in urinary pathogens. There is also on-going concern about Clostridium difficile associated disease arising in the community. The main driver for the spread of both resistance and C. difficile is antimicrobial use; certain antibacterial agents have been particularly implicated in the spread of C. difficile.

In response to this threat to the health of the people of Wales, in May 2018, Welsh Government introduced an antimicrobial prescribing improvement goal for the 2017/18 financial year. The goal for both Primary Care and Secondary Care a 5% reduction in the total volume of antimicrobials (WHC/2018/020).

This report shows the recent progress has been made in changing antibacterial use in GP Practice in Wales. There has been a reduction in overall usage of 2.0% in the financial year 2017/18, and specifically in the use of agents used for treatment of respiratory infection (amoxicillin and macrolides), and those associated with C. difficile (cephalosporins, quinolones, and co-amoxiclav). Trimethoprim usage has decreased in response to increasing resistance, and the awaited changes in guidance for the treatment of uncomplicated-UTI.

There is however, significant variability between Health Boards and GP Clusters in both the amount and types of antibacterials used, which suggests that there remains room for improvement. The aim of this report is to provide ‘information for action’ in support of the 2017/18 improvement goals.
Section 2: Key points of interest

- In 2017/18, the total volume of antibacterials items dispensed for GP practices in Wales was 1,205 items/1000 STAR-PUs; showing a **2% reduction** in usage compared with the 2016/17 financial year.

- During the 5-year period, 2013/14 to 2017/18, there was an **11.9% reduction** in total antibacterial usage across the GP practices in Wales, suggesting the creation of GP clusters in April 2014 has benefitted antimicrobial stewardship.

- In 2017/18, there was a reduction in total antibacterial usage in six of the seven Health Boards, most notably in Betsi Cadwaladr.
  - Abertawe Bro Morgannwg UHB 1.1% reduction
  - Aneurin Bevan UHB 1.1% reduction
  - Betsi Cadwaladr UHB **5.9% reduction**
  - Cardiff & Vale UHB 1.1% reduction
  - Cwm Taf UHB **0.8% increase**
  - Hywel Dda UHB 1.8% reduction
  - Powys THB 1.9% reduction

- There was significant variability between GP Clusters in gross annual antimicrobial use in 2017/18, with a **36% difference** in prescribing rates between the GP Cluster with highest rate of dispensed items and the GP Cluster with the lowest rate.
  - South Rhondda GP Cluster had the highest dispensing rate of 1505 items/1000 patients per annum
  - North Ceredigion had the lowest dispensing rate with 958 items/1000 patients per annum.

- In 2017/18, the following reductions were made:
  - Amoxicillin usage **4.1% reduction**
  - Cephalosporin usage **9.8% reduction**
  - Co-amoxiclav usage **6.3% reduction**
  - Flucloxacillin usage **3.1% reduction**
  - Fluoroquinolone usage **3.0% reduction**
  - Macrolide usage **4.6% reduction**
  - Metronidazole usage **13.6% reduction**
  - Trimethoprim usage **9.0% reduction**

- There was a notable change in usage of key drug/drug groups
  - A reduction in winter usage of amoxicillin and macrolides, despite the high number of influenza cases in 2017/18 winter quarters.
  - An increase in winter usage of doxycycline, suggesting an increased use for respiratory infections in adherence to guidance.
  - A reduction in usage of trimethoprim, suggesting a decreased usage for urinary tract infections in response to increasing resistance.
In terms of total antibacterial use in GP practice across Wales in 2017/18,
  o The commonest antibacterial type (defined by items dispensed) was
    broad-spectrum penicillins (mainly amoxicillin) at 24.3% of total use
  o Tetracyclines (e.g. doxycycline) 16.8%
  o Beta-lactamase-resistant penicillins (e.g. flucloxacillin) 11.4%
  o Macrolides (e.g. clarithromycin) 11.2%
  o Trimethoprim group 11.0%
  o Cephalosporins and fluoroquinolones (e.g. ciprofloxacin) represented
    3.1% and 1.9% of total antibiotic use respectively.
  o Beta-lactam/beta-lactamase inhibitor combinations (e.g. co-amoxiclav)
    represented 3.3% of use.
Section 3: Methods

Data sources
Antimicrobial prescribing data was provided by the Prescribing Services Unit (PSU). PSU is part of NHS Wales Shared Service Partnership. PSU is responsible for calculating the remuneration due to community pharmacies, dispensing doctors, appliance contractors and GPs who personally administer drugs for issuing prescribed items against NHS prescriptions. The data collected during this process is also used to drive a range of information products that are provided to stakeholders across the NHS and, where applicable, made publicly available. [http://www.wales.nhs.uk/sites3/home.cfm?orgid=428](http://www.wales.nhs.uk/sites3/home.cfm?orgid=428)

Data is collected from prescriptions that are submitted to PSU by dispensing contractors at the end of each month. Data is collected only from prescriptions that have actually been dispensed. Data is allocated to Local Health Boards on the basis of where the item is prescribed. References to “dispensed” items should therefore be read as items dispensed by community dispensing contractors against prescriptions written in the referenced Local Health Board.

Data presentation
Only antibacterial data BNF chapter 5.2 ‘Bacterial infection’ is presented in this report.

In general, data in the report is expressed as items/1000 patients, items/1000 STAR-PU, or DDD/1000 STAR-PU, and collated at the level of All-Wales, Health Board, and GP clusters. Items refer to antibacterial items that have been dispensed, and patients refer to the number of registered patients.

STAR-PU (Specific Therapeutic Group Age-sex weightings Related Prescribing Units) are an adjusted measure of population. These weighting allow more accurate and meaningful comparisons within a specific therapeutic group by taking into account the types of people who will be receiving that treatment. The current 2013 weighting by age group and gender are shown in the table below.

Table 1: STAR-PU 2013 weighting

<table>
<thead>
<tr>
<th>Age Band</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>5-14</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>15-24</td>
<td>0.3</td>
<td>0.6</td>
</tr>
<tr>
<td>25-34</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>35-44</td>
<td>0.3</td>
<td>0.6</td>
</tr>
<tr>
<td>45-54</td>
<td>0.3</td>
<td>0.6</td>
</tr>
<tr>
<td>55-64</td>
<td>0.4</td>
<td>0.7</td>
</tr>
<tr>
<td>65-74</td>
<td>0.7</td>
<td>1.0</td>
</tr>
<tr>
<td>75+</td>
<td>1.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Numerator divided by the denominator
Represented as number of antibacterial items per STAR PU
**Data Interpretation**
A number of factors should be considered when examining the data presented in this report:

- The data presented at Health Board and All-Wales level only includes GP practice level data where the numerator (items and DDDs) and denominator (patients and STAR-PU) are available. Dispensing data for other locations such as OOH, Community Resources Teams, and Incontinence Services are not included in the data set as no denominator data is available for them. As such, the data may differ from that published in SPIRA, which contains some of these data in the Health Board and Wales aggregates. [http://prescribing.wales.nhs.uk/Spira/Spira.cfm](http://prescribing.wales.nhs.uk/Spira/Spira.cfm)

- The data presented is for antimicrobial items that have been dispensed and therefore **DO NOT** necessarily correlate with antimicrobial prescriptions (e.g. delayed prescriptions that were not dispensed would not be included in the data set) or antimicrobial use (i.e. dispensed antimicrobial courses may not be completed by the patient).

- Differences in antimicrobial use between Local Health Boards may be due to many differences that have been shown to influence use including population health, population deprivation, or availability of dispensing practices.

- Only data for oral and parenteral antimicrobial usage are included in this report, it **DOES NOT** include topical, inhaled, rectal or genital preparation usage.

- It should be noted that PSU uses a drug database supplied and maintained by the NHS Business Services Authority, Prescription Pricing Division (PPD). This database does not have full coverage of Defined Daily Dose (DDD) allocations for all of the products contained therein. For the products with ATC codes used in this dataset the coverage is approximately 96%. This should be noted when considering data using DDD as a measure.

- GP practices data have been aggregated to cluster level based on the WRDS GP practice to clusters information obtained by PHW 13 April 2018. [http://www.wales.nhs.uk/nwis/page/65201](http://www.wales.nhs.uk/nwis/page/65201)

- Historic GP practice data (pre April-2014) has been mapped to the April 2018 cluster structure in order to observe if inter-cluster collaboration influences antimicrobial stewardship.
Section 4.1: All-Wales level antibacterial usage

All-Wales Antibacterial Usage 2017/18

Key: Antibacterials within the drug group ‘Other’ include lincosamides, polymyxins, fusidic acid, aminoglycosides, glycopeptides, carbapenems, amphenicols, monobactams and streptogramins.

Figure 1: All-Wales Antibacterial Usage for 20117/18 (ITEMS)

Figure 1 shows antibacterial usage at group level for All-Wales in 2017/18:

- The data is based on the number of antibacterial ITEMS
- Broad-spectrum penicillins (BSP: predominantly amoxicillin) were the most commonly prescribed antibacterial group in 2017/18, accounting for 24% of total antibacterial usage in Primary Care in Wales.
- Tetracyclines, beta lactamase resistance penicillins, macrolides, and trimethoprim/sulphonamide group (predominantly trimethoprim), accounted for a further 50% of usage
- BL inhibitor combinations (predominantly co-amoxiclav) accounted for 3.3% of total usage.
- Cephalosporins accounted for 3.1% of total usage.
- Fluoroquinolones accounted for 1.9% of total usage.
Antibacterials within the drug group ‘Other’ include lincosamides, polymyxins, fusidic acid, aminoglycosides, glycopeptides, carbapenems, amphenicols, monobactams and streptogramins.

Figure 2: All-Wales Antibacterial Usage for 2017/18 (DDDs)

Figure 2 shows antibacterial usage at group level for All-Wales in 2017/18:

- The data is based on the number of Defined Daily Doses (DDDs)
- Tetracyclines showed the highest usage accounting for 28.3% of total antibacterial usage in Primary Care in Wales in 2017/18.
- BL inhibitor combinations accounted for 4.4% of total usage.
- Cephalosporins accounted for 1.3% of total usage.
- Fluoroquinolones (J01MA) accounted for 1.9% of total usage.

Note 1: Figures 1 and 2 show the effect of using different prescribing measures: The proportion of tetracycline use when measured as 'items' was 16.8%, compared to 28.3% when the measure was ‘DDDs’. The proportion of usage is much higher when using DDDs as a measure because tetracycline is often dispensed as long courses (28 day packs) for skin conditions such as acne; one dispensed item of the tetracycline ‘lymecycline’ relates to 28 DDDs whereas, one item of co-amoxiclav generally only relates to 5-7 DDDs.

Note 2: The data that follows for both Health Boards and GP clusters, presents total antibacterial usage as items/1000 STAR-PUs and individual drug/drug group usage as items/1000 patients.
**Trends in All-Wales Antibacterial Usage (2013/14 – 2017/18)**

Figure 3 shows trends in total antibacterial usage for ‘All-Wales’ GP practices from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A marked decrease in the winter prescribing peaks suggesting a decrease in prescribing for self-limiting respiratory infections (blue line).
- A marked decrease in usage from 1369 items/1000 STAR-PU per 12-month rolling total, to 1206 items/1000 STAR-PU (green line).
- Equating to an 11.9% reduction in total antibacterial usage for ‘All-Wales’ across the 5-year period.
- BMA Cymru Wales agreed a new contract deal with the Welsh Government effective from April 2014, which resulted in the GP clusters being established.
Figure 4: Trends in 3C Group Dispensing

Figure 4 shows trends in dispensing of 3C usage: co-amoxiclav, cephalosporins, and fluoroquinolones.

- Co-amoxiclav shows a reduction in winter peaks and a marked downward trend in usage across time.
- Cephalosporin usage shows a reduction in winter peaks and a marked downward trend in usage across time.
- Fluoroquinolone usage has levelled off.
Figure 5: Trends in Antibacterial Usage – Respiratory (quarterly data)

Figure 5 shows the trends in quarterly data for usage for antibacterials that may be prescribed for respiratory tract infections:

- Amoxicillin shows marked winter peaks and a downward trend in usage.
- Macrolide usage shows winter peaks and a downward trend in usage.
- Doxycycline shows an upward trend in usage, with increasing winter peaks, suggesting an increased use for respiratory infections.
- Co-amoxiclav shows a reduction in winter peaks and a downward trend in usage; fluoroquinolones usage has levelled off.
- The data shows that despite the 2017/18 influenza season seeing the highest number of influenza cases since the 2009 pandemic, prescribing of respiratory related agents decreased – see influenza data link below.
Figure 6 shows the trends in annual data for usage for antibacterials that may be prescribed for respiratory tract infections, and shows a simpler representation of the changes in prescribing between the financial years 2013/14 and 2017/18:

- A notable reduction in amoxicillin usage from 214 to 167 items/1000 patients.
- A reduction in macrolide usage from 95 to 77 items/1000 patients.
- A reduction in co-amoxiclav usage from 36 to 23 items/1000 patients.
- A reduction in fluoroquinolone usage from 16.7 to 13.3 items/1000 patients.
- An increase in doxycycline usage from 52 to 80 items/1000 patients.
Figure 7: Trends in Antibacterial Usage – Urinary

Figure 7 shows the trends in quarterly data for usage for antibacterials that may be prescribed for urinary tract infections:

- Trimethoprim shows marked summer peaks and a downward trend in usage.
- Nitrofurantoin usage shows summer peaks and an upward trend in usage.
- Co-amoxiclav shows small winter peaks and a downward trend in usage.
- First generation cephalosporins show a downward trend in usage.
- Fluoroquinolones usage has levelled off.
- Pivmecillinam shows a small increase in usage.
Figure 8: Trends in Antibacterial Usage - Other

Figure 8 shows the trends in usage for agents that may be prescribed for skin and soft-tissue infection and sore throat: beta-lactamase sensitive penicillins (mainly phenoxymethylpenicillin), and flucloxacillin.

- Flucloxacillin shows marked summer peaks and a downward trend in usage.
- Beta-lactamase sensitive penicillin usage shows a small upward trend in usage in the last quarter of 2017/18 (January-March), with marked peaks in usage in the same quarter each year.
- The increase in phenoxymethylpenicillin usage in 2017/18 q4 is probably linked to the increase in invasive group A streptococcal infections in 2018 – see iGAS data link below.
Comparing All-Wales Antibacterial Usage (2016/17 & 2017/18)

Figure 9: Difference in Antibacterial Usage

Figure 9 shows the difference in antibacterial usage comparing the financial years 2016/17 to 2017/18. The data shows:

- **A 2.0% reduction in total antibacterial usage.**
- A 4.1% reduction in amoxicillin usage.
- A 9.8% reduction in cephalosporin usage.
- A 6.3% reduction in co-amoxiclav usage.
- A 3.1% reduction in flucloxacillin usage.
- A 3.0% reduction in fluoroquinolone usage.
- A 13.6% reduction in imidazole (metronidazole) usage.
- A 4.6% reduction in macrolide usage.
- A 9.0% reduction in trimethoprim usage.
- A 3.8% increase in BL sensitive penicillin (mainly phenoxyethylpenicillin) use.
- A 6.9% increase in doxycycline usage.
- An 8.2% increase in nitrofurantoin usage.
Section 4.2: Health Board level antibacterial usage

Antibacterial Usage in Welsh HBs and English CCGs

**Figure 10: Antibacterial Usage in Welsh HBs and English CCGs 2017/18 q4**
Reference for figure: National Prescribing Indicators 2017-18 report, All Wales Therapeutics and Toxicology Centre (AWTTC).

**Figure 10** shows the rate for dispensed antibacterial items by Health Boards in Wales and CCG in England for the quarter ending March 2018. The data shows:

- The average rate of dispensed antibacterial items for Wales were significantly higher than England, or NE England (comparable demographics to Wales).
  - Wales 339.9 items/1000 STAR-PU
  - England 282.0 items/1000 STAR-PU
  - NE England 319.5 items/1000 STAR-PU
- Cwm Taf UHB has the second highest rate in England & Wales.
- All of the HBs in Wales, with the exception of Powys THB, appear in the top quintile of dispensed antibacterial items.
**Trends in Health Board Antibacterial Usage (2013/14 – 2017/18)**

Figure 1 shows trends in total antibacterial usage for GP practices by Health Board (HB) from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- Cwm Taf UHB remains the highest prescribing HB, and the only HB to show any increase in usage in 2017/18.
- All other HBs show a notable decrease in total antibacterial usage across time.
- Powys THB remains the lowest prescribing HB in Wales.
Figure 12: Difference in Total Antibacterial Usage by Health Board

Figure 12 shows the difference in total antibacterial usage comparing the financial years 2016/17 to 2017/18. The data shows:

- An average 1.8% reduction across Wales.
- A 1.1% reduction in Abertawe Bro Morgannwg UHB.
- A 1.1% reduction in Aneurin Bevan UHB.
- A 5.9% reduction in Betsi Cadwaladr UHB.
- A 1.1% reduction in Cardiff & Vale UHB.
- **A 0.8% increase in Cwm Taf UHB.**
- A 1.8% reduction in Hywel Dda UHB.
- A 1.9% reduction in Powys THB
Figure 13: ABMUHB trends in Antibacterial Usage

Figure 13 shows the trends in quarterly data for usage for the most commonly prescribed antibacterials:

- Amoxicillin shows marked winter peaks with no significant reduction in usage in between 2016/17 and 2017/18.
- Macrolide usage shows winter peaks and a downward trend in usage.
- Doxycycline shows marked winter peaks.
- Co-amoxiclav, cephalosporins and fluoroquinolones usage has levelled off.
- Trimethoprim shows summer peaks and a downward trend in usage.
- Flucloxacillin shows summer peaks and a downward trend in usage.
- Beta-lactamase sensitive penicillin (mainly phenoxymethylpenicillin) usage shows an increase in the last quarter of 2017/18 (Jan-Mar), with marked peaks in usage in the same quarter each year.
Figure 14 shows the trends in quarterly data for usage the most commonly prescribed antibacterials:

- **Amoxicillin** shows marked winter peaks and a downward trend in usage.
- **Macrolide** usage shows winter peaks and a downward trend in usage.
- **Doxycycline** shows a marked upward trend, with increasing winter peaks.
- **Cephalosporin** usage shows a continuing downward trend.
- **Co-amoxiclav** and fluoroquinolone usage has levelled off.
- **Trimethoprim** shows summer peaks and a downward trend in usage.
- **Flucloxacillin** shows marked summer peaks and a downward trend in usage.
- **Beta-lactamase sensitive penicillin** (mainly phenoxymethylpenicillin) usage shows marked peaks in the Jan-Mar quarter each year.
Figure 15: BCUHB trends in Antibacterial Usage

Figure 15 shows the trends in quarterly data for usage the most commonly prescribed antibacterials:

- Amoxicillin shows marked winter peaks and a downward trend in usage.
- Macrolide usage shows winter peaks and a downward trend in usage.
- Doxycycline shows a marked upward trend, with increasing winter peaks.
- Cephalosporin usage shows a continuing downward trend.
- Co-amoxiclav and fluoroquinolone usage has levelled off.
- Trimethoprim shows summer peaks and a downward trend in usage.
- Flucloxacinilin shows marked summer peaks and a downward trend in usage.
- Beta-lactamase sensitive penicillin (mainly phenoxymethylpenicillin) usage shows a small increase in usage in the last quarter of 2017/18 (Jan-Mar), with marked peaks in usage in the same quarter each year.
Figure 16: CAVUHB trends in Antibacterial Usage

Figure 16 shows the trends in quarterly data for usage the most commonly prescribed antibacterials:

- Amoxicillin shows marked winter peaks and a downward trend in usage.
- Macrolide usage shows winter peaks and a downward trend in usage.
- Doxycycline shows a marked upward trend, with increasing winter peaks.
- Co-amoxiclav, cephalosporins and fluoroquinolones usage has levelled off.
- Trimethoprim shows summer peaks and a downward trend in usage.
- Flucloxacillin shows marked summer peaks and a downward trend in usage.
- Beta-lactamase sensitive penicillin (mainly phenoxyemethylpenicillin) usage shows no significant change across time, with marked peaks in the last quarter of each financial year (Jan-Mar).
Figure 17: CTUHB trends in Antibacterial Usage

Figure 17 shows the trends in quarterly data for usage the most commonly prescribed antibacterials:

- Amoxicillin and macrolide usage show marked winter peaks, with no significant reduction in usage in between 2016/17 and 2017/18.
- Doxycycline shows a marked upward trend, with increasing winter peaks.
- Co-amoxiclav, cephalosporins and fluoroquinolones usage has levelled off.
- Trimethoprim shows summer peaks and a downward trend in usage.
- Flucloxacillin shows summer peaks and a downward trend in usage.
- Beta-lactamase sensitive penicillin (mainly phenoxymethylpenicillin) shows an upward trend in usage, with marked peaks in the Jan-Mar quarter of each year.
Figure 18: HDUHB trends in Antibacterial Usage

Figure 18 shows the trends in quarterly data for usage the most commonly prescribed antibacterials:

- Amoxicillin usage shows marked winter peaks, with no significant changes in the winter peak between 2016/17 and 2017/18.
- Macrolide usage shows winter peaks and a general downward trend in usage.
- Doxycycline shows a marked upward trend, with increasing winter peaks.
- Co-amoxiclav, cephalosporins and fluoroquinolones usage has levelled off.
- Trimethoprim shows summer peaks and a marginal downward trend in usage.
- Flucloxacillin shows no significant change in the last three years.
- Beta-lactamase sensitive penicillin (mainly phenoxyethylpenicillin) shows no significant change in usage across time, with marked peaks in the Jan-Mar quarter of each year.
Figure 19: PTHB trends in Antibacterial Usage

Figure 19 shows the trends in quarterly data for usage the most commonly prescribed antibacterials:

- Amoxicillin shows marked winter peaks and a downward trend in usage.
- Macrolide usage shows winter peaks and a downward trend in usage.
- Doxycycline shows a marked upward trend, with increasing winter peaks.
- Co-amoxiclav, cephalosporins and fluoroquinolones usage has levelled off.
- Trimethoprim shows summer peaks and a downward trend in usage.
- Flucloxacillin shows marked summer peaks and a downward trend in usage.
- Beta-lactamase sensitive penicillin (mainly phenoxyethylpenicillin) shows a downward trend in usage, with decreasing peaks in the last quarter of each financial year (Jan-Mar).
Section 4.3: GP Cluster level antibacterial usage

**Abertawe Bro Morgannwg UHB**

![Image of bar chart showing GP Cluster antibacterial usage]

**Figure 20: ABMUHB Total Antibacterial Usage by GP Cluster**

**Figure 20** shows total antibacterial usage for the 64 GP Clusters present in Wales in 2017/18. The ABMUHB GP Clusters *(orange bars)* are presented in descending order of antibacterial usage with the other GP Clusters across Wales *(grey bars)*.

Three of the eleven ABMUHB GP clusters were in the top quintile of prescribing:
- Afan (fifth highest prescribing Cluster in Wales)
- Bridgend West Network (sixth highest prescribing Cluster in Wales)
- Bridgend North Network

Data showing the trends in total antibacterial usage *(Figure 21)* and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions *(Figures 22-24)* follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 21 shows trends in total antibacterial usage for ABMUHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in some GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- A notable reduction in total prescribing for all GP Clusters across time.
- Afan, Bridgend North Network, and Bridgend West Network remain the highest prescribing GP Clusters across time.
- Bay Health and Bridgend East Network remain the lowest prescribing GP Clusters across time.
Figure 2: Percentage point difference in co-amoxiclav usage by GP Cluster

Figure 3: Percentage point difference in cephalosporin usage by GP Cluster

Figure 4: Percentage point difference in fluoroquinolone usage by GP Cluster

Figures 22-24 shows the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in ABMUHB compared to the Health Board proportion for 2017/18.

- Bay Health and Llchwrr GP Clusters used a higher proportion of co-amoxiclav and fluoroquinolones than the other GP Clusters in the Health Board.
- Co-amoxiclav usage has reduced at Bay Health.
- Co-amoxiclav usage has increased in the Penderi GP cluster.
- The historically high proportion of cephalosporin use in the Bridgend West Network GP cluster has reduced across time.
Figure 25: ABUHB Total Antibacterial Usage by GP Cluster

Figure 25 shows total antibacterial usage for the 64 GP Clusters present in Wales in 2017/18. The ABUHB GP Clusters (yellow bars) are presented in descending order of antibacterial usage with the other GP Clusters across Wales (grey bars).

Two of the twelve ABUHB GP clusters were in the top quintile of prescribing:
- Blaenau Gwent West (eight highest prescribing Cluster in Wales)
- Torfaen North (ninth highest prescribing Cluster in Wales)

Data showing the trends in total antibacterial usage (Figure 26) and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions (Figures 27-29) follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 26: ABUHB trends in Total Antibacterial Usage by GP Cluster

Figure 26 shows trends in total antibacterial usage for ABUHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in some GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- A notable reduction in total prescribing for all GP Clusters across time, especially Newport West.
- Blaenau Gwent West and Torfaen North remain the highest prescribing GP Clusters across time.
- Newport North and Newport East remain the lowest prescribing GP Clusters across time.
Figures 27-29 show the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in ABUHB compared to the Health Board proportion for 2017/18.

- Monmouthshire North GP Cluster historically uses higher proportions of all three drug/drug groups, but have made some reductions in both cephalosporin and fluoroquinolone use.
- The historically higher proportion of cephalosporin use in the Torfaen North GP cluster has reduced across time.
Betsi Cadwaladr UHB

Figure 30: BCUHB Total Antibacterial Usage by GP Cluster

Figure 30 shows total antibacterial usage for the 64 GP Clusters present in Wales in 2017/18. The BCUHB GP Clusters (green bars) are presented in descending order of antibacterial usage with the other GP Clusters across Wales (grey bars).

Only one of the fourteen BCUHB GP clusters was in the top quintile of prescribing:

- Dwyfor (tenth highest prescribing Cluster in Wales)

Data showing the trends in total antibacterial usage (Figure 31) and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions (Figures 32-34) follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 31: BCUHB trends in Total Antibacterial Usage by GP Cluster

Figure 31 shows trends in total antibacterial usage for BCUHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in some GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- A notable reduction in total prescribing for many GP Clusters across time, especially Meirionnydd.
- Dwyfor and North Denbighshire remain the highest prescribing GP Clusters across time.
- Conway East, North Flintshire and South Flintshire remain the lowest prescribing GP Clusters across time.
Figure 32: Percentage point difference in co-amoxiclav usage by GP Cluster

Figure 33: Percentage point difference in cephalosporin usage by GP Cluster

Figure 34: Percentage point difference in fluoroquinolone usage by GP Cluster

Figures 32-34 shows the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in BCUHB compared to the Health Board proportion for 2017/18.

- The proportion of co-amoxiclav use remains higher in all three Wrexham GP Clusters and North East Flintshire.
- Central & South Denbighshire and Central Wrexham uses a higher proportion of cephalosporins.
- The historically higher proportion of fluoroquinolone use in North West Flintshire shows periodic improvement.
Figure 35: CAVUHB Total Antibacterial Usage by GP Cluster

Figure 35 shows total antibacterial usage for the 64 GP Clusters present in Wales in 2017/18. The CAVUHB GP Clusters (blue bars) are presented in descending order of antibacterial usage with the other GP Clusters across Wales (grey bars).

Only one of the nine CAVUHB GP clusters was in the top quintile of prescribing:
- Cardiff East

Data showing the trends in total antibacterial usage (Figure 36) and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions (Figures 37-39) follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 36 shows trends in total antibacterial usage for CAVUHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in some GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- A notable reduction in total prescribing for many GP Clusters across time.
- Cardiff East remains the highest prescribing GP Cluster across time.
- Cardiff South East remains the lowest prescribing GP Cluster across time.
Figures 37-39 show the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in CAVUHB compared to the Health Board proportion for 2017/18.

- Co-amoxiclav use has reduced in Eastern Vale, but sporadically higher use is noted in Central and Western Vale.
- Eastern Vale generally uses a higher proportion of cephalosporins.
- Western Vale sporadically use higher proportions of fluoroquinolones.
Figure 40 shows total antibacterial usage for the 64 GP Clusters present in Wales in 2017/18. The CTUHB GP Clusters (turquoise bars) are presented in descending order of antibacterial usage with the other GP Clusters across Wales (grey bars).

Five of the eight CTUHB GP clusters were in the top quintile of prescribing:
- South Rhondda (highest prescribing Cluster in Wales)
- North Cynon (second highest prescribing Cluster in Wales)
- North Rhondda (fourth highest prescribing Cluster in Wales)
- South Merthyr Tydfil
- South Cynon

Data showing the trends in total antibacterial usage (Figure 41) and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions (Figures 42-44) follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 4.1 shows trends in total antibacterial usage for CTUHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in some GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- An increase in total antibacterial usage in South Merthyr Tydfil, North Merthyr Tydfil and South Rhonda in 2017/18.
- No significant reduction in total antibacterial usage for the other CTUHB GP Clusters in 2017/18.
- South Rhondda and North Cynon remain the highest prescribing GP Clusters across time.
- North Taff Ely and South Taf Ely remain the lowest prescribing GP Clusters across time.
Figure 42: Percentage point difference in co-amoxiclav usage by GP Cluster

Figure 43: Percentage point difference in cephalosporin usage by GP Cluster

Figure 44: Percentage point difference in fluoroquinolone usage by GP Cluster

Figures 42-44 shows the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in CTUHB compared to the Health Board proportion for 2017/18.

- North Merthyr Tydfil, North Rhondda and South Taf Ely generally uses a higher proportion of co-amoxiclav.
- South Merthyr Tydfil and South Taf Ely use higher proportion of cephalosporins.
- North and South Merthyr Tydfil sporadically use higher proportions of fluoroquinolone.
One of the seven HDUHB GP clusters were in the top quintile of prescribing:
  - Llanelli (third highest prescribing Cluster in Wales)

Data showing the trends in total antibacterial usage (Figure 46) and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions (Figures 47-49) follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 46: HDUHB trends in Total Antibacterial Usage by GP Cluster

Figure 46 shows trends in total antibacterial usage for HDUHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in some GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- A reduction in total prescribing for most GP Clusters across time.
- Llanelli remains the highest prescribing GP Cluster across time.
- North Ceredigion remains the lowest prescribing GP Cluster across time in both the Health Board and across Wales in 2017/18.
Figures 47-49 show the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in HDUHB compared to the Health Board proportion for 2017/18.

- North Ceredigion, South Pembrokeshire and Taf/Tywi generally use a higher proportion of co-amoxiclav.
- South Pembrokeshire use higher proportion of cephalosporins.
- A number of GP Clusters sporadically use higher proportions of fluoroquinolone, most notably North Pembrokeshire.
Figure 50: PTHB Total Antibacterial Usage by GP Cluster

Figure 50 shows total antibacterial usage for the 64 GP Clusters present in Wales in 2017/18. The PTHB GP Clusters (purple bars) are presented in descending order of antibacterial usage with the other GP Clusters across Wales (grey bars).

None of the three PTHB GP clusters was in the top quintile of prescribing; in fact, two of the three Clusters appeared in the bottom (lowest) quintile of prescribing.

Data showing the trends in total antibacterial usage (Figure 51) and the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster compared with the HB proportions (Figures 52-54) follow.

The percentage point data are presented in heat maps, using a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest quintile are coloured dark blue. The scale goes from negative values (less than the HB proportion) to positive values (above the HB proportion).
Figure 51: PTHB trends in Total Antibacterial Usage by GP Cluster

Figure 51 shows trends in total antibacterial usage for PTHB GP Clusters from quarter Apr-Jun 2013 to quarter Jan-Mar 2018. The data shows:

- A decrease in the winter prescribing peaks in the GP Clusters suggesting a decrease in prescribing for self-limiting respiratory infections.
- No significant reduction in total antibacterial usage in South Powys from 2015/16 onwards.
- South Powys remains the highest prescribing GP Cluster across time.
- North Powys remains the lowest prescribing GP Cluster across time.
Figures 52-54 show the percentage point difference in prescribing of co-amoxiclav, cephalosporin, and fluoroquinolone for individual GP Cluster in CTUHB compared to the Health Board proportion for 2017/18.

- South Powys generally uses a higher proportion of co-amoxiclav.
- The historically higher proportion of cephalosporin use in South Powys has reduced across time.

The percentage point difference in fluoroquinolone use between is very small (-1.20 to 0.58), indicating there is little difference in fluoroquinolone use in PTHB. Although the use of colour graduated quintiles in this instance, makes North Powys appear significantly higher.
Section 5: Useful links

Welsh Health Circulars
https://gov.wales/topics/health/nhswales/circulars/?lang=en

National Prescribing Indicators 2017–2018 - Analysis of Prescribing Data to March 2018

Antimicrobial Resistance in Wales 2008-2017
http://www.wales.nhs.uk/sitesplus/888/page/94136

Review on Antimicrobial Resistance May 2016
https://amr-review.org/

UK Antimicrobial Resistance Strategy 2013 – 18