Antimicrobial Usage in Primary Care in Wales 2006-2015

June 2016

Microbiology Division, Public Health Wales
About us

Public Health Wales exists to protect and improve health and wellbeing and reduce health inequalities for people in Wales.
We are part of the NHS and report to the Minister for Health and Social Services in the Welsh Government.

Our vision is for a healthier, happier and fairer Wales. We work locally, nationally and, with partners, across communities in the following areas:

<table>
<thead>
<tr>
<th>Health protection</th>
<th>Primary, community and integrated care</th>
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<tbody>
<tr>
<td>providing information and advice and taking action to protect people from communicable disease and environmental hazards</td>
<td>strengthening its public health impact through policy, commissioning, planning and service delivery</td>
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<table>
<thead>
<tr>
<th>Microbiology</th>
<th>Safeguarding</th>
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<tr>
<td>providing a network of microbiology services which support the diagnosis and management of infectious diseases</td>
<td>providing expertise and strategic advice to help safeguard children and vulnerable adults</td>
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<tr>
<th>Screening</th>
<th>Health intelligence</th>
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<tr>
<td>providing screening programmes which assist the early detection, prevention and treatment of disease</td>
<td>providing public health data analysis, evidence finding and knowledge management</td>
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<tr>
<th>NHS quality improvement and patient safety</th>
<th>Policy, research and international development</th>
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<tr>
<td>providing the NHS with information, advice and support to improve patient outcomes</td>
<td>influencing policy, supporting research and contributing to international health development</td>
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<table>
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<tr>
<th>Health improvement</th>
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<td>working across agencies and providing population services to improve health and reduce health inequalities</td>
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Further information

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In Primary Care the effects are most clearly seen in increasing resistance in the bacteria causing urinary infections. There is also increasing 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*.

This report shows that progress has been made in changing antibacterial use in Primary Care in Wales. There has been a reduction in overall usage over the last 2 years, reversing the trend since 2006, and specifically the use of agents associated with *C. difficile* (cephalosporins, quinolones, and co-amoxiclav) has decreased. There is however, significant variability between Health Boards both in the amount and types of antibacterials used which suggests that there is still room for improvement.
Section 2: Key points of interest

Antibacterial usage in primary care shows variability across Wales.

- In 2015, there was a **5.1% reduction** in total antibacterial usage across primary care in Wales compared with 2014.
  - Broad-spectrum penicillin usage **8.1% reduction**
  - Beta-lactam/beta-lactamase inhibitor combinations **16.8% reduction**
  - Cephalosporins **17.3% reduction**
  - Fluoroquinolones **9.1% reduction**

- In 2015, there was an increase in only two drug groups across primary care in Wales:
  - Tetracyclines (predominantly doxycycline) **5.6% increase**
  - Nitrofurans **4.5% increase**

- In 2015, twenty of the twenty two old Local Health Boards in Wales reduced their antibacterial usage. Only Blaenau Gwent LHB and Rhondda Cynon Taff LHB increased their usage by **4.1%** and **1.6%** respectively.

- In terms of total antibacterial use in primary care across Wales in 2015,
  - The commonest antibiotic type (defined by items dispensed) was broad-spectrum penicillins (e.g. amoxicillin) at **26.5%** of total use
  - Tetracyclines (e.g. doxycycline) - **14.1%**
  - Macrolides (e.g. clarithromycin) - **11.9%**
  - Trimethoprim group - **11.7%**
  - Beta-lactamase-resistant penicillins (e.g. flucloxacillin) - **11.2%**.
  - Beta-lactam/beta-lactamase inhibitor combinations (e.g. co-amoxiclav) represented **4.0%** of use.
  - Cephalosporins and fluoroquinolones (e.g. ciprofloxacin) represented **3.8%** and **2.0%** of total antibiotic use respectively.

- There was significant variability between old Health Boards in gross annual antimicrobial use in 2015: Blaenau Gwent LHB had the highest dispensing rate of 626 items/1000 prescribing units per annum and Powys LHB had the lowest dispensing rate with 436 items/ 1000PUs PA. The All-Wales dispensing rate was 545 items/ 1000PUs PA.

- The proportion of antibacterial prescribing that is drawn from the “Top 9 antibacterials” is a National Prescribing Indicator. There proportion varied between 85% in Wrexham LHB, to 91% in Blaenau Gwent LHB.

- There was a notable change in seasonal usage of key drug groups
  - A reduction in winter usage of cephalosporins, fluoroquinolones and beta-lactam/beta-lactamase inhibitor combinations.
  - An increase in winter usage of tetracyclines, suggesting an increased use for respiratory infections in adherence to guidance.
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

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
In general, data in the report is expressed as items/1000 prescribing units per annum or DDDs/1000 PU collated at the level of the former 22 Local Health Boards listed in Table 1. Items refer to antibacterial items that have been dispensed.

“PU” stands for Prescribing Unit. PUs are an age adjusted measure of population. They are used to take account of the greater need of elderly patients for medication. Rather than compare the number of items prescribed by patient, comparison by PU weights the result according to the number of elderly patients in population. Patients aged 65 and over are counted as 3 prescribing units and patients aged < 65 and temporary residents are counted as 1.

Data Interpretation
A number of factors should be considered when examining the data presented in this report:

- 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.
Table 1: LHB codes

<table>
<thead>
<tr>
<th>Former LHBs</th>
<th>Code</th>
<th>Health Board</th>
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<tbody>
<tr>
<td>Bridgend LHB</td>
<td>BGD</td>
<td>Abertawe Bro Morgannwg UHB</td>
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<tr>
<td>Blaenau Gwent LHB</td>
<td>BLG</td>
<td>Aneurin Bevan UHB</td>
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<tr>
<td>Caerphilly LHB</td>
<td>CAE</td>
<td>Aneurin Bevan UHB</td>
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<tr>
<td>Carmarthen LHB</td>
<td>CAM</td>
<td>Hywel Dda UHB</td>
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<tr>
<td>Cardiff LHB</td>
<td>CAR</td>
<td>Cardiff and Vale UHB</td>
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<td>Ceredigion LHB</td>
<td>CER</td>
<td>Hywel Dda UHB</td>
</tr>
<tr>
<td>Conwy LHB</td>
<td>CON</td>
<td>Betsi Cadwaladr UHB</td>
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<tr>
<td>Denbighshire LHB</td>
<td>DEN</td>
<td>Betsi Cadwaladr UHB</td>
</tr>
<tr>
<td>Flintshire LHB</td>
<td>FLI</td>
<td>Betsi Cadwaladr UHB</td>
</tr>
<tr>
<td>Gwynedd LHB</td>
<td>GWY</td>
<td>Betsi Cadwaladr UHB</td>
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<tr>
<td>Merthyr Tydfil LHB</td>
<td>MER</td>
<td>Cwm Taf UHB</td>
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<tr>
<td>Monmouth LHB</td>
<td>MON</td>
<td>Aneurin Bevan UHB</td>
</tr>
<tr>
<td>Newport LHB</td>
<td>NEW</td>
<td>Aneurin Bevan UHB</td>
</tr>
<tr>
<td>Neath/ Port Talbot LHB</td>
<td>NPT</td>
<td>Abertawe Bro Morgannwg UHB</td>
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<tr>
<td>Pembrokeshire LHB</td>
<td>PEM</td>
<td>Hywel Dda UHB</td>
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<tr>
<td>Powys LHB</td>
<td>POW</td>
<td>Mid &amp; West Wales</td>
</tr>
<tr>
<td>Rhondda Cynon Taff LHB</td>
<td>RCT</td>
<td>Cwm Taf UHB</td>
</tr>
<tr>
<td>Swansea LHB</td>
<td>SWA</td>
<td>Abertawe Bro Morgannwg UHB</td>
</tr>
<tr>
<td>Torfaen LHB</td>
<td>TOR</td>
<td>Aneurin Bevan UHB</td>
</tr>
<tr>
<td>The Vale of Glamorgan LHB</td>
<td>VOG</td>
<td>Cardiff and Vale UHB</td>
</tr>
<tr>
<td>Wrexham LHB</td>
<td>WRX</td>
<td>Betsi Cadwaladr UHB</td>
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<tr>
<td>Ynys Mon LHB</td>
<td>YNY</td>
<td>Betsi Cadwaladr UHB</td>
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</table>

For ease of interpretation and presentation, antimicrobial data has been collated by ATC codes as shown in Table 2.

Table 2: Antimicrobial Group codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Antimicrobial Group</th>
<th>Example from data set</th>
</tr>
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<tbody>
<tr>
<td>J01AA</td>
<td>Tetracyclines</td>
<td>Oxytetracycline</td>
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<tr>
<td>J01CA</td>
<td>Broad Spectrum Penicillins</td>
<td>Amoxicillin</td>
</tr>
<tr>
<td>J01CE</td>
<td>Beta Lactamase Sensitive Penicillins</td>
<td>Penicillin V</td>
</tr>
<tr>
<td>J01CF</td>
<td>Beta Lactamase Resistant Penicillins</td>
<td>Flucloxacillin</td>
</tr>
<tr>
<td>J01CR</td>
<td>Beta Lactamase Inhibitor Combinations</td>
<td>Co-amoxiclav</td>
</tr>
<tr>
<td>J01D</td>
<td>Cephalosporins</td>
<td>Cefalexin</td>
</tr>
<tr>
<td>J01E</td>
<td>Trimethoprim &amp; Sulphonamides</td>
<td>Trimethoprim</td>
</tr>
<tr>
<td>J01FA</td>
<td>Macrolides</td>
<td>Erythromycin</td>
</tr>
<tr>
<td>J01MA</td>
<td>Fluoroquinolone</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>J01XD</td>
<td>Imidazoles</td>
<td>Metronidazole</td>
</tr>
<tr>
<td>J01XE</td>
<td>Nitrofurans</td>
<td>Nitrofurantoin</td>
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</tbody>
</table>
Section 4: Antibacterial Usage in Primary Care

All Wales Antibacterial Usage for Primary Care in 2015

Figure 1: All Wales Antibacterial Usage for 2015 (ITEMS)

Figure 1 shows antibacterial usage at group level for All-Wales in 2015:

- The data is based on the number of antibacterial ITEMS.
- Broad spectrum penicillins were the most commonly prescribed antibacterial group in 2015, accounting for 27% of total antibacterial usage in Primary Care in Wales.
- Tetracyclines, macrolides, trimethoprim/sulphonamide group (predominantly trimethoprim), and the beta lactamase resistance penicillins accounted for a further 49% of usage.
- Beta-lactam/beta-lactamase inhibitor combinations (co-amoxiclav) accounted for 4.0% of total usage.
- Cephalosporins accounted for 3.8% of total usage.
- Fluoroquinolones accounted for 2.0% of total usage.
Figure 2: All Wales Antibacterial Usage for 2015 (DDDs)

Figure 2 shows antibacterial usage at group level for All-Wales in 2015:

- The data is based on the number of Defined Daily Doses (DDDs).
- Tetracyclines and broad spectrum penicillins had the highest usage; both accounting for 26% of total antibacterial usage in Primary Care in Wales in 2015.
- Beta-lactam/beta-lactamase inhibitor combinations accounted for 5.2% of total usage.
- Fluoroquinolones (J01MA) accounted for 1.9% of total usage.
- Cephalosporins accounted for 1.7% 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 14%, compared to 26% 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 ‘lumecycline’ relates to 28 DDDs whereas, one item of co-amoxiclav generally only relates to 5-7 DDDs.

**Note 2**: The data that follows for individual LHBs presents the number of items/1000 PUs as a measure of antimicrobial usage in primary care.
Figure 3: Trends in Restricted Antibacterial Group Dispensing 2006-2015

Figure 3 shows trends in dispensing of ‘restricted agents’ and tetracyclines across Primary Care in Wales from 2006-2015:

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) e.g. co-amoxiclav shows a reduction in winter peaks and a downward trend in usage across time.
- Cephalosporin usage (J01D) e.g. cefalexin shows a reduction in winter peaks and a marked downward trend in usage across time.
- Fluoroquinolone usage (J01MA) e.g. ciprofloxacin shows a downward trend in usage across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin usage (J01CA) e.g. amoxicillin, and total antibacterial usage (J01) show marked winter peaks, and a small decrease in 2015 compared with the previous year (see Figure 4).
Figure 5: Trends in Antibacterial Group Usage 2006-2015 (Respiratory)

Figure 5 shows the trends in usage for antibacterials that can be used to treat respiratory tract infections:

- Broad spectrum penicillins (J01CA) e.g. amoxicillin show a downward trend in usage in 2014/15, but with marked winter peaks in usage in quarters 1 and 4.
- Macrolides (J01FA) e.g. clarithromycin shows marked winter peaks, with no significant change in usage across time.
- Tetracyclines (J01AA) e.g. doxycycline, shows an upward trend and winter peaks in usage, suggesting an increased use for respiratory infections.
- Beta-lactam/beta-lactamase inhibitor combinations (J01CR) show a reduction in winter peaks and a downward trend in usage over time.
- Fluoroquinolones (J01MA) e.g. levofloxacin show a downward trend in usage over time.

Figure 6: Trends in Antibacterial Group Usage 2006-2015 (Urinary)
Figure 6 shows the trends in usage for antibacterials that can be used to treat urinary tract infections: beta-lactam/beta-lactamase inhibitor combinations (J01CR), first generation cephalosporins (J01DB), fluoroquinolones (J01MA), nitrofurans (J01XE), and trimethoprim and sulphamethoxazole combinations (J01E):

- Trimethoprim/sulphonamide group (predominantly trimethoprim) show an upward trend in usage over time, levelling off in 2014/15, with marked peaks in usage in quarters 3 (July-September) and 4 (October-December).
- Beta-lactam/beta-lactamase inhibitor combination (J01CR) shows a notable downward trend in usage over time.
- Cephalosporins (J01D) show a marked downward trend in usage over time.
- Fluoroquinolones (J01MA) shows a downward trend in usage over time.
- Nitrofurans (J01XE) e.g. nitrofurantoin shows an upward trend in usage across time.

Figure 7 shows the trends in usage for other agents: beta-lactamase sensitive penicillins (J01CE), and beta-lactamase resistant penicillins (J01CF).

- Beta-lactamase resistant penicillins (J01CF) e.g. flucloxacillin show a decrease in usage in 2015, with marked summer peaks in quarter 3 (Jul-Sep) each year.
- Beta-lactamase sensitive penicillins (J01CE) e.g. phenoxymethyl penicillin shows general downward trend across time, with marked winter peaks in quarter 1 (January-March) each year.
Figure 8: Difference in Antibacterial Group Usage 2014-2015 (%)

Figure 8 shows the difference in antibacterial group usage across Wales in 2015 compared with 2014 as a proportion, based on items/1000 PUs:

In 2015:
- Tetracycline usage (J01AA) increased by 6.6%
- Broad spectrum penicillin usage (J01CA) decreased by 8.1%
- Beta-lactamase sensitive penicillins (J01CE) decreased by 3.9%
- Beta-lactamase resistant penicillins (J01CF) decreased by 5.4%
- Beta-lactam/beta-lactamase inhibitor combinations (J01CR) decreased by 16.8%
- Cephalosporins (J01D) decreased by 17.3%
- Trimethoprim group (J01E) decreased by 2.6%
- Macrolides (J01FA) decreased by 7.5%
- Fluoroquinolones (J01MA) decreased by 9.1%
- Imidazole (J01XD) decreased by 10.15%
- Nitrofurans (J01XE) increased by 4.5%
- **Total antibacterial usage (J01) decreased by 5.1%**
Comparisons between LHBs

Figure 9: Total antimicrobial items/1000 PUs per annum by LHB

The difference in the number of antibacterial items/1000 PUs per annum between the old local health boards (LHBs) in Wales for 2015 is shown in Figure 9. Torfaen LHB had the highest dispensing rate of 626 items/1000 prescribing units per annum and Powys LHB had the lowest dispensing rate with 436 items/1000PUs PA. The All-Wales dispensing rate for 2015 was 546 items/1000PUs PA.

Figures 10-20 show the dispensing rates and proportional use for the following antibacterial groups:

- Top-9 antibacterials (amoxicillin, clarithromycin, doxycycline, erythromycin, flucloxacillin, nitrofurantoin, oxytetracycline, penicillin V, and trimethoprim)
- Tetracyclines (J01AA)
- Broad spectrum penicillins (J01CA)
- Beta-lactamase sensitive penicillins (J01CE)
- Beta-lactamase resistant penicillins (J01CF)
- Beta-lactam/beta-lactamase inhibitor combinations (J01CR)
- Cephalosporins (J01D)
- Trimethoprim and sulphonamides (J01E)
- Macrolides (J01FA)
- Fluoroquinolones (J01MA)
- Nitrofurans (J01XE)
Figure 10: Top-9 antibacterial dispensing by LHB

The difference in Top-9 dispensing between LHBs in Wales for 2015 and the Top-9 as a proportion of total antibacterial dispensing is shown in Figure 10. Top-9 dispensing ranged from 567 items/1000PUs for Blaenau Gwent LHB (BLG) to 382 items/1000PUs in Powys LHB (POW). The Top-9 antibacterials as a proportion of total antibacterial dispensing varied between 91% in Blaenau Gwent LHB to 85% in Wrexham LHB (WRX). The average for All-Wales was 88% dispensing of Top 9.

Figure 11: Tetracycline (J01AA) dispensing by LHB

The difference in tetracycline (J01AA) dispensing between LHBs in Wales for 2015 and J01AA dispensing as a proportion of total antibacterial dispensing is shown in Figure 11. J01AA dispensing ranged from 106 items/1000PUs for Neath Port Talbot LHB (NPT) to 49 items/1000PUs in Pembroke LHB (PEM). J01AA as a proportion of total dispensing varied between 18% in Neath Port Talbot LHB to 9.5% in Pembroke LHB.
Figure 12: Broad spectrum penicillin (J01CA) dispensing by LHB

The difference in broad spectrum penicillin (J01CA) dispensing between LHBs in Wales for 2015 and J01CA dispensing as a proportion of total antibacterial dispensing is shown in Figure 12. J01CA dispensing ranged from 183 items/1000PUs for Carmarthen LHB (CAM) to 106 items/1000PUs in Powys LHB (POW). J01CA as a proportion of total dispensing varied between 31% in Carmarthen LHB to 22% in Neath Port Talbot LHB (NPT).

Figure 13: Beta-lactamase sensitive penicillins (J01CE) dispensing by LHB

The difference in beta-lactamase resistant penicillins (J01CE) dispensing between LHBs in Wales for 2015 and J01CE dispensing as a proportion of total antibacterial dispensing is shown in Figure 13. J01CE dispensing ranged from 50 items/1000PUs for Swansea LHB (SWA) to 28 items/1000PUs in Powys LHB (POW). J01CE as a proportion of total dispensing varied between 5.3% in Merthyr LHB (MER) and 9.3% in Swansea LHB.
Figure 14: Beta-lactamase resistant penicillins (J01CF) dispensing by LHB

The difference in beta-lactamase resistant penicillins (J01CF) dispensing between LHBs in Wales for 2015 and J01CF dispensing as a proportion of total antibacterial dispensing is shown in Figure 14. J01CF dispensing ranged from 71 items/1000PUs for Blaenau Gwent LHB (BLG) to 49 items/1000PUs in Ceredigion LHB (CER). J01CF as a proportion of total dispensing varied between 9% in Wrexham LHB (WRX) and 13% in Vale of Glamorgan LHB (VOG).

Figure 15: Beta-lactam/beta-lactamase inhibitor combinations (J01CR) dispensing by LHB

The difference in beta-lactam/beta-lactamase inhibitor combination (J01CR) dispensing between LHBs in Wales for 2015 and J01CR dispensing as a proportion of total antibacterial dispensing is shown in Figure 15. J01CR dispensing ranged from 33 items/1000PUs for Rhondda Cynon Taff LHB (RCT) to 9 items/1000PUs in Denbigh LHB (DEN). J01CR as a proportion of total dispensing varied between 1.7% in Denbigh LHB 5.6% in Rhondda Cynon Taff LHB. Rhondda Cynon Taff LHB.
Figure 16: Cephalosporin (J01DB, J01DC & J01DD) dispensing by LHB

The difference in cephalosporin (J01D) dispensing between LHBs in Wales for 2015 and J01D dispensing as a proportion of total antibacterial dispensing is shown in Figure 16. J01D dispensing ranged from 31 items/1000PUs for Wrexham LHB (WRX) to 13 items/1000PUs in Cardiff LHB (CAR). J01D as a proportion of total dispensing varied between 2.3% in Blaenau Gwent LHB (BLG), to 5.6% in Wrexham LHB.

Figure 17: Trimethoprim and sulphonamides (J01E) dispensing by LHB

The difference in trimethoprim sand sulphonamide (J01E) dispensing between LHBs in Wales for 2015 and J01E dispensing as a proportion of total antibacterial dispensing is shown in Figure 17. J01E dispensing ranged from 72 items/1000PUs for Torfaen LHB (TOR) to 53 items/1000PUs in Newport LHB (NEW). J01E as a proportion of total dispensing varied between 10% in Newport LHB to 14% in Powys LHB (POW).
Figure 18: Macrolide (J01FA) dispensing by LHB

The difference in macrolide (J01FA) dispensing between LHBs in Wales for 2015 and J01FA dispensing as a proportion of total antibacterial dispensing is shown in Figure 18. J01FA dispensing ranged from 85 items/1000PUs for Torfaen LHB (TOR) to 51 items/1000PUs in Powys LHB (POW). J01FA as a proportion of total dispensing varied between 10% in Bridgend LHB (BGD) to 15% in Pembroke LHB (PEM).

Figure 19: Fluoroquinolone (J01MA) dispensing by LHB

The difference in fluoroquinolone (J01MA) dispensing between LHBs in Wales for 2015 and J01MA dispensing as a proportion of total antibacterial dispensing is shown in Figure 19. J01MA dispensing ranged from 16 items/1000PUs for Swansea LHB (SWA) to 7 items/1000PUs in Newport LHB (NEW). J01MA as a proportion of total dispensing varied between 1.3% in Newport LHB to 2.7% in Flint LHB (FLI).
Figure 20: Nitrofurans (J01XE) dispensing by LHB

The difference in nitrofurans (J01XE) dispensing between LHBs in Wales for 2015 and J01XE dispensing as a proportion of total antibacterial dispensing is shown in Figure 20. J01XE dispensing ranged from 43 items/1000 PUs for Blaenau Gwent LHB (BLG) to 19 items/1000 PUs in Bridgend LHB (BGD). J01XE as a proportion of total dispensing varied between 3.4% in Bridgend LHB to 7.9% in Cardiff LHB (CAR).
Section 3: Local Health Board Usage

Bridgend LHB (Abertawe Bro Morgannwg Health Board)

Figure 21: Bridgend LHB - Antibacterial Dispensing for 2015

Figure 21 shows the pattern of antibacterial dispensing in Bridgend LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 26% of total antibacterial dispensing, and tetracyclines - 17%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 3.8% of dispensing, cephalosporins - 3.7%, and fluoroquinolones - 1.8%.

Figure 22: Trends in Specific Antibacterial Group Dispensing 2006-2015
**Figure 22** shows trends in specific antibacterial group dispensing in Bridgend LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta Lactam/beta-lactamase inhibitor combination usage (J01CR) e.g. co-amoxiclav levelled off in 2015 following a small increase in 2014.
- Cephalosporin usage (J01D) shows reduced seasonal winter peaks, and a marked downward trend during 2011, levelling off from 2012 onwards.
- Fluoroquinolone usage (J01MA) shows no significant change in dispensing rates from 2011 onwards.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Total antibacterial usage (J01) and broad spectrum penicillin usage (J01CA) shows seasonal winter peaks reducing in size in the later years, and a downward trend in usage from 2011 onwards (see **Figure 23**).
Figure 24: Neath Port Talbot LHB - Antibacterial Dispensing for 2015

Figure 24 shows the pattern of antibacterial dispensing in Neath Port Talbot LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 22% of total antibacterial dispensing, and tetracyclines - 18%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 4.1% of dispensing, cephalosporins - 3.2%, and fluoroquinolones - 2.1%.
Figure 25 shows trends in specific antibacterial group dispensing in Neath Port Talbot LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) decreased in 2015.
- Cephalosporin usage (J01D) shows a marked decrease in usage in 2011, and a notable reduction in winter peaks, with the reduction in usage levelling off from 2013 onwards.
- Fluoroquinolone usage (J01MA) decreased in 2011, and has shown a small increase in usage from 2013 onwards.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Total antibacterial usage (J01) and broad spectrum penicillin usage (J01CA) shows seasonal winter peaks reducing in size in the later years, and a downward trend in usage from 2011 onwards (see Figure 26).

Figure 26: Trends in Total Antibacterial Usage 2006-2015
**Figure 27: Swansea LHB - Antibacterial Dispensing for 2015**

**Figure 28** shows the pattern of antibacterial dispensing in Swansea LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 25% of total antibacterial dispensing, and tetracyclines - 14%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 5.2% of dispensing, cephalosporins - 3.7%, and fluoroquinolones - 2.6%.
Figure 28 shows trends in specific antibacterial group dispensing in Swansea LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination use (J01CR) decreased in 2015.
- Cephalosporin usage shows a reduction in winter peaks and a general downward trend in usage from 2012 onwards.
- Fluoroquinolone usage (J01MA) increased in 2014/15.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Broad spectrum penicillin dispensing (J01CA) and total dispensing (J01) shows seasonal winter peaks, and a notable reduction in usage in 2014/15 (see Figure 29).

Figure 29: Trends in Total Antibacterial Usage 2006-2015
Figure 30: Blaenau Gwent Talbot LHB - Antibacterial Dispensing for 2015

Figure 30 shows the pattern of antibacterial dispensing in Blaenau Gwent LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 28% of total antibacterial dispensing, and tetracyclines - 18%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 2.9% of dispensing, cephalosporins - 2.3%, and fluoroquinolones - 1.6%.

Figure 31: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 31 shows trends in specific antibacterial group dispensing in Blaenau Gwent LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination use (J01CR) levelled off in 2014/15.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks and a notable downward trend levelling off in 2015.
- Fluoroquinolone usage (J01MA) increased in 2015.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Total antibacterial usage (J01) and broad spectrum penicillin usage (J01CA) shows a reduction in seasonal winter peaks, and a downward trend in usage from 2011 onwards, but with a **4.2% increase in 2015 compared with the previous year** (see Figure 32).
- **Note:** Please note the difference in the y-axis scale which is larger and finishes at 220 Items/1000 PUs per quarter.

![Figure 32: Trends in Total Antibacterial Usage 2006-2015](image-url)
Caerphilly LHB (Aneurin Bevan Health Board)

Figure 33: Caerphilly LHB - Antibacterial Dispensing for 2015

Figure 33 shows the pattern of antibacterial dispensing in Caerphilly LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 27% of total antibacterial dispensing, and tetracyclines - 15%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 3.5% of dispensing, cephalosporins - 2.7%, and fluoroquinolones - 1.5%.

Figure 34: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 34 shows trends in specific antibacterial group dispensing in Caerphilly LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows seasonal winter peaks, and a general downward trend across time.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks, and a downward trend across time.
- Fluoroquinolone usage (J01MA) shows a downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a small downward trend in usage from 2012 onwards (see Figure 35).

Figure 35: Trends in Total Antibacterial Usage 2006-2015
Newport LHB (Aneurin Bevan Health Board)

Figure 36: Newport LHB - Antibacterial Dispensing for 2015

Figure 36 shows the pattern of antibacterial dispensing in Newport LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 27% of total antibacterial dispensing, and tetracyclines - 14%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 3.9% of dispensing, cephalosporins - 2.9%, and fluoroquinolones - 1.3%.

Figure 37: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 37 shows trends in specific antibacterial group dispensing in Newport LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combinations (J01CR) show a general downward trend in usage from 2011 onwards.
- Cephalosporin usage (J01D) shows a notable downward trend from 2011 onwards.
- Fluoroquinolone usage (J01MA) shows a general downward trend.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2012 onwards (see Figure 38).

**Figure 38: Trends in Total Antibacterial Usage 2006-2015**
Figure 39: Monmouth LHB - Antibacterial Dispensing for 2015

Figure 39 shows the pattern of antibacterial dispensing in Monmouth LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 24% of total antibacterial dispensing, and tetracyclines - 15%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 4.0% of dispensing, cephalosporin - 3.6%, and fluoroquinolones - 2.1%.

Figure 40: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 40 shows trends in specific antibacterial group dispensing in Monmouth LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a general downward trend from 2011 onwards.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks and a marked downward trend from 2010 onwards.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a small downward trend in usage from 2012 onwards (see Figure 41).

Figure 41: Trends in Total Antibacterial Usage 2006-2015
Figure 42: Torfaen LHB - Antibacterial Dispensing for 2015

Figure 42 shows the pattern of antibacterial dispensing in Torfaen LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 26% of total antibacterial dispensing, and tetracyclines - 14%. Cephalosporins usage accounted for 3.3% of dispensing, beta-lactam/beta-lactamase inhibitor combination - 3.1%, and fluoroquinolones - 1.4%.

Figure 43: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 43 shows trends in specific antibacterial group dispensing in Torfaen LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a general downward trend from 2011 onwards.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks, and a notable downward trend from 2011 onwards.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show a reduction in seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 44).

Figure 44: Trends in Total Antibacterial Usage 2006-2015
Figure 45: Conwy LHB - Antibacterial Dispensing for 2015

Figure 45 shows the pattern of antibacterial dispensing in Conwy LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 27% of total antibacterial dispensing, and tetracyclines - 13%. Cephalosporins usage accounted for 5.3% of dispensing, fluoroquinolones - 2.3%, and beta-lactam/beta-lactamase inhibitor combination - 2.2%.

Figure 46: Trends in Specific Antibacterial Group Dispensing 2005-2015q1
Figure 46 shows trends in specific antibacterial group dispensing in Conwy LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a general downward trend across time.
- Cephalosporin usage (J01D) shows seasonal winter peaks and a general downward trend across time, with a notable reduction in usage in 2014, levelling off in 2015.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows a gradual increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 47).

![Figure 47: Trends in Total Antibacterial Usage 2006-2015](image-url)
Figure 48: Denbighshire LHB - Antibacterial Dispensing for 2015

Figure 48 shows the pattern of antibacterial dispensing in Denbighshire LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 29% of total antibacterial dispensing, and tetracyclines - 13%. Cephalosporins usage accounted for 4.9% of dispensing, fluoroquinolones - 2.2%, and beta-lactam/beta-lactamase inhibitor combination - 1.8%.

Figure 49: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 49 shows trends in specific antibacterial group dispensing in Denbighshire LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a general downward trend across time.
- Cephalosporin usage (J01D) shows seasonal winter peaks, and a downward trend from 2013 onwards.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 50).

Figure 50: Trends in Total Antibacterial Usage 2006-2015
**Flintshire LHB (Betsi Cadwaladr University Health Board)**

**Figure 51: Flint LHB - Antibacterial Dispensing for 2014**

Figure 51 shows the pattern of antibacterial dispensing in Flintshire LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 26% of total antibacterial dispensing, and tetracyclines - 14%. Cephalosporin usage accounted for 5.1% of dispensing, beta-lactam/beta-lactamase inhibitor combination - 3.4%, and fluoroquinolones - 2.7%.

**Figure 52: Trends in Specific Antibacterial Group Dispensing 2006-2015**
**Figure 52** shows trends in specific antibacterial group dispensing in Flintshire LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a general downward trend across time, with winter peaks.
- Cephalosporin usage (J01D) shows a marked downward trend from 2014 onwards.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show a reduction in seasonal winter peaks, and a downward trend in usage from 2011 onwards (see **Figure 50**).

**Figure 53: Trends in Total Antibacterial Usage 2006-2015**
Figure 54: Gwynedd LHB - Antibacterial Dispensing for 2015

Figure 54 shows the pattern of antibacterial dispensing in Gwynedd LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 30% of total antibacterial dispensing, and tetracyclines - 11%. Cephalosporin usage accounted for 3.9% of dispensing, beta-lactam/beta-lactamase inhibitor combination - 2.7%, and fluoroquinolones - 2.0%.

Figure 55: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 55 shows trends in specific antibacterial group dispensing in Gwynedd LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a marked downward trend from 2013 onwards.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks and a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows a general downward trend.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend in 2014/15 with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 56).

![Figure 56: Trends in Total Antibacterial Usage 2006-2015](image-url)
Figure 57: Wrexham LHB - Antibacterial Dispensing for 2015

Figure 57 shows the pattern of antibacterial dispensing in Wrexham LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 29% of total antibacterial dispensing, and tetracyclines - 14%. Cephalosporin usage accounted for 5.6% of dispensing, beta-lactam/beta-lactamase inhibitor combination - 4.4%, and fluoroquinolones - 2.2%.

Figure 58: Trends in Specific Antibacterial Group Dispensing 2005-2015q1
Figure 58 shows trends in specific antibacterial group dispensing in Wrexham LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a marked downward trend from 2013 onwards.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks and a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows a general downward trend.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 59).

Figure 59: Trends in Total Antibacterial Usage 2006-2015
Figure 60: Ynys Mon LHB - Antibacterial Dispensing for 2015

Figure 60 shows the pattern of antibacterial dispensing in Ynys Mon LHB for 2015: broad spectrum penicillins were the most used antibacterials accounting for 28% of total antibacterial dispensing, and tetracyclines - 12%. Cephalosporins usage accounted for 4.3% of dispensing, fluoroquinolones - 2.4%, and beta-lactam/beta-lactamase inhibitor combination - 2.3%.

Figure 61: Trends in Specific Antibacterial Group Dispensing 2006-2015
**Figure 61** shows trends in specific antibacterial group dispensing in Ynys Mon LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a marked downward trend from 2013 onwards.
- Cephalosporin usage (J01D) shows a reduction in seasonal winter peaks and a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows a general downward trend.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend from 2013 onwards with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see **Figure 62**).

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**Figure 62: Trends in Total Antibacterial Usage 2006-2015**
Figure 63: Cardiff LHB - Antibacterial Dispensing for 2015

Figure 63 shows the pattern of antibacterial dispensing in Cardiff LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 26% of total antibacterial dispensing, and tetracyclines - 14%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 3.3% of dispensing, cephalosporins - 2.7%, and fluoroquinolones - 1.8%.

Figure 64: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 64 shows trends in specific antibacterial group dispensing in Cardiff LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a marked reduction in 2014, levelling off in 2015.
- Cephalosporin usage (J01D) shows a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend from 2013 onwards with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 65).

Figure 65: Trends in Total Antibacterial Usage 2006-2015
Figure 66: The Vale of Glamorgan LHB - Antibacterial Dispensing for 2014

Figure 66 shows the pattern of antibacterial dispensing in the Vale of Glamorgan LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 24% of total antibacterial dispensing, and tetracyclines - 14%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 3.4% of dispensing, cephalosporins - 2.9%, and fluoroquinolones - 2.0%.

Figure 67: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 67 shows trends in specific antibacterial group dispensing in the Vale of Glamorgan from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows a marked reduction in 2014, levelling off in 2015.
- Cephalosporin usage (J01D) shows a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows a general downward trend across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend from 2012 onwards with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 68).

Figure 68: Trends in Total Antibacterial Usage 2006-2015
**Merthyr Tydfil LHB (Cwm Taf Health Board)**

**Figure 69: Merthyr Tydfil LHB - Antibacterial Dispensing for 2015**

**Figure 69** shows the pattern of antibacterial dispensing in Merthyr Tydfil LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 26% of total antibacterial dispensing, and tetracyclines - 16%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 5.5% of dispensing, cephalosporins - 4.9%, and fluoroquinolones - 2.0%.

**Figure 70: Trends in Specific Antibacterial Group Dispensing 2006-2015**
Figure 70 shows trends in specific antibacterial group dispensing in Merthyr Tydfil LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows seasonal winter peaks, and a general downward trend across time, with a marked reduction in usage in 2011.
- Cephalosporin usage (J01D) shows seasonal winter peaks, with no significant change in dispensing rates across time.
- Fluoroquinolone usage (J01MA) shows no significant change over time.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend from 2012 onwards with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 71).

![Figure 71: Trends in Total Antibacterial Usage 2006-2015](image-url)
Figure 72: Rhondda Cynon Taff LHB - Antibacterial Dispensing for 2015

Figure 72 shows the pattern of antibacterial dispensing in Rhondda Cynon Taff LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 28% of total antibacterial dispensing, and tetracyclines - 15%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 6.4% of dispensing, cephalosporins - 4.7%, and fluoroquinolones - 1.7%.

Figure 73: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 73 shows trends in specific antibacterial group dispensing in Rhondda Cynon Taff LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination use (J01CR) shows seasonal winter peaks, with no significant change in dispensing rates from 2013 onwards.
- Cephalosporin usage (J01D) shows seasonal winter peaks, with no significant change in dispensing rates from 2013 onwards.
- Fluoroquinolone usage (J01MA) shows no significant change in dispensing from 2012 onwards.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend from 2011 onwards with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a small increase in total antibacterial dispensing in 2015 of 1.6% (see Figure 74).

Figure 74: Trends in Total Antibacterial Usage 2006-2015
Figure 75: Carmarthen LHB - Antibacterial Dispensing for 2015

Figure 75 shows the pattern of antibacterial dispensing in Carmarthen LHB for 2015: broad spectrum penicillins were the most used antibacterials accounting for 31% of total antibacterial dispensing, and tetracyclines - 13%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 5.2% of dispensing, cephalosporins – 3.7%, and fluoroquinolones - 2.1%.

Figure 76: Trends in Specific Antibacterial Group Dispensing 2006-2015
**Figure 76** shows trends in specific antibacterial group dispensing in Carmarthen LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination use (J01CR) shows seasonal winter peaks, and a downward trend across time.
- Cephalosporin usage (J01D) shows seasonal winter peaks, and a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows seasonal winter peaks, and a general downward trend across time, but with a small increase in usage in 2015.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see **Figure 77**).

![Figure 77: Trends in Total Antibacterial Usage 2006-2015]
Figure 78: Ceredigion LHB - Antibacterial Dispensing for 2015

Figure 78 shows the pattern of antibacterial dispensing in Ceredigion LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 31% of total antibacterial dispensing, and tetracyclines - 10%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 5.1% of dispensing, cephalosporins - 3.3%, and fluoroquinolones - 2.0%.

Figure 79: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 79 shows trends in specific antibacterial group dispensing in Ceredigion LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination use (J01CR) shows seasonal winter peaks, and a general downward trend across time.
- Cephalosporin usage (J01D) shows a marked reduction in seasonal winter peaks, and a notable decrease in dispensing rates across time.
- Fluoroquinolone usage (J01MA) shows seasonal winter peaks, with no significant change in dispensing from 2013 onwards.
- Tetracycline usage (J01AA) e.g. doxycycline shows marked winter peaks, with no significant change in dispensing from 2012 onwards.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see Figure 80).

Figure 80: Trends in Total Antibacterial Usage 2006-2015
Figure 81: Pembroke LHB - Antibacterial Dispensing for 2015

Figure 81 shows the pattern of antibacterial dispensing in Pembroke LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 27% of total antibacterial dispensing, and tetracyclines - 9%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 5.1% of dispensing, cephalosporins - 4.4%, and fluoroquinolones - 2.2%.

Figure 82: Trends in Specific Antibacterial Group Dispensing 2006-2015
Figure 82 shows trends in specific antibacterial group dispensing in Pembrokeshire LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination use (J01CR) shows a downward trend in usage from 2013 onwards.
- Cephalosporin usage (J01D) shows seasonal winter peaks, and a general downward trend across time.
- Fluoroquinolone usage (J01MA) shows no significant change across time.
- Tetracycline usage (J01AA) e.g. doxycycline shows marked winter peaks, a small increase in dispensing from 2013 onwards.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a decrease in usage in 2014/15 (see Figure 83).

Figure 83: Trends in Total Antibacterial Usage 2006-2015
Figure 84: Powys LHB - Antibacterial Dispensing for 2015

Figure 84 shows the pattern of antibacterial dispensing in Powys LHB for 2015; broad spectrum penicillins were the most used antibacterials accounting for 24% of total antibacterial dispensing, and tetracyclines - 13%. Beta-lactam/beta-lactamase inhibitor combination usage accounted for 4.2% of dispensing, cephalosporins - 3.2%, and fluoroquinolones - 2.3%.

Figure 85: Trends in Specific Antibacterial Group Dispensing 2006-2015
**Figure 85** shows trends in specific antibacterial group dispensing in Powys LHB from 2006-2015: beta-lactam/beta-lactamase inhibitor combinations (J01CR), all cephalosporins (J01D), fluoroquinolones (J01MA), and tetracyclines (J01AA).

- Beta-lactam/beta-lactamase inhibitor combination usage (J01CR) shows seasonal winter peaks, with no significant change in dispensing from 2013 onwards.
- Cephalosporin usage (J01D) shows seasonal winter peaks, with no significant change in dispensing from 2013 onwards.
- Fluoroquinolone usage (J01MA) shows no significant change from 2013 onwards.
- Tetracycline usage (J01AA) e.g. doxycycline shows an increasing trend with marked winter peaks.
- Both broad spectrum penicillin dispensing (J01CA) and total antibacterial dispensing (J01) show seasonal winter peaks, and a downward trend in usage from 2013 onwards (see **Figure 86**).

**Figure 86: Trends in Total Antibacterial Usage 2006-2015**
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