Antimicrobial utilisation surveillance

Vicki McNeil
National Antimicrobial Utilisation Surveillance Program (NAUSP)
Strengthening Antimicrobial Stewardship
Sydney 20-22 May 2015
Antimicrobial surveillance

> **What** – monitoring usage of antimicrobials in a standardised way to facilitate trend mapping and benchmarking

> **Why** – Antimicrobial stewardship (AMS) – monitoring used to evaluate impact of stewardship & target interventions

> **How** – methodology
  - internationally accepted standards
  - reproducible
  - applicable in a variety of situations
What is antimicrobial surveillance?

- Many ways of measuring antimicrobial usage:
  - Number of prescriptions / population
  - Number of days of therapy per admission
  - Grams of antimicrobial given
  - Defined daily doses (DDD) given per (measure of occupancy)
  - etc
- All these measures are **volume based**
  - Amount of antimicrobial converted to a rate
- Does not measure whether antimicrobials being used appropriately.
Examples of antimicrobial surveillance - trending data at hospital level

![Graph showing DDD / 1000 bed days over time for different antibiotics.]
Measuring appropriateness of antimicrobial prescribing – quality-based surveillance

> Valid method of antimicrobial surveillance
> Usually involves audit techniques
  • Target particular antibiotic or antibiotic class
  • OR point prevalence survey – ‘snapshot’ looking at all antimicrobials prescribed on one day or other time period
  • Need criteria for assessment of ‘appropriateness’, eg compliance with TG:antibiotic 15 or local guideline
  • Labour intensive collecting audit data and assigning ‘appropriateness’
Differences between volume-based & quality-based antimicrobial surveillance

<table>
<thead>
<tr>
<th></th>
<th>Volume-based</th>
<th>Quality-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour intensive</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can benchmark with similarly peered hospitals</td>
<td>Yes</td>
<td>Yes (via NAPS)</td>
</tr>
<tr>
<td>Can assess quality of prescribing</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can show trends in usage</td>
<td>Yes</td>
<td>No (but maybe with annual NAPS)</td>
</tr>
<tr>
<td>Useful for meeting Standard 3.14.3</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
National Safety & Quality Health Service Standards
Standard 3.14

> Surveillance is a key component

<table>
<thead>
<tr>
<th>C/D</th>
<th>This criterion will be achieved by:</th>
<th>Actions required</th>
<th>Examples of evidence that can be used to demonstrate an action is being met.</th>
<th>Self assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3.14 Developing, implementing and regularly reviewing the effectiveness of the antimicrobial stewardship system</td>
<td>3.14.1 An antimicrobial stewardship program is in place</td>
<td>• Policies, procedures and/or protocols consistent with national guidelines such as Therapeutic Guidelines: Antibiotic&lt;br&gt;• Agenda papers, meeting minutes and/or reports of committees related to antimicrobial stewardship&lt;br&gt;• Reports and recommendations from an antimicrobial management team&lt;br&gt;• Educational programs address antimicrobial usage, development of resistance, and judicious prescribing&lt;br&gt;• Audit of antimicrobial usage, particularly in high antimicrobial usage areas&lt;br&gt;• Referral process to specialist Infection Diseases practitioner and/or microbiologist</td>
<td>E MM&lt;br&gt; E SM&lt;br&gt; E NM → add to action plan</td>
</tr>
<tr>
<td>C</td>
<td>3.14.2 The clinical workforce prescribing antimicrobials have access to current endorsed therapeutic guidelines on antibiotic usage</td>
<td>3.14.2 The clinical workforce prescribing antimicrobials have access to current endorsed therapeutic guidelines on antibiotic usage</td>
<td>• Access by clinical workforce prescribing antimicrobials to current endorsed therapeutic guidelines on antibiotic usage</td>
<td>E MM&lt;br&gt; E SM&lt;br&gt; E NM → add to action plan</td>
</tr>
<tr>
<td>C</td>
<td>3.14.3 Monitoring of antimicrobial usage and resistance is undertaken</td>
<td>3.14.3 Monitoring of antimicrobial usage and resistance is undertaken</td>
<td>• Prescribing guidelines, policies, procedures and/or protocols&lt;br&gt;• Agenda papers, meeting minutes and/or reports of relevant committees include information on monitoring outcomes&lt;br&gt;• Medication audit&lt;br&gt;• Records of antibiotic consumption&lt;br&gt;• Reviews of antibiotic usage and feedback to prescribers&lt;br&gt;• Laboratory based data including analysis of antimicrobial resistance&lt;br&gt;• Documented scope of practice for specialist proceduralists&lt;br&gt;• Observational audit of prescribing behaviour practices&lt;br&gt;• Standing orders for antimicrobial medication and prescribing</td>
<td>E MM&lt;br&gt; E SM&lt;br&gt; E NM → add to action plan</td>
</tr>
<tr>
<td>C</td>
<td>3.14.4 Action is taken to improve the effectiveness of antimicrobial stewardship</td>
<td>3.14.4 Action is taken to improve the effectiveness of antimicrobial stewardship</td>
<td>• Same evidence options as 3.11.3</td>
<td>E MM&lt;br&gt; E SM&lt;br&gt; E NM → add to action plan</td>
</tr>
</tbody>
</table>
NAUSP

- National Antimicrobial Utilisation Surveillance Program
- Funded by Australian government through the Australian Commission on Safety and Quality in HealthCare (ACSQHC)
- Managed by the Infection Control Service, SA Health
- Uses custom-built database to convert dispensing data to usage rates
  - Fox-pro database developed 2001
  - Upgraded in 2010 to a web-based version, using SQL server
  - Several enhancements since 2010
NAUSP…history

> Based on a South Australian surveillance program commenced in 2001
> Dispensing data and OBD data from a range of SA public and private hospitals were submitted
> In 2004, pilot of 15 non-SA tertiary referral hospitals was commenced
> Successful and program expanded
> Initially large hospitals were ‘targeted’, now a range of medium and small facilities (50 beds or more)
> In 2015 > 130 hospitals
NAUSP history cont...

- Pilot program - 15 tertiary referral hospitals
- Hunter New England hospitals
- Additional Tasmanian hospitals
- Antimicrobial Stewardship book
- NSW hospitals encouraged by CEC
- 8 more Queensland medium to small hospitals
- 13 Queensland hospitals
- Additional Tasmanian hospitals

Cumulative number of NAUSP contributors

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>35</td>
<td>37</td>
<td>42</td>
<td>44</td>
<td>48</td>
<td>50</td>
<td>53</td>
<td>53</td>
<td>58</td>
<td>61</td>
<td>65</td>
<td>78</td>
<td>91</td>
<td>113</td>
</tr>
</tbody>
</table>
NAUSP

> Volume-based surveillance
> Measures rates of antimicrobial usage in DDD per 1000 occupied bed days
> Defined daily dose (DDD) specified by the WHO ATC
  • [http://www.whocc.no/atc_ddd_index](http://www.whocc.no/atc_ddd_index)
WHO ATC classification - examples

> J – Anti-infectives
  • J01 – Anti-bacterials for systemic use
    ▪ J01C – Beta-lactams – Penicillins
      ▪ J01CA – extended spectrum penicillins
        ▪ J01CA01 – ampicillin
        ▪ J01CA04 - amoxycillin
  • J02 – Antimycotics
    ▪ J02A - Antimycotics for systemic use
      > J02AC – triazole antifungals
        > J02AC01 – fluconazole
        > J02AC02 - itraconazole
Antimicrobial usage - numerator

> NAUSP uses dispensing data as a measure of the antimicrobials which are used in hospitals
>   • Assumes all antimicrobials dispensed are given to patients

> Data loaded by formulation of antimicrobial
>   • Name
>   • Strength
>   • Formulation type (tablet, capsule, vial, mixture)
>   • Quantity dispensed

> NAUSP stores data for systemic antimicrobial use
>   • Oral, intravenous, mixtures – not topical preparations e.g. ear drops
>   • NAUSP database recognises which medicines are to be loaded and which to ignore
Antimicrobial usage - denominator

- Occupied bed days (OBD)
  - Need a denominator measure to make usage into a rate
  - Can then compare hospitals of different sizes
  - NAUSP uses overnight OBD (i.e. occupancy at midnight)

- Alternative denominators
  - Patient days
  - Separations
  - Admissions
Data requirements to contribute to NAUSP

> Pharmacy dispensing system with ability to retrieve data elements required:
  • Antimicrobials defined through ATC classification (J01 – J05) or SHPA codes (4200000 through 4500000) or agents included in Chapter 5 of AMH
  • Quantity dispensed
  • Wards or specialties to which antimicrobials sent
  • Data by calendar month

> MS Excel format

> Occupancy data by ward
  • descriptions matching those for dispensing data
Demographic information

- Hospitals peered according to AIHW categorisation
- NAUSP requests further information for ‘included’ beds
  - Acute adult inpatient
  - Paediatrics, psychiatry, outpatients, long-term rehab, day surgery and clinics excluded
- Allows for more precise benchmarking of hospitals with similar activity (particularly private hospitals)

Permission from hospital or LHN chief executive
Confidentiality of data

> Any reports available in public domain are de-identified. Each contributor is assigned an alpha-numeric code.

> The CEO / General Manager of each contributing hospital signs a Willingness to Participate form and receives letter outlining purpose of NAUSP.

> Signed WtP’s maintained through Record’s Management at SA Health
National Antimicrobial Utilisation Surveillance Program (NAUSP)

National Antimicrobial Utilisation Surveillance Program (NAUSP) is a national antimicrobial surveillance program run by SA Health and funded by the Australian government.

The program provides contributing hospitals with bimonthly and annual reports on their antibiotic usage rates, enabling them to compare their usage to similarly peered hospitals and thus identify areas for improvement.

Background

The NAUSP began in 2004 and is based on the South Australian Antibiotic Utilisation Surveillance program which commenced in 2001. Both programs continue to be run by staff of the SA Health Infection Control Service.

If you are interested in joining, email antibio@health.sa.gov.au.

Antimicrobial surveillance

Surveillance of antimicrobial usage is a fundamental component of antimicrobial stewardship within a health facility in order to target interventions to improve antimicrobial prescribing. It is also a required action for hospitals to comply with the National Safety and Quality Health Service Standards.

From a public health perspective, antimicrobial surveillance enables us to investigate links between antibiotic use and bacterial resistance.

Types of surveillance

Types of antimicrobial surveillance can be classified as being:

- volume-based (observing trends in quantities of antimicrobials used)
- quality-based (observing the appropriateness of antimicrobial prescribing).

NAUSP is an example of volume-based surveillance.

Quality-based surveillance includes point prevalence surveys and clinical audits. Data from these types of surveillance are labour-intensive but can enable assessment of appropriateness of prescribing and can be applied to any patient group or clinical setting.

Related resources

- Data principles and definitions (PDF 363KB)
- Demographic survey for contributors (DOCX 226KB)
- Data submission explanatory notes (PDF 423KB)
- Data submission dates (PDF 116KB)
- Confirmation of willingness to participate (PDF 105KB)
NAUSP website

National Antimicrobial Utilisation Surveillance Program (NAUSP)

National Antimicrobial Utilisation Surveillance Program (NAUSP) is a national antimicrobial surveillance program run by SA Health and funded by the Australian government.

The program provides contributing hospitals with bimonthly and annual reports on their antibiotic usage rates, enabling them to compare their usage to similarly pressured hospitals and thus identify areas for improvement.

Background

The NAUSP began in 2004 and is based on the South Australian Antibiotic Utilisation Surveillance program which commenced in 2001. Both programs continue to be run by staff of the SA Health Infection Control Service.

If you are interested in joining, email antibio@health.sa.gov.au.

Antimicrobial surveillance

Surveillance of antimicrobial usage is a fundamental component of antimicrobial stewardship within a health facility in order to target interventions to improve antimicrobial prescribing. It is also a required action for hospitals to comply with the National Safety and Quality Health Service Standards.

From a public health perspective, antimicrobial surveillance enables us to investigate links between antibiotic use and bacterial resistance.

Types of surveillance

Types of antimicrobial surveillance can be classified as being:

- volume-based (observing trends in quantities of antimicrobials used)
- quality-based (observing the appropriateness of antimicrobial prescribing).

NAUSP is an example of volume-based surveillance.

Quality-based surveillance includes point prevalence surveys and clinical audits. Data from these types of surveillance are labour-intensive but can enable assessment of appropriateness of prescribing and can be applied to any patient group or clinical setting.

Related information

- Australian Commission on Safety and Quality in Health Care
- Antimicrobial Stewardship resources
- Danish antimicrobial usage surveillance reports (DANMAP)
- Swedish antimicrobial usage surveillance reports (SwedRes)

Related resources

- Data principles and definitions (PDF 393KB)
- Demographic survey for contributors (DOCX 226KB)
- Data submission explanatory notes (PDF 423KB)
- Data submission dates (PDF 116KB)
- Confirmation of willingness to participate (PDF 108KB)

Information for NAUSP Contributors

Data Principles

Numerator: Antimicrobial usage data

The quantity of each antimicrobial agent used per month within the included wards or clinical areas.

Key Principles:

- The dataset indicates the monthly usage of each antimicrobial for acute adult inpatient wards (see Inpatient and Paediatric, expressed as number of DDD).
- Antimicrobials refers to all relevant anti-infective agents for systemic use within the World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC) classification system (UTI antibiotics, UTI antimicrobials, UTI antimicrobials and UTI antimicrobials (Vancomycin)). The only topical antimicrobials for which data is currently collected is tetracycline.
- The dataset contains the number of UTIIs or PAIS used of each antimicrobial agent during the month. There are obtained from the contribution from their local laboratory.
- DDDs are calculated for each agent.
- During data processing, NAUSP converts the quantity of UTIs or PAISs used of each agent to a number of DDDs that is a monthly usage density (in mg).
- All required data should be included - both inpatient ward data and individual patient prescribing.

Dataset Notes:

- Data should be entered in an Excel spreadsheet format with distinct columns for each element – see Data Elements.
- DDD DESCRIPTION and QUANTITY are the minimum required elements, but other information such as WARD DESCRIPTION and UNIT DESCRIPTION are added with data interpretation so can be included. Please ensure there are no merged, highlighted or blank cells within the spreadsheet, and that there are no anastomosed tables.
- Data should be presented on questions of UTIs. If only PAISs are available for all or part of the unit, the column should indicate this (PAIS) and include the PAIS data within the dataset. It is mandatory if WARD DESCRIPTION is included. If WARD DESCRIPTION is not included in the dataset, NAUSP takes no responsibility for ensuring the necessary information and will accept all data as appropriate inclusion.
- The methods of antimicrobial usage data from validated sources should be made prior to submission in NUPTR.
- If WARD DESCRIPTION is not included in the dataset, NAUSP will assume all questions refer to the appropriate ward - see Reminders.
- Any agents or dosage forms not required to NAUSP will be disregarded automatically during processing (e.g. topical preparations). However, for ease of processing, it is recommended to include an explanatory note in the dataset that the agent is not antimicrobials.
- The NUPTR and NAUSP are named in all references. No whose numbers are accepted for publication – see Data Elements table.
National Antimicrobial Utilisation Surveillance Program (NAUSP)

NAUSP is a national antimicrobial surveillance program run by SA Health and funded by the Australian government. This program provides hospitals with bi-monthly and annual reports on antibiotic usage rates, enabling them to compare their usage with a similarly peer hospital and thus identify areas for improvement.

Background

NAUSP began in 2004 and is based on the South Australian Antibiotic Utilisation Surveillance program which commenced in 2001. Both programs continue to be run by staff of the SA Health Infection Control Service.

If you are interested in joining, email antibio@health.sa.gov.au

Antimicrobial surveillance

Surveillance of antimicrobial usage is a fundamental component of antimicrobial stewardship within a health facility to identify interventions to improve antimicrobial prescribing. It is also a required action for hospitals to comply with the National Safety and Quality Health Service Standards.

From a public health perspective, antimicrobial surveillance enables us to investigate links between antibiotic use and bacterial resistance.

Types of surveillance

Types of antimicrobial surveillance can be classified as being:

- Volume-based (observing trends in quantities of antimicrobials used)
- Quality-based (observing the appropriateness of antimicrobial prescribing).

NAUSP is an example of volume-based surveillance.

Quality-based surveillance includes point prevalence surveys and clinical audits. Data from these types of surveillance are labour-intensive but can enable assessment of appropriateness of prescribing and can be applied to any patient group or clinical setting.

Related information

- Australian Commission on Safety and Quality in Health Care: Stewardship resource materials
- Danish antimicrobial usage surveillance reports (DANMAP)
- Swedish antimicrobial usage surveillance reports (SwedRes)

Related resources

- Data principles and definitions (PDF 363KB)
- Demographic survey for contributors (DOCX 226KB)
- Data submission explanatory notes (PDF 423KB)
- Data submission dates (PDF 116KB)
- Confirmation of willingness to participate (PDF 108KB)
Please remove columns which are not required by the program. Also any subtotals for wards.

Please provide spreadsheet with NO merged cells, no frozen panes, no field colours in cells, and no hidden cells. Please include both imprest and individual patient supplies.

See Data elements tab for further details.

<table>
<thead>
<tr>
<th>PeriodName</th>
<th>Ward description</th>
<th>Product description</th>
<th>Quantity</th>
<th>Grams</th>
<th>ValueDescC</th>
<th>ValueDescD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>AMPICILLIN (Ampicyn) 1g INJECTION 5</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>AMPICILLIN (Austrapan) 1g INJECTION 1</td>
<td>5 x 1g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>AZITHROMYCIN (Zithromax) 500mg INJECTION 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>BENZYL PENICILLIN SODIUM (BenPen) 1.2g INJECTION 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>CEFTRIAXONE (Ceftriaxone ICP) 1g INJECTION 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>CEPHALOSPORIN (Cefazolin Sandoz) 1g INJECTION 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>CHLORAMPHENICOL (Chloromycetin) 1% EYE OINTMENT 4g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>CIPROFLOXACIN (intravenous) (Aspen) 200mg/100mL INJECTION 10 x 100mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>CLOTRIMAZOLE (Clonea) 1% (10mg/g) CREAM 20g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>FLUCLOXACILLIN (Flucil) 1g INJECTION 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>GENTAMICIN (Pfizer) 80mg/2mL INJECTION 50 x 2mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>MEROPENEM (intravenous) (Merrem) 1g INJECTION 10 x 1g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>METRONIDAZOLE (intravenous) (AHB3399) 500mg/100mL INJECTION 10 x 100mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>MOXIFLOXACIN (Avelox) 400mg INJECTION 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>NYSTATIN (Nystatin Trust) 100,000units/mL ORAL SUSPENSION 24mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>NYSTATIN (Omega) 100,000units/mL ORAL SUSPENSION 24mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>ROXITHROMYCIN (Roximycin) 150mg TABLETS 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>TICARCILIN-CLAVALANIC ACID (Timentin) 3.1g INJECTION 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 HDU</td>
<td>HDU</td>
<td>VANCOMYCIN (intravenous) (DBL) 1g INJECTION 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>AMOXYCILLIN 400mg + CLAVULANATE 57mg/5mL (Augmentin Duo 400) ORAL SUSPENSION 60mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>AMOXYCILLIN 875mg + CLAVULANATE 125mg (GenRx) TABLETS 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>AMPICILLIN (Ampicyn) 1g INJECTION 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>AMPICILLIN (Austrapan) 1g INJECTION 5 x 1g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>CEFACLOR (slow release) (Ceclor CD) 375mg TABLETS 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>CEFTRIAXONE (Ceftriaxone ICP) 1g INJECTION 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>CEPHALAXIN (GenRx) 500mg CAPSULES 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>CEPHALOSPORIN (Cefazolin Sandoz) 1g INJECTION 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>CHLORAMPHENICOL (Chloromycetin) 0.5% EYE DROPS 10mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>CLOTRIMAZOLE (Clonea) 1% (10mg/g) CREAM 20g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>DICLOXACILLIN (Distaph) 500mg CAPSULES 24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>FLUCLOXACILLIN (Flucil) 1g INJECTION 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>GENTAMICIN (Pfizer) 80mg/2mL INJECTION 50 x 2mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>MERONIDAZOLE (Flagyl) 400mg TABLETS 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>METRONIDAZOLE (intravenous) (AHB3399) 500mg/100mL INJECTION 10 x 100mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>NYSTATIN (Nystatin Trust) 100,000units/mL ORAL SUSPENSION 24mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>NYSTATIN (Omega) 100,000units/mL ORAL SUSPENSION 24mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-11 N1F</td>
<td>N1F</td>
<td>ROXITHROMYCIN (Roximycin) 150mg TABLETS 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Denominator – Occupied Bed Days
example data

<table>
<thead>
<tr>
<th>Ward Identifier</th>
<th>Ward Name</th>
<th>Jul-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1F</td>
<td>N1F N1F Acute Aged Care</td>
<td></td>
</tr>
<tr>
<td>N1G</td>
<td>N1G N1G Rehabilitation</td>
<td></td>
</tr>
<tr>
<td>N2F</td>
<td>N2F N2F Stroke,Medical</td>
<td></td>
</tr>
<tr>
<td>N3B</td>
<td>N3B MAU, Opera</td>
<td></td>
</tr>
<tr>
<td>N3H</td>
<td>N3H E3H - Surgical Orthopaedics</td>
<td></td>
</tr>
<tr>
<td>N3I</td>
<td>N3I E3I - General Surgery</td>
<td></td>
</tr>
<tr>
<td>N3W</td>
<td>N3W Medical Oncology</td>
<td></td>
</tr>
<tr>
<td>N4B</td>
<td>N4B W4B Surgical</td>
<td></td>
</tr>
<tr>
<td>N4C</td>
<td>N4C W4C Surgical</td>
<td></td>
</tr>
<tr>
<td>N4D</td>
<td>N4D Medical Oncology</td>
<td></td>
</tr>
<tr>
<td>N5A</td>
<td>N5A W5A Medical</td>
<td></td>
</tr>
<tr>
<td>N5B</td>
<td>N5B W5B Medical</td>
<td></td>
</tr>
<tr>
<td>NAI</td>
<td>NAI Intensive Care Unit</td>
<td></td>
</tr>
<tr>
<td>NAM</td>
<td>NAM Antenatal Maternity</td>
<td></td>
</tr>
<tr>
<td>NAP</td>
<td>NAP Ambulatory Procedure Centre</td>
<td></td>
</tr>
<tr>
<td>NCL</td>
<td>NCL Cardiac Cath Lab</td>
<td></td>
</tr>
<tr>
<td>NCW</td>
<td>NCW Childrens Ward</td>
<td></td>
</tr>
<tr>
<td>NDA</td>
<td>NDA Centre for Drug &amp; Alcohol Medicine</td>
<td></td>
</tr>
<tr>
<td>NDS</td>
<td>NDS Delivery Suite</td>
<td></td>
</tr>
<tr>
<td>NED</td>
<td>NED Emergency Observation Ward</td>
<td></td>
</tr>
<tr>
<td>NEM</td>
<td>NEM Emergency Medical Unit</td>
<td></td>
</tr>
<tr>
<td>NEN</td>
<td>NEN Endoscopy</td>
<td></td>
</tr>
<tr>
<td>NFM</td>
<td>NFM Feto Maternal Assessment Unit</td>
<td></td>
</tr>
<tr>
<td>NHU</td>
<td>NHU Inpatient Haemodialysis Unit</td>
<td></td>
</tr>
<tr>
<td>NNB</td>
<td>NNB Newborn Babies</td>
<td></td>
</tr>
<tr>
<td>NNC</td>
<td>NNC Neonatal Intensive Care Unit</td>
<td></td>
</tr>
<tr>
<td>NON</td>
<td>NON Medical Oncology Department</td>
<td></td>
</tr>
<tr>
<td>NPE</td>
<td>NPE Psychiatric Emergency Care Centre</td>
<td></td>
</tr>
<tr>
<td>NPM</td>
<td>NPM Postnatal Maternity</td>
<td></td>
</tr>
<tr>
<td>NPU</td>
<td>NPU Pialla Unit</td>
<td></td>
</tr>
<tr>
<td>NRD</td>
<td>NRD Penrith Community Dialysis Centre</td>
<td></td>
</tr>
<tr>
<td>NRS</td>
<td>NRS</td>
<td></td>
</tr>
</tbody>
</table>

**Non-ICU**

**Sum (yellow + blue)**

**ICU**

**Blue**

Numbers left blank for privacy reasons.
NAUSP coverage of Australian public hospitals (May 2015)

- Principal Referral – 29 contributors (100%)
- Specialist Women – 2 contributors (33%)
- Large Public Acute – 53 contributors (84%)
- Medium Public Acute – 33 contributors (76%)
- Small Public Acute with Surgery / Obstetrics – 12 contributors (32% of small hospitals with > 50 beds)
- In addition there are 19 Private Hospital contributors.
Data validation processes

> Caveat – NAUSP assumes that data submitted (numerator and denominator) are accurate and only include ‘included’ wards – “rubbish in, rubbish out”

> Validation processes:
  
  • Automated process to check if quantities for each agent are ‘reasonable’ – flags anything outside the range of:
    
    ▪ > twice the average quantity for the previous year for that hospital
    ▪ < half the average quantity for the previous year for that hospital
    ▪ Oral liquid antimicrobials - > 20 bottles
Examples of NAUSP automated data validation

> Loading process: quantities outside a usual range:

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Quantity</th>
<th>Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMOXYCILLIN with CLAVULANIC ACID 4.8g, ORAL LIQUID</td>
<td>45</td>
<td>Oral liquid quantity &gt;20</td>
</tr>
<tr>
<td>AMPICILLIN 1g, PARENTERAL</td>
<td>74</td>
<td>Quantity &lt; 50% of average usage (916.833)</td>
</tr>
<tr>
<td>ANIDULAFUNGIN 100mg, PARENTERAL</td>
<td>64</td>
<td>Quantity &gt; 200% of average usage (15.750)</td>
</tr>
<tr>
<td>BENZYPENICILLIN 600mg, PARENTERAL</td>
<td>920</td>
<td>Quantity &gt; 200% of average usage (436.417)</td>
</tr>
<tr>
<td>CLARITHROMYCIN 250mg, ORAL</td>
<td>710</td>
<td>Quantity &lt; 50% of average usage (1480.167)</td>
</tr>
<tr>
<td>FLUCONAZOLE 200mg, PARENTERAL</td>
<td>138</td>
<td>Quantity &gt; 200% of average usage (35.917)</td>
</tr>
<tr>
<td>TRIMETHOPRIM with SULFAMETHOXAZOLE 4.8g, ORAL LIQUID</td>
<td>100</td>
<td>Oral liquid quantity &gt;20</td>
</tr>
</tbody>
</table>

> Pharmacist review – decision to proceed with loading or otherwise
Examples of NAUSP semi-automated data validation

> Database recognises that it has not processed this item before.
  • Pharmacist determines:
    • If can be aliased to an antimicrobial already in the system, OR
    • Add as a ‘new’ antibiotic, OR
    • Discard (all future occurrences of this antimicrobial will be ignored)

<table>
<thead>
<tr>
<th>Unknown Antibiotic</th>
<th>Alias</th>
<th>New</th>
<th>Discard</th>
</tr>
</thead>
<tbody>
<tr>
<td>cephazolin (Hospira cephazolin) 1g injection Pack: 5</td>
<td>Set Alias</td>
<td>Add New</td>
<td>Discard</td>
</tr>
<tr>
<td>fluconazole (difulcan) 100mg capsule Pack: 28</td>
<td>Set Alias</td>
<td>Add New</td>
<td>Discard</td>
</tr>
<tr>
<td>fluconazole (difulcan) 50mg capsule Pack: 28</td>
<td>Set Alias</td>
<td>Add New</td>
<td>Discard</td>
</tr>
<tr>
<td>amphotericin B (SAS) (fungizone) 50mg infusion Pack: 1</td>
<td>Set Alias</td>
<td>Add New</td>
<td>Discard</td>
</tr>
<tr>
<td>clindamycin 300mg/2mL injection Pack: 10</td>
<td>Set Alias</td>
<td>Add New</td>
<td>Discard</td>
</tr>
<tr>
<td>ciprofloxacin (ciloquin) 0.3%, EYE DROP 5mL</td>
<td>Set Alias</td>
<td>Add New</td>
<td>Discard</td>
</tr>
</tbody>
</table>

Please resolve the following unknown antibiotics
Other quality assurance processes

- Cyclical basis – each hospital QA’d every 6 months, i.e. one third of hospitals every 2 months
  - Previous 12 months data analysed
  - Rates outside a range of average ± 2 SD investigated:
    - Automatically generated report for ‘outliers’
    - NAUSP staff manually check data entered to database against data sent from contributor
    - Labour-intensive
- Half-yearly – check NAUSP has aliased antimicrobials correctly
- Annually – check WHO defined daily dose for amendments
Using surveillance data – at the hospital level
Example 1

> NAUSP reports showed norfloxacin use > national comparator
> In house audits conducted to assess appropriateness of prescribing
> AMS committee addressed specific prescribers to highlight inappropriate use
> The reporting of UTI pathology results was altered to offer norfloxacin as a sensitive antibiotic only if the specimen was resistant to other first-line antibiotics

![Norfloxacin Graph](image)
Using surveillance data – at the hospital level

Example 2

> Showing change in “prescribing culture” – introduction of electronic approval and decision support system
> Annual rates of broad-spectrum antibiotics declined
> Narrow-spectrum ratio increased
Using surveillance data – at the hospital level

Example 2

- Showing change in “prescribing culture” – introduction of electronic approval and decision support system
- Annual rates of broad-spectrum antibiotics declined
- Narrow-spectrum ratio increased
Using surveillance data – at the hospital level

Example 2

- Showing change in “prescribing culture” – introduction of electronic approval and decision support system
- Annual rates of broad-spectrum antibiotics declined
- Narrow-spectrum ratio increased
Examples of surveillance data - comparison between state and national averages

Source: NAUSP data – yet to be published
Using surveillance data – state level

> Carbapenem usage in SA metropolitan hospitals (n=13) over a three year period
Using surveillance data – local health district level

Azithromycin usage in 5 Sydney hospitals

Antimicrobial usage rate (DDD per 1000 OBDDS)


Hospital 1
Hospital 2
Hospital 3
Hospital 4
Hospital 5
Using surveillance data – national level

> Antibiotic Awareness Week 2014

Source: NAUSP Annual Report 2013-14
Using surveillance data – national level

> Monitor change in prescribing practices nationally
> Fluoroquinolone usage rates have declined at national level

Source: McNeil V, Wilkinson I. Fluoroquinolone and third & fourth generation cephalosporin usage in Australian tertiary hospitals. PO2.16 ASA 2014
Examples of surveillance data - trending data at national level

Source: NAUSP Annual Report 2013-14

SA Health
Limitations of NAUSP data

- No patient specific data – volume-based, population data
- Benchmarking – are apples being compared with apples?
- Problems with WHO-defined DDDs
  - examples – erythromycin, piperacillin/tazobactam
- DDD not applicable to paediatric surveillance data
- Very small hospitals < 50 beds – what is meaningful data?

- NEVERTHELESS – useful and relatively easy method of commencing antimicrobial surveillance
Conclusion

> Antimicrobial surveillance integral part of AMS
  • Assists AMS committees with targeting of limited AMS resources to achieve greatest benefit
  • Direct prescriber feedback major strategy in changing prescribing behaviour
  • Provides evidence to hospital governance of success of AMS strategies
  • Fulfils NSQHS Standard 3.14.3

> NAUSP surveillance
  • Limited to acute inpatient antimicrobial use
  • Volume-based data – does not assess appropriateness of use
  • Relatively easy method of data collection – use as ‘trigger’ for further AMS interventions
Acknowledgements

> Australian Commission on Safety and Quality in HealthCare (ACSQHC)
> Colleagues Infection Control Service, CDCB, SA Health
> AMS pharmacists and others at contributing hospitals for data supply

FOR FURTHER INFORMATION:
NAUSP website:  www.sahealth.sa.gov.au/nausp
Email:  antibio@health.sa.gov.au