Background paper: Current state analysis

The following analysis provides an overview of current surveillance activities across the eight streams of work. In addition, the analysis explores any key gaps and issues.

Summary of AMR and AU activities, key gaps and issues

A detailed descriptive analysis of the data gaps which currently exist across the four key population groups and data types (AMR and AU) of interest are provided in the following section. A number of key themes have emerged and a summary is presented here:

For AMR:

- AMR data exists and the data covers all population groups of interest
- AMR data are held across both public and private laboratories service providers, regardless whether the test is done for public or private patients
- No clear guidance, or requirement for AMR data to be released for surveillance purposes (particularly so for privately referred tests)
- Anecdotal evidence suggests that AMR data, as they are held in its current form by both public and private laboratories, would have considerable variations in data format and quality, in addition to being generated by three different susceptibility testing standards
- Data available today is not able to identify RACF residents from the general community

For AU:

- For public hospitals, only NAUSP collects AU data
- NAUSP has remarkable AU data coverage for large public hospitals and provides good bench-marking data for the same
- NAUSP has notable weaknesses in the coverage of small hospitals, the level of specificity of data reporting, and the private hospital sector
- CHRISP (QLD) is the only state to demonstrate the Hospital-based collection and reporting of AU data, at a level of granularity more sophisticated than NAUSP
- For the Community, the 'nearest' AU dataset is the national PBS dataset, but it can only provide volume data and not appropriateness of prescribing due to the lack of clinical details
- The PBS dataset does not identify RACF residents
- The DUSC group has a broad advisory remit in support of the PBAC for all things medicine, and is not resourced (or specialised) to undertake long term antimicrobial usage surveillance work

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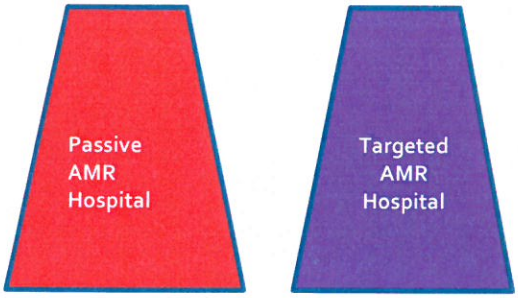
AMR Surveillance



AMR surveillance in the public hospital setting

The majority of AMR surveillance work in public hospitals is passive in nature. The key targeted surveillance activity in the public hospital setting is through the AGAR program which collects information and reports on resistance for some organisms causing septicaemia, including *Staphylococcus aureus*, Enteric Gram negatives, and *Enterococcus* species. However, participation is essentially voluntary and the coverage is incomplete.

For diseases of public health interest, such as Gonococci, Meningococci, Tuberculosis and Salmonella, there is some degree of coordination in AMR data collection. There are clearly recognised centres to which isolates should be sent for further testing, and the data flows within these programs are usually robust. While the majority of AMR surveillance work in public hospitals is passive in nature, AMR surveillance of notifiable diseases tends to be more "active" in that dedicated AMR reports are provided to the requestor as soon as is practical, and the data is collected in a national repository. Active surveillance work tends to be undertaken by reference laboratories on a clinical case – by – clinical case basis.

At a state and territory level, some states, such as WA (HISWA), Queensland (CHRISP), and Tasmania (TIPCU) have developed a state/ territory-based coordinated approach in the collection and surveillance of AMR data, focussed largely on documenting and trending the hospital burden of certain multi-resistant organisms (MROs). Some, though not all, of this data also is submitted in addition to national surveillance programs, such as AGAR. Gaps currently exist in states where AMR data is not collected in a systematic way or comprehensively, including in NSW, Victoria, SA and NT. Whilst AMR data is not collected for surveillance purposes in these jurisdictions, there are however existing structures which already work to undertake the surveillance of HAIs. Specifically:

- Victoria has a prominent HAI surveillance program (VICNISS) and is recognised for its successes in surveillance and monitoring of HAIs, however it does not currently collect and report AMR data.
- NSW hospitals are required to report on HAIs to the Ministry of Health, however there is no formalised central coordination program in place for reporting of HAI or AMR.

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- The SA HAI program is a coordination centre for the collection and reporting of HAIs for the state of SA. As part of its data submission of HAI, it does allow contributing organisations to provide AMR data for blood-stream infections, however, submission of AMR data is not mandatory. One of the reasons is that SA has a high proportion of regional hospitals which do not have their own laboratories, and, in the absence of an automated data extraction platform, many of these smaller hospitals do not have the resources to collect and submit this information manually.

At the hospital or organisation level, there are considerable variations in the approach to AMR data collection and monitoring. The majority of tertiary or primary referral hospitals have an affiliated laboratory which may assist in developing antimicrobial resistance reports, which may include antibiograms. Large hospitals which have a dedicated Infection Control Unit (or equivalent of) can also undertake active monitoring and intervention in the event of AMR detection (e.g. VRE or CRE cases).

Currently in Australia, there are 3 extant standards used for antimicrobial susceptibility testing. Two of these (CLSI and EUCAST) are calibrated to the ISO standard (ISO 20776). One (CDS) is not. Further susceptibility testing data generated at the 'bench' level may be re-interpreted (i.e. different to the interpretation proposed in the standard) before being stored in the laboratory information system. As there are no national susceptibility testing standards for testing or interpretation, and three extant methods, data merging is and will remain impaired until this problem can be addressed.

Smaller or regional hospitals, which often rely on external contracted private pathology service providers, are not able to undertake any surveillance of AMR. Many of these hospital groups will not have an infection control unit or the resources to coordinate data collection and submission to a surveillance body. The issue therefore with small hospitals is that data from small hospitals are held by a range of different pathology laboratories, and they do not have the resource to coordinate the collection and monitoring of AMR.

It should be noted that public hospital requests are undertaken by both public and private laboratories, depending on the public hospital's contracted pathology service providers. As a collective, private and public laboratory services hold all AMR hospital data, public and private. Only a proportion of this data (as outlined above) is collated and analysed for the purposes of surveillance.

Key gaps for AMR surveillance in the public hospital setting are summarised in **Box 1** below.

Box 1: Key gaps and issues for AMR surveillance in the public hospital setting

Surveillance Type: AMR	**Setting: Public Hospitals**
Key gaps in and issues include: • Lack of coordination across each state in the collection and reporting of AMR data, with no systematic statewide AMR collection in NSW, Victoria, SA, and NT. • Different states have different coverage of information collection of AMR data. • AMR data from smaller regional hospitals serviced by private laboratories may not be picked up by standard data collection processes. • Smaller hospitals, which do not have their own laboratory may not have the resources to collect and submit data manually.	

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AMR surveillance in the private hospital setting

There is little to no coordination for the collection and monitoring of AMR in the private hospital sector at a national or state and territory level. Private laboratories participating on the AGAR program provide some data on the private hospital sector for a selected number of AMR results. As highlighted above for the public hospital sector, diseases of public health interest crosses all population groups.

There are a number of barriers to AMR surveillance in the private hospital sector. These include:

- The majority of private hospitals do not have a formal infection control unit (i.e. one that his headed up by an Infectious Disease consultant), and as such, have limited resources available to collect, collate and submit data to a surveillance body.
- There is a lack of legislative guidance in data disclosure and protection in the use of AMR data which are completed on a private referral basis; as such there is little clarify regarding whether or not this data can be used for AMR surveillance purposes.
- There are concerns that AMR data, if not accurately and appropriately presented, may have unintended negative quality connotations which would impact on the brand of the private hospital providers.
- AMR data for private patients exist in private and public laboratories. Collectively, results from all laboratories (public and private labs) have complete coverage of the private hospital sector. Through mergers and acquisitions, the large majority of private laboratory service providers are made up of small laboratory service enterprises. These small enterprises commonly retain their legacy laboratory information systems and their methods of AST. As a result, the private laboratory services sector is made up of a complex range of databases, information systems and variations in AST approaches. Despite the presence of information, there remains a significant issue in terms of consistency and comparability of information available.

Key gaps and issues for AMR surveillance in the private hospital setting are summarised in Box 2 below.

Box 2: Key gaps and issues for AMR surveillance in the private hospital setting

Surveillance Type: AMR	**Setting: Private Hospitals**
Key gaps and issue include: • lack of coordination in the collection and monitoring of AMR data for the private hospital sector • lack of a central repository of AMR data by private laboratory providers – private laboratory providers are made up of different laboratories each with its own LIS and information model • information format and sensitivity test by different private laboratory providers may vary considerably across providers • many private hospitals do not have an Infection Control Unit (or equivalent of) to support the coordination, collection and reporting of AMR data to a surveillance body • no clear legislative guidance around the use of laboratory AMR results from privately referred cases.	

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AMR surveillance in the community

There is currently a significant gap in AMR surveillance data available from the community sector. AMR surveillance for the community sector is current limited to data to blood stream infections collected by AGAR (from two private providers only), and AMR data collected on TB, Neisseria and Salmonella infections.

Whilst there is a significant gap in surveillance, AMR data from the community sector do exist. Both public and private laboratories have records of microbiology and sensitivity testing which had been requested by community general practitioners or by specialists who work in the community. However, similar to the private hospital setting, there is no clear legislative guidance around the use of AMR results stored within laboratory information systems from tests performed for patients requested by their GP. Similar to AMR surveillance data from the private hospital sector, there is also variation in the AST methods used.

There is also at present no coordinated process to extract AMR data from laboratories or GP records for surveillance purposes. Individual results of microbiology and sensitivity testing completed in the community are reported on a case by case basis to the requestor of the test. The original AMR test data are held within laboratory information systems in laboratories which undertook the testing. There is currently no requirement for the reporting of this information outside of the standard results-reporting procedure back to the requestor. Neither Local Health Networks / Districts nor Medicare Locals have any requirement to monitor nor report infection rates or emergent resistance from infections that arise in the community.

A further, but related, challenge in relation to the collection, collation and submission of community AMR data is the lack of resources available in the community to support data collection process. The process in reporting the rates of true infection (e.g. such as HAI reporting in hospitals) generally require considerable resources to validate the relevant information for reporting purposes. This includes a range of activities, including reviewing all pathology information extracts and validating this content against clinical notes, ensuring that a positive culture is a true infection as opposed to a colonised sample. In the community, however, there are currently no specific procedures (or resources to support) administrative efforts to differentiate clinical cases that are colonisations, contaminations, or true infections. Positive cultures and AMR data collected would therefore have limited value in determining strains that are associated with true infections.

Key gaps and issues for AMR surveillance in the community setting are summarised in Box 3 below:

Box 3: Key gaps for AMR surveillance in the community setting

Surveillance Type: AMR	**Setting: Community**

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Key gaps and issues include:

- little or no coordination in the collection of AMR data in the community
- no requirement for GP practitioners or Primary Care authorities to monitor for AMR
- no clear legislative guidance regarding the use of AMR results sitting within laboratory information systems which arise from privately referred cases
- an absence of resources or a dedicated body to coordinate the collection and monitoring of AMR data in the community sector
- a lack of resources to extract relevant and accurate AMR data for surveillance purposes.

AMR surveillance in the Residential Aged Care Facility setting

There is currently a significant gap in AMR surveillance which is specific to the Residential Aged Care Facility (RACF) setting. Clinical care for this population group is driven primarily by GPs, and hence the issues in data collection for this sector are the same as those identified in the previous section on AMR surveillance in the community.

RACFs do not have the same operational model as hospitals. Whilst there are infection control procedures, almost all do not have a dedicated Infection Control Units or Antimicrobial Stewardship programs such as those established public hospitals. Hence, there is little by way of existing support function for the collection, analysis, and monitoring of AMR within or across these facilities.

Public and private laboratories currently hold data from test results arising from requests made in the community. Within this cohort are residents who live in aged care facilities. Challenges in obtaining AMR data in this group from laboratory information systems, in addition to the ones listed above, is the lack of sufficient details in patient identifiers to reliably separate microbiology results which are based in RACFs as opposed to elderly people living independently in the community.

A summary of the key gaps and issues for AMR surveillance in the aged care facility setting is provided in Box 4 below..

Box 4: Key gaps and issues for AMR surveillance in the aged care facility setting

Surveillance Type: AMR	**Setting: Residential Aged Care Facilities**
Key gaps and issues include: • no national coordination in the collection and reporting of AMR (or HAI) data for RACFs • there is lack of guidance in data reporting by private and public laboratories for microbiology tests done by private referral cases or from the GPs • while AMR data is present in laboratory systems, there is actually a lack of identifier within the data sets to identify RACF residents from the broader cohort of community referrals – so tests arising from a RACF cannot be identified • a lack of resources to support coordination in the collection, monitoring, analysis and reporting of AMR information.	

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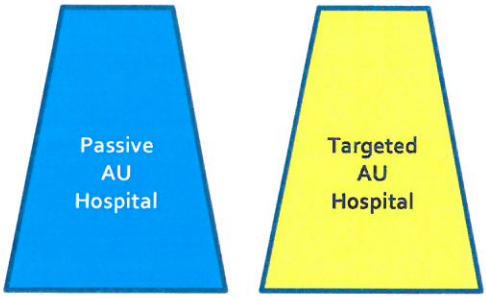
AU surveillance



AU surveillance in the public hospital setting

Currently the NAUSP collects and reports on AU. The data is generated electronically by pharmacy dispensing systems. While there is a high participation rate, currently there is not a requirement for participation, and for this reason, the coverage of public hospitals is not complete. While there are no restrictions on participation, data for small hospitals which have fewer than 50 beds (or throughput of a small regional hospital) is unreliable, hence participation by this hospital group traditionally has not been strong.

While the methodology in AU measurement is consistent with that used by international counterparts, the method is applicable only to adult patients. Children's hospitals and paediatric units are not measured in this sector. It is noted however that the NAUSP data is fairly high level, in that it does not allow analysis of data to pin-point patterns of antimicrobial prescribing characteristics based on specific wards other than intensive care for hospitals that have one (e.g. a surgical ward), sub-specialty team (e.g. oncology team), or a specific admitting consultant. This data reported therefore lacks the specificity required to develop targeted response strategies.

NAPS is an antimicrobial surveillance program which allows organisations to provide their antimicrobial *prescribing* data based on a point prevalence study. The data of this program is reflective of *clinician prescribing characteristics* rather than on the *amount* of antimicrobials used. While it has been very effective in enabling hospital services to reflect on its quality of clinical services, the data is not designed for the purpose of usage data collection.

A summary of key gaps and issues in AU surveillance in the public hospital setting is provided in box 5 below..

Box 5: Key gaps and issues in AU surveillance in the public hospital setting

Surveillance Type: AU	**Setting: Public Hospitals**
Key gaps and issues include: • children and paediatric population groups are not covered • small hospitals are insufficiently covered • there is currently no requirement to participate in surveillance (although the recent introduction of the NSQHS Standard requirement for AMS programs has significantly boosted participation rates).	

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AU in the private hospitals

There is a significant gap in information regarding AU in the private hospital setting. There are currently only a small number of private hospital groups which are actively participating on the NAUSP program, and these are predominantly larger private hospitals. There are a large number of medium to small size private hospitals who do not provide AU data.

Many private hospitals do not share the same governance infrastructures as their peers in the public sector. A considerable proportion of private hospitals do not have formalised AMS programs, an Infection Control Unit, or a dedicated pharmacy stock control system. These are some of the enabling features which help large hospital participate on the NAUSP program successfully. Many small to medium-sized private hospitals do not have such resources, and hence do not participate in any data collection activities.

There is some structured AU data collection by some private hospitals which is not currently fed in to state and territory or national surveillance system. Stakeholder have reported that a number of private hospitals have some form of stand-alone electronic medical record system or electronic prescribing system, within which are held clinical prescribing data. It is possible that there are relevant and useful data which can be used for surveillance purposes, however the depth of details of these systems have not been privy to this project at the time of report development. The number of private hospitals which have electronic prescribing systems in place is unclear.

A summary of gaps in AU surveillance in the private hospital setting is provided in box 6 below.

Box 6: Key gaps and issues in AU surveillance in the private hospital setting

Surveillance Type: AU	**Setting: Private Hospitals**
Key gaps and issues include: • lack of requirement for participation the NAUSP program • a lack of coordination 1and invested resource in the collection and reporting on AU data, as the majority of private hospitals do not have a formally established infection control unit which could support collection, validation and reporting of AU.	

AU in the community setting

AU in the community at the national level are largely captured by PBS data, which reflect dispensed medications as recorded by the pharmacy. The data forms part of the dataset held by the Commonwealth Department of Human Services, and is submitted by pharmacies for reimbursement under the PBS co-

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payment system. The coverage of PBS data of community dispensed medications is high, though but not entirely complete. The 2011 release of the Australian Statistics of Medicine[1] quoted medicines not reported because of under co-payment of general prescriptions represented around 17.9 percent of all community prescriptions. There are also a number of medicine and drugs that are not listed on the PBS and which are available only on private prescriptions, with the patient paying the full cost. Private prescriptions represented 7.2 percent of community prescriptions in 2011. Despite this, PBS data is of very high quality as the data are linked to financial payments.

The DUSC group has access to the entire PBS dataset. Analysis of AU (through dispensing data) is only a part of all advisory function of DUSC. While there is some level of AU analysis, the majority of this analysis is to support different costing or economic decisions taken by PBAC, and not necessarily related to AMR surveillance related issues. From the AU perspective, while DUSC has full access to PBS data collected, DUSC is not a *dedicated* AU surveillance program which is designed to collect, analyse and report on AU characteristics. In addition, the dataset collected for PBS purposes lacks the clinical granularity to identify important clinical information (e.g. clinical indication for prescribing) or the identification of patient subgroups (e.g. RACFs).

There are other programs (these programs have not been formally analysed for this project) which are currently collecting, or exploring the possibility of collecting, GP data on prescribing. This includes the University of Sydney's Family Medicine Research Centre - Bettering the Evaluation and Care of Health (BEACH) as well as work currently undertaken by NPS Medicinewise – MedicineInsight.

- Broadly, the *BEACH program* obtains 1000 samples of GP consultation interactions per year and records key attributes such as "reason for the encounter", "medication prescribed", and "tests and investigations". These are then collated on a database for analysis. The data are possibly relevant, but potentially limiting in representativeness due to the small volume of all encounters in the Community. Within the sample of 1000 encounters, there may only be a fraction of all presentations which require prescription of an antimicrobial.

- *NPS Medicinewise* is currently operating a program – MedicineInsight - which aims to collect longitudinal data from GP practices on the prescribing of medicines. It collects anonymous patient and clinical care information from general practices IT systems over a period of time, and links the information on patient diagnosis to the medicines prescribed, along with the health services provided and the clinical impact. Of all information collected, this data will also include antimicrobial medications, and could potentially be relevant for the purpose of AU surveillance in the community. This project is in its early stage of exploration.

A summary of key gaps in AU surveillance in the community setting is provided in box 7 below.

Box 7: Key gaps in AU surveillance in the community setting

Surveillance Type: AU	**Setting: Community**
Key gaps and issues include: • lack of a dedicated program to coordinate, collect, analyse and report on AU • there is a significant deficiency in the PBS data content available – it lacks (1) whether the patient actually took the medications, and (2) what the medications were prescribed to treat	

[1] http://www.pbs.gov.au/statistics/asm/2011/australian-statistics-on-medicines-2011.pdf accessed August 2014

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- there are inconsistencies in the data available within GP IT systems (e.g. lack of clinical indication or formal diagnosis at the time of prescribing) which presents limitations as to the value of automated extraction for surveillance purposes.

AU surveillance in RACFs

There is a significant gap in AU data specific to the RACF setting. Residents of RACFs are a subset of the community population as a whole, so gaps identified in the previous section on the community AU data equally apply to this population group. Notably, the main issue is that PBS data do not provide sufficient information to differentiate RACF AU from the general community population AU.

There is currently a strong momentum towards implementing the use of the National Inpatient Medication Chart (NIMC) across all RACFs as part of safety and quality in the use of medications. This would facilitate the recording of consistent and high quality medication information being collected by RACFs. However, the NIMC is paper-based, which means RACFs will be required to undertake chart audits in order to extract relevant prescribing information, should AU data be required.

Some RACFs have electronic medical record systems or electronic prescribing systems (or both), which may also include the resident's medication records. However, it was reported that these systems were not consistently used across facilities. Even when they are used, anecdotal reports suggested that the quality of information within them was varied considerably.

As discussed earlier, RACFs do not have the same operational model as hospitals. RACFs do not routinely have dedicated pharmacies (such as in the hospital setting), and hence, there is no facility to extract medication usage data from a pharmacy stock control system, and most do not have the necessary resources to coordinate the collection of AU surveillance data.

Finally, many of the RACF are small facilities (less than 50 beds), which would be considered too small for NAUSP data collection and analysis. Antibiotic usage data collected from these facilities using NAUSP methodology are likely to be too unreliable for benchmarking purposes.

As discussed earlier, medication prescriptions in RACF are managed by the resident's GP, and hence the record of medication recording in GP systems could provide some insight about AU and prescribing in RACFs.

A summary of key gaps in AU surveillance in the residential age care facility setting are outlined in box 8 below.

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Box 8: Key gaps in AU surveillance in the residential age care facility setting

Surveillance Type: AU	**Setting: Residential aged care facilities**
Key gaps and issues include: Same gaps as for AU data recording in the community, plus: • inconsistencies in the use of electronic medical records or electronic prescribing systems within RACF • lack of resources to support coordination in the collection, monitoring, analysis and reporting of AU information • most RACF are small facilities, and the proportion of high-care beds for patients with high-care needs are very small, resulting in unreliable data for benchmarking purposes	

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