QUALITY MEASURES

Point Prevalence Surveys of Antimicrobial Prescribing in Acute Hospitals in Wales
2013-2017

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Quality Measures 2013-2017 PPS

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HARP Programme
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INTRODUCTION

This report compares Quality Measures data from the 2013 to 2017 all-Wales Point Prevalence Survey (PPS) of antimicrobial usage in secondary care in Wales. The data collected in the survey includes all systemic and topical antibacterials, antivirals, and antifungals, antiseptic agents, and TB agents, collectively described as antimicrobials. However, this Quality Measures report focuses mainly on systemic antibacterial usage.

This Quality Measures report includes data for the acute hospitals in Wales; psychiatric wards and units have been excluded from these analyses. Neath Port Talbot hospital is no longer considered an acute hospital and is excluded from this report. Due to its specialist nature and the small number of in-patients, Velindre hospital is also excluded from this report. Data from the excluded sites and all non-acute hospitals that participated in the survey will be published in the main PPS report later in the year.

This report allows for comparison between acute hospitals and shows trends across time; however, it should be noted that patient mix and specialities vary between hospitals and comparisons should be made with caution.

METHODOLOGY

The annual point prevalence survey takes place in November each year. Pharmacy teams collect data using a paper-based method; Public Health Wales collate the forms and transcribe the data into Microsoft Excel. In 2017, the data was processed and analysed using a statistical software package (Stata 14), and confidence intervals were calculated using the Wilson approach\(^1\). The inclusion criteria for this Quality Measures report and the analytical methodology differs from previous years; consequently, historical results may differ slightly from those previously reported.
KEY POINTS

Variation in sampling
- There is significant variation in sampling across time for many of the hospitals; e.g. for Royal Gwent the number of patients surveyed varied by 11% between 2013-2017.
- Variation in sampling may account in part for the variation in antibacterial prescribing rates.

Systemic Antibacterial Prescribing Rate [95% Confidence Interval]
- No significant change in the all-Wales prescribing rate across time (32.2% in 2013, 31.9% in 2014, 29.7% in 2015, 32.1% in 2016, and 31.3% in 2017).
- SIGNIFICANTLY HIGHER prescribing rates for Bronlais hospital across time (median 45.0%).

Route of administration
- 57.5% [55.6, 59.3] of antibacterials prescribed were parenteral (intravenous route).
- AN INCREASE in the rate of intravenous antibacterial usage for Withybush hospital from 54.1% in 2013 to 66.3% in 2017.
- SIGNIFICANTLY HIGHER parenteral antibacterial usage in Morriston hospital across time (median 64.2%)

Number of different antibacterial agents
- No significant change in the number of different antibacterial agents prescribed across the time: A median of 26 for the acute hospitals in 2017.

Duration of treatment
- 15.5% [13.9, 17.2] of patients prescribed systemic antibacterials for the treatment of infections received the antibacterials for more than 7 days
- SIGNIFICANTLY HIGHER extended duration of treatment (>7 days) for infections in University Hospital Llandough across time (median 23.3%)

Surgical prophylaxis
- 19.5% [14.4, 25.8] of patients prescribed surgical prophylaxis were prescribed surgical prophylaxis for >24 hours.
- The all-Wales rate has decreased across time from 31.6% in 2013 to 19.5% in 2017.

Reason for treatment documented
- 88.0% [86.8, 89.1] of antimicrobial prescriptions across Wales had a reason documented.
- SIGNIFICANTLY LOWER rate of documentation in UHW across time (median 78.1%).
Stop/review date documented

- 51.7% [49.9, 53.6] of all antimicrobial prescriptions had a stop/review date documented (excluding surgical prophylaxis).
- **SIGNIFICANTLY LOWER** rate of documentation in Withybush hospital across time (median 33.5%).
- Generally, documentation of a stop/review date is poor.

Appropriate drug choice

- 92.4% [91.4, 93.3] of antimicrobial prescriptions were judged the appropriate drug of choice.
- **A SIGNIFICANT INCREASE** in appropriate drug choice in UHL across time.
- **SIGNIFICANTLY LOWER** rate of use of the appropriate drug choice in Glangwili and Withybush hospitals in 2017 (median 83.6% and 83.7% respectively).

CURB-65 score documented

- 34.7% [27.9, 42.2] of patients with a diagnosis of community acquired pneumonia (CAP) had a CURB-65 score documented
- There remains much room for improvement.
VARIATION IN SAMPLING

Figure 1 is a box-plot showing the distribution of patients surveyed in the annual PPS by acute hospital from 2013-2017. Each point on the box plot represents an acute hospital. The upper and lower lines represent data within 1.5 times the inter-quartile range (IQR). Points outside of the IQR are outliers, and show marked variation in the number of patients surveyed compared with other years. For example, for Royal Gwent (D) 682 patients were surveyed in 2016, compared with 616 in 2013 – an 11% difference between years.

Note: Variation in sampling (the number of patients surveyed) may account in part for the variation in antibacterial prescribing rates, and variation in other quality measures. Variation in sampling is generally due to ward closures.

Figure 1: Variation in the total number of patients surveyed by acute hospital (2013-2017)
QUALITY MEASURES

Antibacterial prescribing rates

During the 2017 PPS, 6522 patients were surveyed, of which 2044 were prescribed systemic antibacterials: An all-Wales acute hospital prescribing rate of 31.3\% [30.2, 32.5], a small decrease compared to the 2016 rate of 32.1\% [30.9, 33.2].

Figure 2: Antibacterial prescribing rates by year for acute hospitals (2013-2017)

Figure 2 is a box plot of acute hospital antibacterial prescribing by year. In 2017, Bronglais (A) and Singleton (S) appear as outliers: Bronglais had a significantly higher prescribing rate (46.6\%) than the all-Wales rate, and Singleton had a significantly lower rate (20.1\%).
Table 1: Antibacterial prescribing rates for acute hospitals

<table>
<thead>
<tr>
<th>Hospital Code</th>
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<td>35.6</td>
<td>35.2</td>
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</tr>
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<td>32.9</td>
<td>34.4</td>
<td>34.9</td>
</tr>
<tr>
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<td>25.1</td>
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<td>34.5</td>
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<td>S</td>
<td>27.1</td>
<td>27.7</td>
<td>22.9</td>
<td>26.6</td>
<td>20.1</td>
</tr>
</tbody>
</table>

Table 1 shows the trends in prescribing rates for the acute hospitals over time; the table uses a colour gradation based on quintiles. Those in the lowest quintile are coloured white and those in the highest are coloured dark blue. In the 2017 PPS, rates varied from 20.1% in Singleton (S) to 46.6% in Bronglais hospital (A). For the five years of PPS data presented, the prescribing rate for Bronglais (A) was significantly higher than the all-Wales rate.

Figure 3 is a box plot of the prescribing rate by acute hospital, and all-Wales. For Bronglais hospital (A), the median prescribing rate was 45%, significantly higher than the other acute hospitals. The lower rate of 33.6% recorded as an outlier for Bronglais in 2015 was possibly due to chance variation. The 2015 PPS produced lower prescribing rates for many of the major acute hospitals; consequently, the all-Wales (Z) rate was lower at 29.7%, and appears as an outlier.

Figure 3: Antibacterial prescribing rates by acute hospital (2013-2017)
Route of administration

In the 2017 PPS, 1598 of the 2781 systemic antibacterials prescribed were for parenteral usage **57.5%** [55.6, 59.3]. Parenteral usage rates varied from 43.8% in Prince Philip to 66.3% in Withybush hospital.

**Figure 4**: Parenteral route of administration by year for acute hospitals (2013-2017)

**Figure 4** is a box plot of the rate of parenteral antibacterial use by year, showing the variation between hospitals across time.
Table 2 shows the trends in parenteral antibacterial usage over time by acute hospital: There is marked variation in parenteral antibacterial usage across time for a number of hospitals. Withybush hospital (G) appears to shows an increasing trend in parenteral usage.

Figure 5 is a box plot of the parenteral antibacterial usage by acute hospital and all-Wales, and shows the variation in the rate across the survey period 2013-2017. For Morriston hospital (E), the median usage rate was 64.2%, significantly higher than the all-Wales median of 55.2%, and significantly higher than the rates for most of the other acute hospitals. The lower rate of 55.6% recorded for Morriston in 2015, and the higher rate of 69.7% recorded for Royal Gwent in 2016 is possibly due to chance variation.

Figure 5: Parenteral route of administration by acute hospital (2013-2017)
In the 2017 PPS, the median number of different antibacterial agents across the acute hospitals increased from 25 to 26.

The greatest variety of antibacterial agents were prescribed in the tertiary referral centres of Royal Gwent (D), UHW (F) and Ysbyty Glan Clwyd (L).

**Figure 6** is a boxplot of showing the number of agents prescribed in the acute hospitals by year.

**Table 3** shows the trends over time. In the 2017 PPS, the number of different agents ranged from 32 in Royal Gwent (D) to 19 in Bronglais (A), with a notable increase in the number of agents used in Withybush (G) in 2017 compared to 2016.
In the 2017 PPS, 1786 patients were prescribed systemic antibacterials for the treatment of infection, of these 276 patients were prescribed the same antibacterial regimen for >7 days 15.5% [13.9, 17.2].

Figures 7: Proportion of patients prescribed antibacterials for > 7 days by year

Figure 7 is a boxplot showing the proportion of patients prescribed systemic antibacterials for the treatment of infection >7 days. There was no significant change in the median for 2017 compared with 2016, and continued variation within and between hospitals in the rates of prescribing for >7 days.
Table 4 shows trends in the proportion of patients prescribed antibacterials for the treatment of infection >7 days by year. In the 2017 PPS, the proportion ranged from 7.8% in Royal Glamorgan (C) to 22.5% in UHL (P).

Figure 8 is a box plot of patients prescribed antibacterials for >7 days by acute hospital and all-Wales, and shows the variation in the rate across the survey period 2013-2017. For UHL (P), the median was 23.3%, significantly higher than all-Wales median of 15.9%, and significantly higher than the rates for many of the other acute hospitals.
In the 2017 PPS, 185 antibacterials were prescribed for surgical prophylaxis (SP), of these 36 were prescribed for duration >24 hours, 19.5% [14.4, 25.8].

Figure 9: Proportion of surgical prophylaxis given > 24 hours – Health Board level by year

Figure 9 is a box plot of the proportion SP >24 hours at Health Board level by year. The numbers of antibacterials prescribed for surgical prophylaxis at hospital level is small, and so the data is aggregated to Health Board level. At Health Board level, the numbers remain small, and may account for some of the variation in the rates.

Table 5 shows trends in the proportion of surgical prophylaxis prescribed >24 hours at Health Board level over time. The number in brackets after the Health Board code shows the total number of antibacterials prescribed for surgical prophylaxis in the 2017 PPS. In the 2017 PPS, SP >24 hours ranged from 8.7% in Cardiff and Vale Health Board (CVU) to 33.3% in Aneurin Bevan (AB).

Table 5: Proportion of surgical prophylaxis given > 24 hours – Health Board level by year

<table>
<thead>
<tr>
<th>Health Board</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
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<td>AB (12)</td>
<td>26.3</td>
<td>15.7</td>
<td>15.0</td>
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<td>33.3</td>
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<td>ABMU (45)</td>
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<td>25.5</td>
<td>25.0</td>
<td>24.4</td>
</tr>
<tr>
<td>BCU (27)</td>
<td>28.2</td>
<td>61.5</td>
<td>34.8</td>
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</tr>
<tr>
<td>CT (37)</td>
<td>27.8</td>
<td>45.0</td>
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<td><strong>80.0</strong></td>
<td>21.6</td>
</tr>
<tr>
<td>CVU (46)</td>
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<td>15.9</td>
<td>15.4</td>
<td>30.3</td>
<td>8.7</td>
</tr>
<tr>
<td>HDD (18)</td>
<td>48.1</td>
<td>37.5</td>
<td>34.5</td>
<td>3.3</td>
<td>27.8</td>
</tr>
</tbody>
</table>

Note: Surgical prophylaxis numbers are small and prone to misinterpretation at hospital level; therefore, the data is only presented at Health board level in this report.
Note: The data includes prescribing for all types of surgery and this may account for some of the variation in the > 24 hours rate, as the types of surgery performed on the day of the PPS may differ from year to year, and some types of surgery are more likely to require extended prophylaxis than others.

Figure 10 is a box plot of antibacterials prescribed as surgical prophylaxis for >24 hours by Health Board and all-Wales, and shows the enormous variation in the rate across the survey period 2013-2017. For All-Wales (Z), the median was 25.9%; the all-Wales rates have decreased from 31.6% in 2013 to 19.5% in 2017.

**Figure 10:** Proportion of surgical prophylaxis given > 24 hours by Health Board
During the 2017 PPS, 3078 antimicrobials (topical or systemic) were prescribed, of which 2708 had the reason for prescribing documented in the notes or chart 88.0% [86.8, 89.1].

**Figure 11**: Reason documented in notes/chart by year (2013-2017)

**Figure 11** is a box plot of the proportion of antimicrobials where the reason for the prescription was documented in the patient notes or drug chart by year. In 2017, both Bronglais (A) and UHW (F) appear as outliers with lower rates than the other acute hospitals.
Table 6: Reason documented in notes/chart by year (2013-2017)

Table 6 shows trends in the proportion of antimicrobials where the reason for the prescription was documented over time. In 2017, the rate ranged from 93.8% in Nevill Hall (M) to 73.2% in Bronglais hospital (A).

Figure 12 is box plot of the proportion of antimicrobials where the reason for the prescription was documented by hospital. For UHW (F), the median was 78.1%, significantly lower than all-Wales median of 86.1%, and significantly lower than the median for many of the other acute hospitals.

Figure 12: Reason documented in notes/chart by hospital (2013-2017)
Stop/review date for treatment documented (notes/chart)

During the 2017 PPS, **2863** antimicrobials were prescribed for the treatment of infection or medical prophylaxis, of these **1481** had a stop/review date recorded in the patient notes or drug chart **51.7%** [49.9, 53.6]. Surgical prophylaxis is excluded from this quality measure, as it is generally administered on a single day, and therefore does not require stop/review date. This quality measure was introduced in 2014.

**Figures 13:** Stop/review date documented in notes/chart by year (2014-2017)

**Figure 13** is a box plot of the proportion of antimicrobials where a stop/review date was documented by year. There is wide variation in the compliance rates, and no significant change year on year.
Table 7: Stop/review date documented in notes/chart by year (2014-2017)

Table 7 shows trends in documentation of a stop/review date over time. In the 2017 PPS, the proportion of documentation ranged from 69.2% in Princess of Wales (B) to 23.3% in Bronglais (A) hospitals. Wrexham Maelor (H) has significantly increased documentation over time, whereas Singleton (S) has significantly decreased documentation over time.

Figure 14 is box plot of the proportion of antimicrobials where a stop/review date was documented by hospital. Generally, documentation of a stop/review date is very poor, with an all-Wales median of only 51.0%. For Withybush (G), the median was 33.5%, significantly lower than all-Wales median and the rates for many of the other acute hospitals.
Appropriate Drug Choice

During the 2017 PPS, 3106 antimicrobials were recorded, 2998 had a response to the question 'appropriate drug choice yes or no'. Of these 2769 were judged as an appropriate choice 92.4% [91.4, 93.3]. This quality measure was introduced in 2015.

**Figures 15**: Appropriate drug choice by year (2015-2017)

**Figure 15** is a box plot of the proportion of antimicrobials recorded as the appropriate drug choice by year. The data for this quality measure has only been collected for three years, but it appears to show an improvement in appropriate drug choice across time. Both Glangwili and Withybush appear as outliers with significantly lower rates than the all Wales rate for 2017 at 83.6% and 83.7% respectively.
Table 8 shows trends in the proportion of antimicrobials recorded as the appropriate drug choice by year. In the 2017 PPS, the proportion antimicrobials recorded as the appropriate ranged from 100% in Singleton (S) hospital to 83.6% in Glangwili (J). There was a significant increase in antimicrobials recorded as appropriate in UHL (P) across time.

Figure 16 is box plot of the proportion antimicrobials recorded as the appropriate drug choice by hospital. For Glangwili hospital (J), the median was 83.6%, significantly lower than all-Wales median of 92.2%.
During the 2017 PPS, 167 patients were recorded as having a diagnosis of community acquired pneumonia (CAP), of these only 58 had a CURB-65 score documented in their notes 34.7% [27.9, 42.2].

**Figure 17:** CURB-65 score documented for CAP by year

**Figure 17** is a box plot of the proportion of patients with CAP for whom a CURB-65 score was recorded in their notes. Generally, documentation of CURB-65 scores is very poor, with an all-Wales median in 2017 of only 35.6%.
Table 9 shows the trends in documenting a CURB-65 score across time. The number in brackets after the hospital code is the number of patients recorded with CAP in the 2017 PPS, e.g. in Bronglais (A) there were only 5 patients with CAP on the day of the PPS. There is marked variation in the recording rates for CAP across time, and this may be due to small numbers. The proportion of patients with a CURB-65 score recorded ranged from 63.6% in Princess of Wales (B) to 11.1% in Singleton (S), with a notable increase across time in Princess of Wales, but a marked decrease across time in UHW (F).

Figure 18 is box plot the proportion of patients with CAP for whom a CURB-65 score was recorded by hospital, showing an enormous variation in documentation rates for many of the hospitals.

Figure 18: CURB-65 score documented for CAP by hospital
APPENDIX

Rationale for Quality Measures

➢ Antibacterial prescribing rates

Rationale for measure

Inappropriate use of antibacterial agents (e.g. use in patients without a bacterial infection or excessive durations of therapy or prophylaxis) are drivers for the development and spread of antibiotic resistance and *C. difficile* infection. It is widely acknowledged that up to 30% of antibiotic use is inappropriate in terms of being used for patients, who do not have a bacterial infection/need prophylaxis, or incorrect agent chosen, or incorrect dose, or incorrect duration.

Direction of measure

Given the fact that antibiotics are probably over-used in most areas, a lower proportion of patients receiving an antibiotic is probably “good”. However, antibiotics are invaluable agents for the treatment and prophylaxis of infections and therefore use should not be reduced below the level for effective management of infections.

Factors affecting measure

The number of patients requiring antibiotics will be heavily influenced by patient case mix.

➢ Route of administration

Rationale for measure

Parenteral antibacterial therapy is usually indicated for acute severe infections and where oral absorption may be a problem. However oral therapy is appropriate for many infections, reduces the need for intravenous access devices (a potential portal for Healthcare-Associated Infection), and is usually significantly less expensive. Many Health Boards have parenteral/oral switch policies that suggest a switch after 48 hours of treatment and when infection is resolving.

Direction of measure

A higher percentage of oral therapy is probably “good”.

Factors affecting measure

Parenteral therapy is indicated in certain clinical situations. Therefore, rates of parenteral use will be affected by case-mix.
Number of different antibacterial agents

Rationale for measure
There are many antibacterials available and some have similar or identical indications. Local antimicrobial formularies/guidance usually recommends a limited number of agents. This limit increases familiarity with the agents recommended in terms of dosing and indications, and thereby reduces the risk of errors.

Direction of measure
A smaller number of different agents used is probably “good”. However, the forthcoming introduction of the WHO recommendations for the increased use of the narrow spectrum (ACCESS) group of antibacterials may lead to an increase in the number of different agents used. [http://www.who.int/mediacentre/news/releases/2017/essential-medicines-list/en/](http://www.who.int/mediacentre/news/releases/2017/essential-medicines-list/en/)

Factors affecting measure
The complexity and variety of infections treated in a hospital may determine the number of different agents required.

Duration of treatment

Rationale for measure
Excessive duration of antibiotic therapy has been identified as an element of inappropriate use. The “Start Smart - Then Focus” guidance from the DH suggests that a planned duration or stop/review date is included in every antibiotic prescription.

Direction of measure
A high proportion of patients receiving treatment for >7 days at the time of the PPS may indicate excessive durations of treatment. However, adequate durations of antibiotics are required to successfully treat infections and thus too small a proportion of patients receiving antibiotics for >7 days may indicate under-treatment.

Factors affecting measure
The data is shown as duration for the treatment of infections alone. For different infections, the appropriate duration of therapy varies widely from a single dose (e.g. gonorrhoea) to many weeks/months. Therefore, case mix will affect the results for Hospitals.

Duration of surgical prophylaxis

Rationale for measure
Antibiotic prophylaxis for surgical procedures is invaluable in the prevention of post-operative infections. However, there has been a tendency in the past to continue prophylaxis for longer than necessary. Guidance from the Scottish Inter-collegiate Guidance Network (SIGN 104) recommends “... a single dose of antibiotic with a long enough half-life to achieve activity throughout the operation...” for most operations, although there are a few exceptions
(e.g. hip arthroplasty) where evidence suggests a full 24 hours of prophylaxis. There is little evidence to support routine prophylaxis for > 24 hours for any surgical procedures.

**Direction of measure**

A lower proportion of antibacterial prophylaxis for > 24 hours is “good”.

**Factors affecting measure**

Although there is little evidence to support prophylaxis for > 24 hours, there are certain types of surgery (e.g. arthroplasty, cardiac surgery) for which longer durations may sometimes be indicated. Therefore, case mix may affect the proportions for Health Boards and Hospitals.

➢ **Reason for treatment documented**

**Rationale for measure**

Documenting the reason for an antimicrobial has been identified as good practice that facilitates review and optimisation of therapy. It is therefore an element of the “Start Smart - Then Focus” guidance from DH.

**Direction of measure**

A higher percentage of documenting the reason for the antimicrobial in the notes is “good”.

**Factors affecting measure**

There are few, if any, valid reasons for not documenting the reason for an antimicrobial.

➢ **Stop/review date for treatment documented**

**Rationale for measure**

Excessive duration of antimicrobial therapy has been identified as an element of inappropriate use. The “Start Smart - Then Focus” guidance from the DH suggests that a planned duration or stop/review date is included in every antimicrobial prescription.

**Direction of measure**

A higher percentage of documenting the stop/review date in the notes is “good”.

**Factors affecting measure**

There are few, if any, valid reasons for not documenting the stop/review date for an antimicrobial.
**Appropriate Antimicrobial Choice**

*Rationale for measure*

The “Start Smart - Then Focus” guidance from the DH suggests using local guidance to initiate prompt effective antibiotic treatment, and avoiding inappropriate use of broad-spectrum antibiotics.

*Direction of measure*

A higher percentage of appropriate antimicrobial choice is “good”.

*Factors affecting measure*

The measure of appropriate antimicrobial choice reflects compliance with local guidance or on microbiology advice, or culture and sensitivity results.

**CURB-65 documented**

*Rationale for measure*

Guidance from NICE/BTS recommends when a diagnosis of community-acquired pneumonia (CAP) is made in an adult at presentation to hospital a CURB-65 score is used for risk stratification to determine the appropriate empiric regimen.

*Direction of measure*

A higher percentage of documenting the CURB-65 score is “good”.

*Factors affecting measure*

There are few, if any, valid reasons for not documenting the CURB-65 score.

**Point Prevalence Survey Reports**

Previous point prevalence survey reports available via:


**References**