NAUSP Data Principles and Definitions

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National Antimicrobial Utilisation Surveillance Program (NAUSP)

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Government of South Australia
SA Health

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Contents

The Australian Government Department of Health and Aged Care provides funding for the development and coordination of NAUSP, analysis of data, and the production of related reports for the AURA Surveillance System. NAUSP is conducted by Antimicrobial Programs, Communicable Disease Control Branch, Department for Health and Wellbeing, Government of South Australia.

Introduction

The National Antimicrobial Utilisation Surveillance Program (NAUSP) reports on antimicrobial use in Australian hospital settings, including acute and sub-acute care. This provides a basis for epidemiological analysis of antimicrobial usage, facilitating awareness of environmental pressures for selection of resistant organisms within healthcare facilities.

This document provides details of the data capture, analytic methodology and reporting of NAUSP. Data are provided by representatives of contributing health facilities (contributor hospitals) that submit monthly utilisation data and hospital activity data via the NAUSP Portal.

To facilitate comparisons between agents and contributors, usage data for most agents are converted to a standardised usage rate for each agent.

The program offers two data submission streams, with differing methodology and reporting metrics:

	Data stream A	**Data stream B**
Data source	Pharmacy dispensing & distribution data	Electronic Medical Administration Data (eMAR)
Numerator	Defined Daily Doses (DDDs)	Days of Therapy (DOTs)
Denominator(s)	Occupied Bed Days (OBDs) or Emergency Department Presentations or Theatre cases	Patient Days (PDs)

Contributing Healthcare Facilities

At its inception, the primary focus of NAUSP was large Australian acute care facilities. The program has expanded in recent years and smaller hospitals in the AIHW categories *Public Acute Group C* or *Private acute group C* and beyond (upon request) are now encouraged to participate.

Because contributors are peered to facilitate appropriate comparisons, there are important considerations for smaller hospitals – see Benchmarking and Peer Grouping. Furthermore, as standard daily doses have not been defined for paediatric patients, the pharmacy data reporting stream of the program is only valid in adult settings.

Reporting and Outcomes

Contributors are supplied with instructions on how to extract a report (Appendix 1) of antimicrobial usage within their hospital, stratified into hospital wards/locations (both acute and sub-acute) where applicable. Usage rates for six antimicrobial classes are available for routine reporting. Corresponding benchmarking rates, calculated from aggregate data of the selected benchmarking group (e.g. AIHW peer group, state, local health district) are also supplied for comparison. Aggregated, de-identified data are supplied to the Australian Government Department of Health and Aged Care, and contribute to Antimicrobial Use and Resistance in Australia (AURA) publications.

De-identified jurisdictional and peer group benchmarking reports are published biannually on the NAUSP website; State and Territory health departments have access to deidentified codes for all public hospitals within their jurisdiction. Reports providing comprehensive summary reports of all antimicrobial usage are published either annually or biennially and are available on both the NAUSP and AURA website.

An important function of NAUSP reports is to provide an indication of exposure to antimicrobials in the Australian healthcare environment, at both a national and local level. At a local level, NAUSP reports serve as an antimicrobial monitoring tool for participating facilities and a means to identify trends for further investigation as part of an Antimicrobial Stewardship program.

National Benchmarking and Peer Grouping

NAUSP reports include aggregate comparator rates to enable contributors to compare usage of each agent to a relevant benchmark. Peer grouping is guided by the Australian Institute of Health and Welfare (AIHW) classifications. Where this is not possible for any given facility, NAUSP will negotiate an appropriate peer grouping with the contributor based on facility size, location and nature of services offered. Benchmarking groups may include AIHW peer groups at national or state level, and local health networks where applicable. Appendix 4 outlines which peer groups and applicable dataset types are eligible for NAUSP reporting.

NAUSP is aware of potential issues relating to data interpretation in smaller facilities but will discuss options with these sites as required. More information on AIHW peer group descriptions and considerations is available via the AIHW website.

Definitions

The following terms used by NAUSP are important for understanding NAUSP reports. Further explanations of other important concepts are included elsewhere in this document.

Antimicrobial	A drug that is classified as an anti-infective agent for use within the World Health Organization Collaboration Centre for Drug Statistics Methodology's (WHOCC) Anatomical Therapeutic Chemical (ATC) classification system. These include agents listed within category: • A01AB (anti-infectives for local oral treatment) • A02BD (combinations for eradication of H.pylori) • A07A (intestinal anti-infectives) • D01 (dermatologicals – antifungals (topical and systemic)) • D06 (dermatologicals – antibiotics/chemotherapeutics) • D07C (corticosteroids, combinations with antibiotics) • D10AF (anti-infectives for treatment of acne) • D11AX (other dermatologicals) • G01 (gynecological anti-infectives and antiseptics) • J01 (antibacterials) • J02 (antimycotics) • J04 (antimycobacterials) • J05 (antivirals) • P01AB (tinidazole) • P01BA (hydroxy-/chloroquine) • P01AX (atovaquone, nitazoxanide) • P03A (ectoparasiticides, topical scabicides) • S01AA/CA (anti-infectives – ophthalmological), incl. combinations • S02AA/CA (anti-infectives – otological), incl. combinations • S03 (eye and ear preparations with anti-infectives) A full list of agents included in NAUSP reporting is available in the document Antimicrobial Agents.
Antimicrobial Usage	The quantity of each antimicrobial agent used per reporting period (month) within the included wards and clinical areas
Critical Care	Critical Care includes both High Dependency and Intensive Care Units. All retrospective data loaded under either HDU or ICU will be reported as Critical Care.
Day(s) of Therapy (DOTs)	Days of therapy refers to the number of day(s) that a patient is administered an antimicrobial, regardless of dose administered or number of doses administered over the course of 24 hours. For a patient on multiple antimicrobials, the DOTs will be the sum of DOTs for all antimicrobials the patient receives.
Defined Daily Dose (DDD)	The average maintenance dose per day for a drug when used for its main indication in an adult. The World Health Organization Collaborating Centre (WHOCC) for Drug Statistics Methodology has determined standard DDDs for most drugs, listed within the Anatomical Therapeutic Chemical (ATC) Classification System. Use of this measure/metric enables the quantity of different antimicrobial agents to be standardised to a common parameter for comparisons between agents, at a local, national and international level. Because DDDs are based on adult dosing, this parameter cannot be used to measure antimicrobial usage in paediatric populations. Most topical antimicrobial agents have not been assigned a DDD by WHO. When performing rate calculations for topical antimicrobials, DDDs should be disregarded. The ATC classification system is available online: www.whocc.no/ddd/definition_and_general_considera/ $\text{Number of DDDs} = \frac{\text{Total grams used}}{\text{DDD value (WHO-issued)}}$

Number of Presentations	Denominator type used in the Emergency Department and Operating Theatre/Recovery areas
Occupied Bed Days (OBDs)	The total number of bed days of all admitted patients accommodated during the reporting period (month), taken from a count of the number of inpatients at about midnight each day. Patients admitted and separated (discharged or otherwise) on the same day are not included. Patients staying for a single night are counted as one (1) OBD.
Other/unspecified acute	Non-Critical Care acute usage that is not submitted at ward/location level.
Other/unspecified sub-acute	Sub-acute usage that is not submitted at ward/location level.
Patient Days (PDs)	The total number of days for all patients who were admitted for an episode of care and who separated during a specified reference period (for NAUSP reporting, generally a calendar month). A patient who is admitted and separated on the same date is allocated one (1) patient day.
Specialty	Admission specialty within a hospital where both numerator and denominator data are available for granular submission of electronic medical administration data (eMAR) reporting. Areas eligible for granular reporting are available to view in the NAUSP Portal and in the appendix of this document.
Total (acute)	Combined acute usage for all reported areas of the health facility (i.e. Critical Care and all acute specialties/other unspecified acute combined).
Total (subacute)	Combined subacute usage for all reported areas of the health facility (i.e. mental health, rehabilitation, palliative care, long-stay aged care and all other unspecified subacute combined).
Usage Density Rate	The number of DDDs used per 1,000 OBDs. This usage rate is widely accepted as an appropriate measurement of usage in non-ambulatory settings and has been adopted by many international programs. Monthly usage density (DDDs per 1,000 OBDs) = $\frac{\text{DDD / month}}{\text{OBD / month}}$ x 1,000
Ward/location	Physical ward or location within a hospital where both numerator and denominator data are available for granular submission for the pharmacy data reporting stream. The ward/location may be acute or sub-acute. Areas eligible for granular reporting are available to view in the NAUSP Portal and in the appendix of this document.

Data Principles: Pharmacy dispensing / distribution data (Data Stream A)

Numerator: Defined Daily Doses (DDDs)

Key Principles:

- **The pharmacy dispensing / distribution dataset indicates the monthly usage of each antimicrobial for adult inpatient wards (see Inclusions and Exclusions), expressed as number of defined daily doses (DDDs).**
- 'Antimicrobial' refers to all relevant anti-infective agents within the World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC) classification system, including antibiotics, antimycotics, antivirals and antifungals. Since January 2019, topical anti-infectives have been included in monthly data submissions. A complete list of agents collected can be found here.
- Antimicrobial usage datasets are obtained by the contributor from their local pharmacy dispensing system. These should contain the number of UNITS of each antimicrobial agent dispensed during the month.
- During data processing, NAUSP converts the quantity of UNITS of each agent to a number of DDDs or grams so that a monthly usage density rate can be calculated for each agent.
- Both imprest/ward stock usage and individual patient dispensing should be included.

Dataset Rules:

- Usage datasets must be submitted to the Portal in the specified Excel spreadsheet template with distinct columns for each element – see Data Elements – pharmacy datasets.
- WARD/LOCATION, PRODUCT DESCRIPTION and QUANTITY are the minimum required elements. Please ensure there are no merged, highlighted or blank cells within the spreadsheet, and that there are no embedded tables, formulas or filtering applied to columns.
- It is strongly recommended that WARD DESCRIPTION is included. If WARD DESCRIPTION is not included in the dataset, NAUSP takes no responsibility for ensuring the necessary exclusions, and will assume all data are for appropriate inclusions/wards or locations.
- Quantities should be presented as the number of UNITS. If only PACK data are available, convert to UNIT data prior to submission by multiplying number of packs by pack size.
- The UNIT quantity for topical agents such as creams, ointments, eye drops, etc. is the number of tubes or bottles.
- The UNIT quantity used for ORAL LIQUID formulations is number of **bottles** NOT number of millilitres. Non whole numbers are accepted for part-bottles – see Data Elements table.
- Removal of antimicrobial usage data from excluded wards should be made **prior** to submission to NAUSP.
- If UNIT DESCRIPTION is not included in the dataset, NAUSP will assume all quantities refer to the appropriate units – see Accepted Unit Types.
- Any dosage forms not collected by NAUSP will be discarded automatically during processing. However, for ease of processing, contributors should endeavor to generate pharmacy usage data extractions/reports that fulfill the NAUSP Antimicrobial Agent list.

- **Discharge supplies** should be excluded from the dataset prior to submission to NAUSP. Alternatively, if the dataset includes discharge supply, a separate report for discharge quantities must be generated and added (pasted) to the end of the dataset. Discharge supply quantities should be **multiplied by -**1 to ensure they are **subtracted** from the total drug usage.
- If **elastomeric infusions** are sourced externally for hospital inpatients, please add "inpatient" to the description to ensure it is included in your submission. Historically these products have been discarded by the database on the assumption of Hospital in the Home (or similar out-of-hospital) use. From January 2021, these out-of-hospital areas will be captured; if these infusions are for this use, please ensure HITH is the assigned ward/location
- If **prepacked** antimicrobials are used for hospital inpatients, 'inpatient' should be added to the description to ensure it is included in your submission. Alternatively, the suffix 'PP' or 'prepack can be removed from the product description. Historically, product descriptions containing 'PP' or 'prepack' have been discarded from the database on the assumption that PP denotes take home packs at discharge. If prepack quantities relate to the number of packs, please convert the quantity to **number of units** (i.e. multiply number of packs by pack size).
- Prepacked antimicrobials for **out-of-hospital** use should not be included in data submissions.
- If **clinical trial antimicrobials** are administered at any time within your facility, please contact the NAUSP team regarding inclusion in monthly submissions. These will be addressed on a case-by-case basis.

Denominators

Antimicrobial usage rates for the pharmacy data stream use one of three denominators, depending upon the ward/location.

Ward / location	Numerator input	Denominator	Output (rate metric)
Emergency department (ED)	Units (converted into grams, then DDDs by Portal)	Number of ED presentations	DDD per 1000 presentations
Operating theatre / day surgical wards (including recovery)	Units (converted into grams, then DDDs by Portal)	Number of theatre cases	DDD per 1000 theatre cases
All other inpatient wards / locations	Units (converted into grams, then DDDs by Portal)	Occupied Bed Days (OBDs)	DDD per 1000 OBDs

Occupied Bed Days (OBDs)

Total number of bed days of all admitted patients accommodated during the reporting period, taken from a count of the number of inpatients at about midnight each day. This denominator type is used when reporting usage rates from pharmacy distribution data for all wards or locations other than the emergency department or the operating theatre / day surgical wards.

- The wards or locations included in the OBD count should reflect those included in the usage data – i.e. the same inclusions and exclusions apply to both numerator and denominator data.
- OBD data are generally obtained from the local health informatics unit (e.g. Casemix).
- Occupied Bed Days are not equivalent to Patient Days. Patient Days are the sum of the lengths of stays of each patient separated during the reporting period, whereas Occupied Bed Days are the sum of a daily count of occupied beds, irrespective of when the separation occurs. The use of Patient Days for monthly reporting will result in skewed results compared to Occupied Bed Days in some circumstances, however variation in annualised figures will be minimal.
- If contributors can only supply a single figure indicating their OBD count for the period per ward/location, NAUSP takes **no responsibility** for ensuring the necessary exclusions have been applied, and will assume that the figure corresponds to only the area included in the relevant numerator.
- For sites submitting ward/location-specific data, the OBDs associated with each area must be easily identifiable in the OBD recording template.

Emergency Department presentations (ED presentations)

Total number of discrete patient presentations to the Emergency Department by **adult** patients. Defined daily doses are only valid in adult patients; where presentations cannot be stratified into adult and paediatric cohorts, please default to **all**.

> *AIHW Definition: The presentation of a patient at an emergency department occurs following the arrival of the patient at the emergency department. It is the earliest occasion of being registered clerically, or triaged. https://www.aihw.gov.au/reports-data/myhospitals/content/glossary*

Theatre Cases (Number of cases)

The number of discrete patients presenting to/spending time in the operating theatre for a procedure/episode of care. The sum of theatre cases for any given month includes both inpatient theatre cases and day-only cases. For facilities that offer investigative procedures such as endoscopy and cardiac catheter labs, please default to **including** these areas in your data.

> *AIHW Definition: A physical medical intervention, often called an operation, to treat or investigate a disease or injury.*

Denominator dataset rules

- Denominator dataset records are to be maintained by contributors and forwarded to NAUSP for Quality Assurance upon request after submission of June and December data.
- Denominator datasets should preferably be recorded in an Excel spreadsheet format with distinct columns for each element. WARD/LOCATION DESCRIPTION and associated denominator (OBDs, number of ED presentations, number of theatre cases) are the minimum required elements – see Data Elements. A suggested template is available from the NAUSP homepage. Denominator dataset records supplied to NAUSP should clearly define which areas are included vs. those excluded, or only provide data for included wards.

Data Elements

The following table describes the elements required for pharmacy datasets to be submitted to NAUSP.

Name	Field type	Description
Hospital/Facility	Text	Enter the hospital name as it appears in the Portal > Must be in the Hospital name format as supplied in My Details in NAUSP portal. (Note: the hospital name should include state / territory)
Year	Number	Enter the year 20XX
Month	Selection	Select the month from the drop-down menu > Month must be in the format supplied
Ward Description	Text	Provide description of ward/unit name, ward activity or ward code
Ward/Location	Text	Assign each entry with its NAUSP specialty (ensure name is exactly as per NAUSP specialties – Appendix 5). > If an area/ward is not included in specialty-specific reporting, it must be assigned **Other / unspecified acute** or **Other / unspecified subacute** > If the origin of the data is not known, it must be assigned **Total**
Product Description	Text	Provide name of drug (generic or brand), strength, formulation (caps, vials etc.), and pack size (bottle volume for oral liquids)
Quantity	Number	Numerical integers preferred. > Number of units dispensed (not packs) > Non-whole numbers (e.g. part bottles) will be rounded to nearest whole number > Negative values (e.g. return dispensing) are accepted > Quantity of oral liquids should be in number of bottles, not volume.
OCCUPIED BED DAYS (Denominator)	Number	Number of overnight Occupied Bed Days (OBD) for period (month) for the Ward / Location (as described above). > Must be whole integer
EMERGENCY DEPARTMENT PRESENTATIONS (Denominator)	Number	Number of presentations to the ED for the period (month) > Must be whole integer > Only required if ED usage data submitted
THEATRE CASES (Denominator)	Number	Number of patients presenting to the operating theatre for a surgical procedure > Must be whole integer > Only required if theatre usage data submitted

See Appendix 2 and Appendix 3 for example spreadsheets; additional information can be found on the NAUSP website. The NAUSP data upload template is available from the Portal homepage.

Accepted Unit Types

NAUSP only accepts pharmacy usage data provided as the smallest unit type for each formulation, except for:

- oral liquids, which are counted as number of **bottles**, not volume (mL)
- eye drops, eye ointments, creams, ointments, lotions, shampoos are counted as **bottles, tubes** etc.
- clotrimazole vaginal pessaries (6 x 100mg), which are counted as **packs**
- combination packs for eradication of *H. pylori*

Data supplied as number of PACKS (e.g. pre-pack boxes where they are used for inpatients) must be converted to number of individual units by the contributor before submitting to NAUSP. Contributors can check that oral liquids have been entered as number of bottles through using the rate calculation "QA Check oral liquids" template to regularly validate their antimicrobial liquid usage. Additionally, the Portal will flag liquid quantities > 20 units for user review to ensure these products have been entered correctly in bottles not millilitres.

The following table summarises accepted unit types for most formulations.

Formulation	Accepted unit type (examples)
Oral solid formulations	Tablet, Capsule
Oral liquid formulations	Bottle
Parenteral formulations	Ampoule, Vial, Infusion, Bag
Inhaled formulations	Nebule, Nebulising solution
Rectal formulations	Suppository
Vaginal formulations	Tube, Pessary
Topical preparations	Tube, Bottle
Eye/Ear preparations	Bottle, Tube

Inclusions and Exclusions – pharmacy dataset

The focus of NAUSP is to give an indication of environmental pressures for selection of resistant organisms within healthcare facilities. Therefore, it is structured to report on antimicrobial usage in inpatient settings, both acute and sub-acute.

NAUSP acknowledges that in many facilities there are combined wards consisting of both included and excluded bed types. Please identify and discuss these wards with the NAUSP team when looking at pharmacy datasets. The proportion of included and excluded beds within the combined ward is required for consideration.

Inclusions	Exclusions
Acute Care: **All** emergency department beds[1] **All** operating theatre (including day-only stay cases) [2] Adult inpatient surgical beds Adult inpatient medical beds Adult intensive care/high dependency beds (combined as Critical Care) Adult inpatient specialist beds[3] **Sub-acute Care:** Palliative Care beds Longer-term care beds (e.g. residential aged care, rehabilitation) Hospital in the home beds Psychiatric beds[4]	**Acute Care:** Any paediatric (including neonatal) beds[5] All other day procedure wards (e.g. infusion suites, dialysis chairs, haematology/oncology day centres etc)

[1] All discharge supplies should be excluded.

[2] All theatre usage is included in NAUSP, including day-only patients and paediatric usage (where it cannot be separated from adult usage)

[3] Ward/location areas (e.g. maternity, haem/onc) within general hospitals should be separated where possible when granular drug usage and denominator data are available.

[4] For the purpose of surveillance, psychiatric beds are considered sub-acute due to low volume of antimicrobials used in this setting

[5] NAUSP methodology has not been validated for use in paediatric settings

Data Principles: Electronic Medication Administration Record data (Data Stream B)

Numerator: Days of Therapy (DOTs)

Key Principles:

- **The dataset indicates the monthly usage of each antimicrobial, by route, for all inpatients by admission specialty (see Inclusions and Exclusions), expressed as sum of Days of Therapy (DOTs)**
- 'Antimicrobial' refers to all relevant anti-infective agents within the World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC) classification system, including antibiotics, antimycotics, antivirals and antifungals. Since January 2019, topical anti-infectives are to be included in monthly data submissions. A complete list of agents collected can be found here.
- Antimicrobial usage datasets are obtained by the contributor from their local electronic medication administration record (eMAR) system. These should contain the number of DOTs of each antimicrobial agent, by route, administered during the month.

Dataset Rules:

- Usage datasets must be submitted to the Portal using the specified Excel spreadsheet template, with distinct columns for each element (*to be published when the portal DOT functionality is launched)*.
- The minimum required elements are: ANTIMICROBIAL, ROUTE ADMINISTERED, DOSE ADMINISTERED, UNIT OF DOSE, DATE ADMINISTERED, MAPPED SPECIALTY, LOCATION OF ADMINISTRATION and PATIENT ID (e.g. Medical Record Number (MRN) or alternative alpha-numeric number to represent a unique patient).
- ANTIMICROBIAL will be the generic name of the antimicrobial being captured, without any details of the strength or dosage form.
- ROUTE ADMINISTERED will be mapped to one of the following routes: Oral, Parenteral, Topical, Vaginal, Rectal, Inhaled, and Implanted. For the purpose of surveillance, administration of antimicrobials via nasogastric and PEG feeding will be mapped to Oral.
- DOSE ADMINISTERED must be submitted in numerical form. Decimals will be accepted. UNIT OF DOSE will be milligrams, grams or application (for topical applications such as creams, ointments, eye drops etc.). For all routes excluding topical, the dose administered and the unit of dose is mandatory.
- DATE ADMINISTERED is essential to measure DOTs during any given period. The date of administration together with a unique patient identifier will be used to calculate DOTs. For **continuous infusions,** one DOT is assigned on the commencement date with one additional DOT counted for each subsequent day where the infusion continues beyond midnight on that day.
- The MAPPED SPECIALTY will be a list of NAUSP-standardised specialties for both adult and pediatric patient populations.
- The LOCATION OF ADMINISTRATION indicates the physical ward location. This data field is to allow analysis of usage in Emergency, Theatre and Recovery and Critical Care irrespective of specialty. All other ward/locations will be mapped to 'Other'.
- The PATIENT ID is required for the purpose of calculating DOTs for any given patient on a single day. While MRNs are not identifiable on their own, it is encouraged to replace the MRN with an alternative alpha-numeric "identifier" for each unique patient. For example, your eMAR report might be coded to extract MRN 12345A as Patient ID A10000.

- Please ensure there are no merged, highlighted or blank cells within the spreadsheet, and that there are no embedded tables, formulas or filtering applied to columns.
- If **clinical trial antimicrobials** are administered, they will be included except where the trial has been blinded and it is not clear whether active drug was administered.
- The raw file submitted is processed to calculate ‘DOTs by Drug’, and ‘DOTs by Route by Drug’. One DOT represents the *first* administration of any antimicrobial by a given route, per patient, per day. Any subsequent administration of the same antimicrobial by the same route on the same day will not be counted as a DOT.
- Any agents or dosage forms not collected by NAUSP will be discarded automatically during processing, for example, other medicines that are not antimicrobials such as monoclonal antibodies. However, for ease of processing, contributors should endeavor to generate/code eMAR extractions/reports that fulfill the NAUSP Antimicrobial Agent list.
- If **clinical trial antimicrobials** are administered, they will be included except where the trial is blinded and it is not clear whether active drug was administered.

Denominator

Patient Days (PDs)

Patient Days are the sum of the lengths of stays of each patient separated during the reporting period. This denominator type will only be used when reporting DOT datasets from eMAR data.

- The dataset indicates the monthly Patient Day (PD) count for the mapped specialties defined in Appendix 6
- Patient Days data are generally obtained from the local health informatics unit (e.g. Casemix).
- Patient Days are not equivalent to Occupied Bed Days. Patient Days are the sum of the lengths of stays of each patient separated during the reporting period, whereas Occupied Bed Days are the sum of a daily count of occupied beds, regardless of when the separation occurs.

Numerator data elements – eMAR datasets

The following table describes the elements required for eMAR datasets to be submitted to NAUSP.

Name	Field type	Description
Hospital/Facility	Text	Must be in the Hospital name format as supplied in My Details in NAUSP portal. (Note: the hospital name should include state / territory)
Year	Number	Enter the year 20XX
Month	Text	The month in 3 letter abbreviation, for example Jan, Feb, Mar
MRN/UID	Number	The unique patient identifier (de-identified) and preferably not the MRN
Antimicrobial	Text	As extracted from eMAR
Date administered	Date	DD/MM/YYYY 00:00
Dose Administered	Number	As extracted from eMAR
Unit of Measurement	Text	As extracted from eMAR
Route	Text	As extracted from eMAR
Location of Administration	Text	The ward/location where the antimicrobial was administered, mapped to Emergency, Theatre and Recovery, Critical Care or Other
Mapped specialty	Text	The specialty of the ward, which is then mapped to a specialty group determined by NAUSP

Data Submission

How to submit data

All data must be submitted via the NAUSP Portal in the specified data template, compliant with data specifications. For further information on how to extract, format, and submit data, please see the NAUSP Portal User Guide.

When to submit data

Contributor hospitals are encouraged to submit data monthly, as soon as practicable after the completion of a month.

Late submission and missing data

Contributor hospitals that have not submitted data for more than three consecutive months may have reporting access restricted for a short period to facilitate the generation of six-monthly national and state reports. Contributors on restricted access must contact the NAUSP team to have access restored. If there are extenuating circumstances necessitating delayed submission, please discuss these with the NAUSP team.

Data Accountability and Quality Assurance

NAUSP relies upon the integrity of the data uploaded by contributor facilities, and it is the responsibility of contributors to ensure that data provided are accurate and complete. For this reason, it is important that there is someone at each site who is prepared to take responsibility for data integrity and is available for NAUSP to contact should there be any queries.

NAUSP has several mechanisms built into the data processing procedures to provide quality assurance (QA) checks. While NAUSP will query significantly abnormal results from time to time, the QA processes can only ensure that the data included in reports is accurate according to the data supplied by the contributor – i.e. we cannot vouch for the accuracy of the data supplied.

Contributors' data are subject to QA processes every six months on completion of June and December data uploads. The NAUSP team will review denominator submissions, ward/specialty inclusions and exclusions, and other data for the period. This system ensures all data are validated twice per year.

Additional QA activities that contributor hospitals assume responsibility for include:

- Acknowledgement of flagged drug quantities loaded (pharmacy distribution datasets) during data upload (for example, quantities less than 50% or greater than 200% of the previous 12 months' average);
- Visual inspection of datasets as part of the standard operating procedures for preparing, loading and processing within the database; and
- Visual inspection of reports produced to identify any apparent abnormal variation.

Data Security and Privacy

All data submitted via the NAUSP Portal are stored in a secure database housed behind the SA Health firewall. Only staff working directly for the Antimicrobial Programs team (Communicable Diseases Control Branch, Department for Health and Wellbeing, SA Health) or Digital Health SA have access to all data, and confidentiality and privacy standards will be upheld at all times.

Access to the NAUSP Portal is obtained only via registration, and only for facilities within which the external user is employed. All external user registrations must first be approved by the NAUSP administration team.

NAUSP participation is not mandatory, and contributor facilities must indicate their agreement to ongoing participation in the program. This is facilitated by NAUSP requesting signed participation agreement from an authorised executive representative of the contributor hospital, or local health district/network. Even after agreeing to participate, submission of data is entirely voluntary, and NAUSP will not demand or claim to compulsorily acquire any data from any contributor hospital. Contributing hospitals are de-identified in publicly available NAUSP reports by means of a de-identifying code assigned to each facility upon registration with the program. An authorised representative of each state and territory government will be in receipt of a legend of *public* hospitals within their respective jurisdiction to support and facilitate stewardship activities.

From time to time there may be circumstances where it is deemed of benefit (to NAUSP or other stakeholder) to incorporate identifiable data into a published report. This will only be undertaken with prior notification of individual contributors involved.

Appendix 1: Example Standard NAUSP report

NATIONAL ANTIMICROBIAL UTILISATION SURVEILLANCE PROGRAM

January 2014 to April 2016

Contributor: **Hospital**

The antimicrobial utilisation rates provided in this report are calculated using the number of defined daily doses (DDDs) of the antimicrobial agent or class consumed each month per 1,000 occupied bed days. Rates reported for this hospital are for **total** hospital use compared to the corresponding pooled data for the selected benchmark group.

Antimicrobial classes reported are:

- 3rd/4th generation cephalosporins (ceftriaxone, cefotaxime, ceftazidime, cefepime);
- glycopeptides (vancomycin, teicoplanin);
- fluoroquinolones (ciprofloxacin, moxifloxacin, norfloxacin);
- aminoglylcosides (gentamicin, tobramycin, amikacin); and
- anti-pseudomonal penicillins plus beta-lactamase inhibitor (piperacillin/tazobactam, ticarcillin/clavulanate).

At times, contributors are unable to supply data; therefore the comparator rates presented in this report may not be entirely representative of Victoria Principal Referral hospital use and may differ from those reported when additional data are available. Comparator rates for this reporting period include data from 6 hospital(s).

In all charts included in this report, H = hospital use, and C = aggregate use of other Victoria Principal Referral hospitals. Data are smoothed using a 3-month moving average. Enquiries regarding information contained in this report should be directed to health.nausphelp@sa.gov.au

1. TOTAL HOSPITAL USE BY ANTIMICROBIAL CLASS

Total hospital antimicrobial utilisation rates for the period January 2014 to April 2016 are displayed in charts 1 and 2.

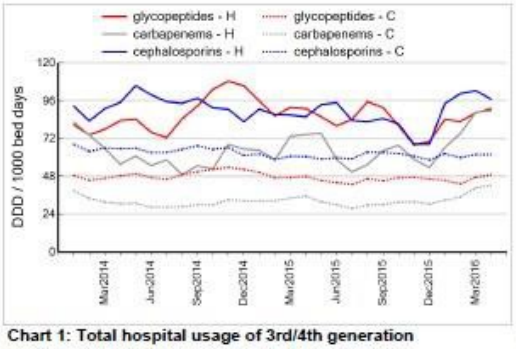


Chart 1: Total hospital usage of 3rd/4th generation cephalosporins, glycopeptides and carbapenems.

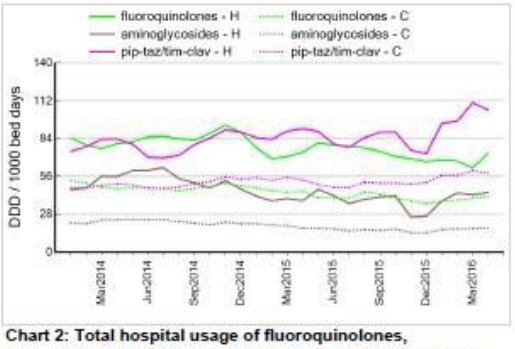


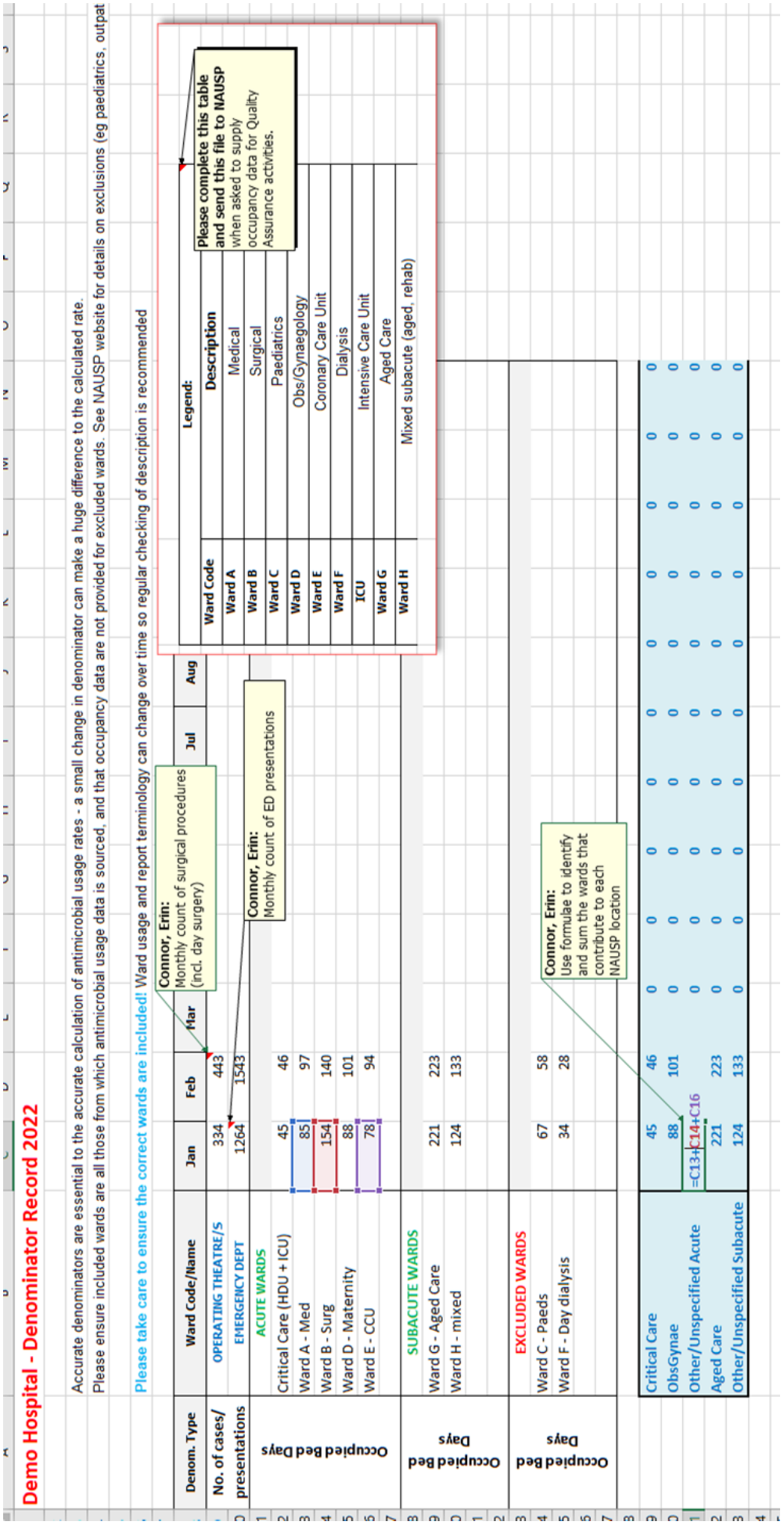
Chart 2: Total hospital usage of fluoroquinolones, aminoglycosides and anti-pseudomonal penicillins plus ß-lactamase inhibitor.

(Only Page 1 has been provided as example)

Appendix 2: Example template – pharmacy data numerator dataset - antimicrobial usage data

	A	B	C	D
1	Facility Name	Wandin Valley Hospital (NSW)		
2	Year (yyyy)	2021		
3	Month	Mar		
4				
5				
6				
7	Ward description	NAUSP Ward/Location	Product description (name, strength, form, pack/liq qty/m	Quantity
8	ICU	Critical Care (ICU/HDU)	GANCICLOVIR 500mg INJECTION	0.32
9	ICU	Critical Care (ICU/HDU)	CHLORAMPHENICOL 0.5%, 10mL EYE DROPS	1.00
10	ICU	Critical Care (ICU/HDU)	GANCICLOVIR 500mg INJECTION	0.40
11	ICU	Critical Care (ICU/HDU)	GANCICLOVIR 500mg INJECTION	0.27
12	ICU	Critical Care (ICU/HDU)	GANCICLOVIR 500mg INJECTION	1.20
13	ICU	Critical Care (ICU/HDU)	GANCICLOVIR 500mg INJECTION	0.96
14	ICU	Critical Care (ICU/HDU)	VALACICLOVIR 500mg TABLETS	4.00
15	ICU	Critical Care (ICU/HDU)	FLUCONAZOLE 200mg Capsules	4.00
16	ICU	Critical Care (ICU/HDU)	VALACICLOVIR 500mg TABLETS	3.00
17	ICU	Critical Care (ICU/HDU)	GANCICLOVIR 500mg INJECTION	0.30
18	ICU	Critical Care (ICU/HDU)	POSACONAZOLE 300mg/16.7mL INJECTION	10.00
19	ICU	Critical Care (ICU/HDU)	FLUCLOXACILLIN 500mg CAPSULES	6.00
20	ICU	Critical Care (ICU/HDU)	HYDROXYCHLOROQUINE 200 mg TABLETS	10.00
21	ED2	Emergency Department	CEFAZOLIN 1 g INJECTION	10.00
22	ED2	Emergency Department	CEFAZOLIN 1 g INJECTION	5.00
23	EDIT	Emergency Department	CEFAZOLIN 1 g INJECTION	5.00
24	ED1	Emergency Department	TRIMETHOPRIM 300mg Tablets	7.00
25	EDIT	Emergency Department	TRIMETHOPRIM 300mg Tablets	7.00
26	ED1	Emergency Department	FLUCLOXACILLIN (E) 500mg CAPSULES	24.00
27	ED1	Emergency Department	FLUCLOXACILLIN (E) 500mg CAPSULES	24.00
28	ED1	Emergency Department	FLUCLOXACILLIN (E) 500mg CAPSULES	96.00
29	ED1	Emergency Department	CHLORAMPHENICOL 0.5%, 10mL EYE DROPS	2.00
30	5W	Other/unspecified acute	CEFTRIAXONE 1g INJECTION	1.00
31	5W	Other/unspecified acute	CEFTRIAXONE 1g INJECTION	1.00
32	5W	Other/unspecified acute	VANCOMYCIN 500mg INJECTION	9.00
33	3N	Other/unspecified acute	CEFTRIAXONE 1g INJECTION	1.00
34	6W	Other/unspecified acute	VALACICLOVIR 500mg TABLETS	18.00
35	7N	Other/unspecified acute	RIFAXIMIN 550mg TABLETS	3.00
36	7N	Other/unspecified acute	MEROPENEM 1g INJECTION	8.00
37	7W	Other/unspecified acute	AMOXICILLIN-CLAVULANIC ACID 1000mg-200mg INJECTION	8.00
38	7E	Other/unspecified acute	CEFTRIAXONE 1g INJECTION	1.00
39	8W	Other/unspecified acute	TEICOPLANIN 400mg INJECTION	2.00
40	ICU	Critical Care (ICU/HDU)	MOXIFLOXACIN 400mg TABLETS	1.00
41	ICU	Critical Care (ICU/HDU)	NORFLOXACIN 400mg Tablets	5.00
42	ICU	Critical Care (ICU/HDU)	AMOXICILLIN-CLAVULANIC ACID 500mg-125mg TABLETS	6.00

Appendix 3: Example denominator template



Demo Hospital - Denominator Record 2022

Accurate denominators are essential to the accurate calculation of antimicrobial usage rates - a small change in denominator can make a huge difference to the calculated rate.
Please ensure included wards are all those from which antimicrobial usage data is sourced, and that occupancy data are not provided for excluded wards. See NAUSP website for details on exclusions (eg paediatrics, outpat

Please take care to ensure the correct wards are included! Ward usage and report terminology can change over time so regular checking of description is recommended

Denom. Type	Ward Code/Name	Jan	Feb	Mar	Jul	Aug
No. of cases/ presentations	OPERATING THEATRE/S	334	443			
	EMERGENCY DEPT	1264	1543			
Occupied Bed Days	ACUTE WARDS					
	Critical Care (HDU + ICU)	45	46			
	Ward A - Med	85	97			
	Ward B - Surg	154	140			
	Ward D - Maternity	88	101			
	Ward E - CCU	78	94			
Occupied Bed Days	SUBACUTE WARDS					
	Ward G - Aged Care	221	223			
	Ward H - mixed	124	133			
Occupied Bed Days	EXCLUDED WARDS					
	Ward C - Paeds	67	58			
	Ward F - Day dialysis	34	28			

Connor, Erin:
Monthly count of surgical procedures (incl. day surgery)

Connor, Erin:
Monthly count of ED presentations

Connor, Erin:
Use formulae to identify and sum the wards that contribute to each NAUSP location

Legend:	
Ward Code	Description
Ward A	Medical
Ward B	Surgical
Ward C	Paediatrics
Ward D	Obs/Gynaegology
Ward E	Coronary Care Unit
Ward F	Dialysis
ICU	Intensive Care Unit
Ward G	Aged Care
Ward H	Mixed subacute (aged, rehab)

Please complete this table and send this file to NAUSP when asked to supply occupancy data for Quality Assurance activities.

Critical Care	45	46	0	0	0	0	0	0	0	0	0	0
ObsGynae	88	101	0	0	0	0	0	0	0	0	0	0
Other/Unspecified Acute	=C13+C14+C16		0	0	0	0	0	0	0	0	0	0
Aged Care	221	223	0	0	0	0	0	0	0	0	0	0
Other/Unspecified Subacute	124	133	0	0	0	0	0	0	0	0	0	0

Appendix 4: AIHW Peer Groups and NAUSP eligibility

Peer Group	Subgroup	
Acute public hospitals	✓	Principal referral hospitals
	✓	Public acute group A hospitals
	✓	Public acute group B hospitals
	✓	Public acute group C hospitals
	¤	Public acute group D hospitals
Acute private hospitals	✓	Private acute group A hospitals
	✓	Private acute group B hospitals
	✓	Private acute group C hospitals
	¤	Private acute group D hospitals
Very small hospitals*		
Specialist hospital groups		
Women's and children's hospitals	¥	Children's hospitals
	✓	Women's hospitals
	#	Combined Women's and children's hospitals
Early parenting centres		
Drug and alcohol hospitals		
Psychiatric hospitals	¥	Public child, adolescent and young adult psychiatric hospitals
	✓	Public acute psychiatric hospitals
	✓	Private acute psychiatric hospitals
	✓	Public sub- and non-acute older adult psychiatric hospitals Public
	✓	sub- and non-acute psychiatric hospitals
	✓	Public forensic psychiatric hospitals
Other acute specialised hospitals*	¤	
Same day hospitals	X	Haematology and oncology clinics
	X	Dialysis clinics
	X	Hyperbaric health centres
	¤	Eye surgery centres
	¤	Plastic and reconstructive surgery centres
	X	Fertility clinics
	X	Reproductive health centres
	X	Endoscopy centres
	¤	Oral and maxillofacial surgery centres
	X	Sleep centres
	¤	Gynaecology day hospitals
	X	Cardiovascular health centres
	¤	Mixed day procedure hospitals
	¤	Other specialist day hospitals*
Sub- and non-acute hospitals	¤	Public rehabilitation hospitals Private
	¤	rehabilitation hospitals Mixed sub-
	¤	and non-acute hospitals*
Outpatient hospitals	X	
Unpeered hospitals*	¤	

Note: Groups marked with an asterisk (*) are not peer groups due to the diverse characteristics of the hospitals within the groups.

- ✓ Site able to submit data for both DDD and DOT reporting streams
- ¤ Site able to submit data **by negotiation** with NAUSP
- ¥ Site able to submit data for DOT reporting stream **only**
- # Adult data eligible for DDD **and** DOT data, paediatric data eligible for DOT data **only**
- **X** Not currently eligible to submit data to NAUSP

Appendix 5: Wards/locations for **pharmacy** **data** reporting stream

Ward / Location	Definition
Acute	
Critical Care	Includes any Intensive Care Unit(s) and/or High Dependency Unit(s) at your facility (ICU and/or HDU)
Haematology/Oncology	Haematology/Oncology minimum requirements • On-call haematologist/oncologist • Some inpatient services • Integration of home-based services with area based program • Access to designated allied health services • Some allied health undergraduate education • Specialist RN/registrar/RMO
Respiratory	Respiratory minimum requirements • Inpatient care by on-site general medical physician; generally an on-site respiratory specialist • Specialist SRN • Access to lung function diagnostics (spirometry, volumes and gas transfer) • Access to respiratory specialist for inpatient consultation • Links with sleep service • Access to designated allied health services • Provision of NIV
Obstetrics/Gynaecology	Including labour ward, birth suite/centre, post-natal, general gynaecology
Theatres/Recovery/Day Surgery	Including inpatient and day-only theatres (and associated recovery areas) and day-only surgical wards
Emergency Department	Where any discrete Emergency Department service exists
Other / Unspecified acute	All acute-care inpatient locations or wards that do not fit any of the above locations, or for mixed-use wards/locations
Subacute	
Rehabilitation	All rehabilitation wards/location, regardless of length of stay
Mental Health	Inpatient psychiatric care
Palliative Care	Inpatient end-of-life care
Aged Care	Care awaiting placement, co-located residential aged care
Hospital in the Home (HITH)	Where antimicrobials are administered in the home, and dispensed to a discrete location, distinct from other inpatient dispensing
Other/ Unspecified subacute	All subacute inpatient areas that do not fit any of the above locations, or for mixed wards/locations.

Appendix 6: Mapped specialties eMAR data reporting stream

Program will be updated later in 2022.

For more information

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National Antimicrobial Utilisation Surveillance Program

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