

**AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE**



September 2019



2018 Aged Care National Antimicrobial Prescribing Survey Report



Published by the Australian Commission on Safety and Quality in Health Care
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ISBN: 978-1-925665-91-8

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National Centre for Antimicrobial Stewardship and Australian Commission on Safety and Quality in Health Care. Antimicrobial Prescribing and Infections in Australian Aged Care Homes: Results of the 2018 Aged Care National Antimicrobial Prescribing Survey. Sydney: ACSQHC; 2019

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Overview

Aged care homes are recognised nationally and internationally as an important community setting for monitoring infections, antimicrobial use and antimicrobial resistance. Residents colonised or infected by multidrug-resistant organisms and inappropriate antimicrobial use has been reported in these settings.

This report presents analyses of data on infections and antimicrobial use in residents of 407 Australian aged care homes and multi-purpose services (aged care facilities) that contributed to the 2018 Aged Care National Antimicrobial Prescribing Survey (AC NAPS).

To protect aged care facility residents from harm and improve the quality of service provision, the Australian Government Department of Health has developed the Aged Care Quality Standards, which apply to all aged care services from 1 July 2019. These include:

- Standard 3: Personal care and clinical care includes requirements for minimisation of infection-related risks through implementing infection control and prevention precautions; and practices to promote appropriate antibiotic prescribing and use
- Standard 8: Organisational governance notes where clinical care is provided, the organisation is required to demonstrate antimicrobial stewardship. Data from AC NAPS directly support these standards.

What does the 2018 AC NAPS data tell us?

Participation in AC NAPS by Australian aged care facilities increased in 2018 (n = 407), compared with 2017 (n = 292). There were contributors from all states and territories for the first time, and 20,030 residents were included.

Important findings from the 2018 AC NAPS include:

- Approximately 1 in 10 (9.9%) residents of contributor facilities were prescribed antimicrobials, compared with 8.8% in 2017
- Approximately three-quarters (73%) of these prescriptions were for therapeutic indications
- More than one-third (36.3%) of all prescriptions were for topical antimicrobials
- Almost one-fifth (19.0%) of antimicrobials were prescribed for prn (as needed) administration; the majority (94.4%) of these were for topical antimicrobials, most commonly clotrimazole (65.4%)
- Only 12.1% (54/445) of antimicrobials for which there was a prn prescription were administered on the survey day or in the six days prior
- Only 39.2% of prescriptions were prescribed in the seven days prior to the survey day; almost one-third (28.3%) were prescribed more than six months prior
- Antimicrobial review or stop dates were not documented for 58.9% of prescriptions and start dates were unknown for 1 in 20 prescriptions (4.9%)
- 35.4% of antimicrobial prescriptions prescribed for therapeutic purposes were for residents with documented signs and/or symptoms of a suspected infection
- The most common clinical indications for prescriptions were skin, soft tissue and mucosal (18.3%), cystitis (16.0%) and pneumonia (9.4%); documentation of indication was missing for 25.1% of prescriptions
- Cefalexin (20.3%), topical clotrimazole (19.0%) and topical chloramphenicol (7.0%) were the most commonly prescribed antimicrobials
- One in ten (10.4%) therapeutic prescriptions were for clotrimazole and initially prescribed more than six months prior to the survey day.

Implications for improving the safety of care for residents

Since 2016, the AC NAPS has identified consistent patterns of antimicrobial use and identification of infections that may adversely affect the safety of care for residents of aged care facilities. These include:

- **Assessment and diagnosis of infections**

The AC NAPS identified a high rate of use of antimicrobials for residents who did not have signs and symptoms of infection that met the McGeer *et al* surveillance criteria used for AC NAPS. Reasons for this may include a lack of documentation of signs and symptoms of infection, limited use of microbiological testing to confirm infections or reporting signs and symptoms for diagnosis of infection that are not part of the McGeer *et al* diagnostic dataset; for example, cloudy urine to diagnose a urinary tract infection. Improving documentation of signs and symptoms, using evidence-based tools to assess infections, and using microbiological testing as clinically indicated, preferably before commencing antimicrobials, are likely to be beneficial for aged care facility residents.

- **Topical antimicrobial use**

The high rate of rate of topical antimicrobial use, the duration of use and the large proportion of prn prescriptions are concerning. The use of prn prescriptions may limit capacity for clinical review of antimicrobials prescribed for aged care facility residents.

The most commonly prescribed topical antimicrobial was clotrimazole, followed by chloramphenicol. Clotrimazole is a recommended treatment for a number of conditions, including mucocutaneous candidiasis; chloramphenicol is infrequently indicated for common infections. Use of clotrimazole is generally recommended only for two weeks.

- **Use of cefalexin prophylaxis**

Cefalexin prescriptions for prophylaxis comprised almost 9% of all prescriptions in the 2018 survey, often continuing for more than six months. The majority of prophylaxis was for urinary tract conditions including asymptomatic bacteriuria. The relative risks and benefits of prolonged antimicrobial prophylaxis in the elderly is not well studied. Prophylaxis is not indicated for asymptomatic bacteriuria. Risks of antimicrobial side effects are high, and include diarrhoea and mucocutaneous candidiasis. The utility of ongoing prophylaxis should be regularly reviewed.

- **Broad-spectrum antimicrobial use**

The patterns of prescribing of broad-spectrum antimicrobials identified by the AC NAPS suggest opportunities to promote improved concordance with evidence-based guidelines, particularly in relation to pneumonia in aged care home residents and urinary tract infections. Appropriate use of narrow-spectrum antimicrobials would likely reduce adverse effects such as mucocutaneous candidiasis and diarrhoea, and may have flow-on benefits of reducing antimicrobial use for those conditions.

- **Poor documentation**

There are opportunities to improve the quality of documentation for antimicrobial prescriptions, particularly in relation to indication, stop and review dates and allergy documentation. The promotion of medication charts that are consistent with the National Residential Medication Chart developed by the Australian Commission on Safety and Quality in Health Care (the Commission) may assist with improving documentation and reducing the duration of antimicrobial use.

The Commission will work with and support the Aged Care Quality and Safety Commission to promote ongoing surveillance of infections and antimicrobial use, the development and implementation of effective infection prevention and control and AMS programs and action to improve the safety of care provided to residents of aged care facilities.

Introduction

In Australia, aged care is primarily provided through the Commonwealth Home Support Program, home care packages and permanent or respite residential care in aged care homes. There are also five flexible service options that provide home support and/or residential care, including multi-purpose services.¹ Multi-purpose services, located in all states and the Northern Territory, provide integrated health and aged care services for small regional and remote communities where a standalone hospital or aged care home would not be viable. Both aged care homes and multi-purpose services play an important role in the care of older members of the community in Australia, as well as some younger people who require residential care.

At 30 June 2018, 886 providers operated 2,695 aged care homes in Australia; most of these were located in New South Wales (32.7%) or Victoria (28.2%) and in major cities (62.3%) or inner regional areas (24.9%). There were 207,142 operational residential aged care places, excluding flexible aged care places. Not-for-profit, private and government providers were responsible for 55.3%, 40.6% and 4.2% of these operational places respectively. Of the 8,667 government provided operational places, 59.8% were located in Victoria. Multi-purpose services ($n=178$) provided 3,152 operational places.²

All Australian aged care homes and multi-purpose services (aged care facilities) are eligible to participate in the Aged Care National Antimicrobial Prescribing Survey (AC NAPS). Since 2017, participation by Victorian state government aged care homes has been mandatory, as part of the Victorian Healthcare Associated Infection Surveillance System (VICNISS) Infection Control Indicator Program.³

AC NAPS is a collaborative project between the National Centre for Antimicrobial Stewardship (NCAS), the Guidance Group and VICNISS Co-ordinating Centre. The Australian Commission on Safety and Quality in Health Care (the Commission) provides funding for AC NAPS to contribute data to the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System. AURA provides comprehensive and coordinated national surveillance of antimicrobial use and antimicrobial resistance. Antimicrobial use is a key factor in the development of antimicrobial resistance.⁴

AC NAPS is a standardised surveillance tool that aged care homes and multi-purpose services can use to monitor the prevalence of infections and antimicrobial use. The survey was modelled on the European Centre for Disease Prevention and Control Healthcare-Associated Infection in Long Term Care Facilities (HALT) study.⁵ AC NAPS was piloted in 2015 with the support of the Commission for the AURA Surveillance System,⁶ and has subsequently been conducted annually.^{7, 8}

This report presents analyses of AC NAPS data collected and submitted in 2018, and includes comparisons with 2016 and 2017 AC NAPS data.

Methods

Time frame

The official data collection and submission period for the 2018 AC NAPS was 1 June to 31 August 2018.

Recruitment

A communication plan was developed to encourage participation by previous contributors and recruit new facilities from all states and territories. Numerous strategies were used including:

- Newsletters issued by the Australian Government Department of Health, the Commission, NCAS, VICNISS Coordinating Centre, the Australasian College for Infection Prevention and Control, and the Australian Association of Consultant Pharmacists.
- Correspondence from the Commission and NCAS to key stakeholders including the then Australian Aged Care Quality Agency, major aged care providers, the Royal Australian College of General Practitioners, Aged and Community Services Australia, Leading Aged Care Services and COTA Australia.
- Tweets issued by NCAS to highlight the official commencement date and the availability of online training sessions.

Survey method

Participating facilities could choose one of two survey methods to collect data. Method 2 was recommended for smaller facilities that wished to expand their sample size to better assess their performance.

Method 1: A single-day point prevalence survey

On the survey day, all residents are screened to determine if they:

- Have an antimicrobial prescription and/or
- Have signs and symptoms of a suspected or confirmed infection.

Method 2: A single-day point prevalence survey plus an additional one month retrospective survey

On the survey day, all residents are screened to determine if they:

- Have an antimicrobial prescription and/or
- Have signs and symptoms of a suspected or confirmed infection.

In addition, all residents present on the survey day are screened to determine if they had an antimicrobial prescription on any day during the previous month that was ceased prior to the survey day.

Data collection forms

Aged Care Home form

Each participating facility completed the Aged Care Home form (Appendix 1). For the first time, questions were included in the facility-level data fields regarding the current status of infection prevention and control and antimicrobial stewardship programs. Resident-level data fields included listing the number of residents present on the survey day. All residents who were present on the survey day were eligible for inclusion.

Antimicrobials form

The Antimicrobials form (Appendix 2) was completed for residents who were prescribed an antimicrobial on the survey day (Methods 1 and 2), and within the previous month (Method 2 only). Antimicrobial prescriptions included all antibiotics, antiviral, antifungal and anti-parasitic agents in all formulations.

Data were collected about prescribing elements including the choice of antimicrobial agent, dose, frequency, route of administration, start date and documentation of a review or stop date. For the first time, data were also collected regarding whether an antimicrobial prescription was for prn (as needed) administration. If the prescription was for prn administration, the surveyor was also required to report if the antimicrobial had been administered on the survey day or in the six days prior.

The indication and body system for the prescription were reported according to a standardised list. If an indication was not included on the list, the surveyor was required to report 'Other' and the body system; for example, 'Other – urinary tract'. The initial mode of prescription (for example, written directly by prescriber or communicated via telephone order) was also recorded.

If the antimicrobial start date was known, and the therapy had commenced less than six months before the survey day, data were collected about the resident's microbiology results, urinary investigations and catheter devices and signs and/or symptoms of a suspected infection. These data were collected in relation to specimens collected, investigations undertaken, devices in situ and signs and/or symptoms present on the antimicrobial start date or in the six days prior to the antimicrobial start date. Data on signs and symptoms were required to be documented in official sources such as resident histories or hospital discharge summaries.

Microbiology data were collected from finalised microbiology reports only. If more than one specimen of the same type was collected within the specified timeframe, only the most recent result was reported.

A list was provided for recording signs and/or symptoms of suspected or confirmed infections documented on the antimicrobial start date or in the six days prior. The list was divided into seven body systems: urinary tract, respiratory tract, skin or soft tissue, gastrointestinal tract, oral, eye, and other. A list was also provided of constitutional criteria, or signs and symptoms common to many different infection types; these included: fever, leucocytosis, change in mental status from baseline, acute functional decline in activities of daily living, and results of full blood examination. The signs and symptoms were required to be recorded in official documents such as resident histories or hospital discharge summaries.

Infections form

An Infections form (Appendix 3) was completed for residents who had signs and/or symptoms of a suspected infection that were present on the survey day or in the two days prior to the survey.

Consistent with the methodology for the 2017 AC NAPS, and for reasons detailed in the 2016 AC NAPS report, the gastrointestinal tract infection signs and/or symptoms were excluded from the Infections form.

Each suspected infection was classified by the surveyor as facility- or non-facility associated. Facility-associated infections were those for which the resident's signs and/or symptoms commenced at least two calendar days after (re)admission into the facility. Non-facility associated infections were those for which the resident's signs and symptoms commenced within two calendar days of being admitted into the facility.

The methodology for collection of data for the Infections form allowed surveyors to use official and non-official data sources. For example, staff handover notes, incident reports, wound-care folders or verbal information provided by a senior aged care home clinician.

Electronic AC NAPS

On the survey day, data collection forms were manually completed by the surveyors and then used to assist with electronic data entry. Registered surveyors could access the e-versions via the NAPS web portal.

Once the data were entered, contributors could generate reports immediately and download them via the NAPS web portal. These reports enabled participating facilities to compare their performance against national aggregate data. Surveyors were encouraged to forward the reports to those who are able to influence resident care, including administrators and clinicians such as general practitioners, pharmacists and nurses.

Support

Optional online training sessions were offered for surveyors. For new surveyors, one-hour beginner sessions provided detailed information about the AC NAPS methodology. Brief refresher sessions were also held for more experienced surveyors. Throughout the year, the NAPS coordinating team provided email and telephone assistance as required.

Data Definitions and Data Analysis

A suspected infection was defined as at least one of the clinical signs or symptoms of infection listed on both the Antimicrobials and Infections forms. As already noted, for the Antimicrobials form signs and/or symptoms had to be present on the antimicrobial start date or in the six days prior to the antimicrobial start date. For the Infections form, the signs and/or symptoms had to be present on the survey day or in the two days prior to the survey day. More than one suspected infection could be reported for each resident.

An electronic decision algorithm was applied to each suspected infection to determine whether or not the McGeer *et al* infection surveillance definitions were met. These widely referenced definitions, which were specifically developed for use in long term care facilities, were last revised in 2012 to take into account the most recent evidence and the availability of improved diagnostics for surveillance.⁹

Limitations

The AC NAPS results should be interpreted in the context of the limitations described below.

Sampling and selection bias

The results may not be generalisable to all aged care homes and multi-purpose services.

Most participating facilities that collected and submitted AC NAPS data were:

- Located in Victoria
- Classified as major city or inner regional
- State government operated.

For some state and territory, remoteness and provider type categories there was a relatively small number of participating facilities.

Unlike aged care homes, multi-purpose services also provide a range of health services.

Infection definitions

Signs and symptoms of infection in older residents may be atypical, so failure to meet the McGeer *et al* definitions may not fully exclude the presence of a true infection. In addition, the McGeer *et al* definitions require microbiological confirmation for some infections (for example, urinary tract infections). This means that these infections will not be confirmed unless microbiological specimens are collected. Specimens for microbiological testing are less likely to be collected in aged care facilities, compared to acute care services. The McGeer *et al* definitions are generally useful to compare the proportion of defined infections between facilities over time in contrast to rule in or rule out the clinical need for a prescription.

Subjective assessment of infections and quality of documentation

The reliability of data sources used to determine a suspected infection and/or McGeer *et al* surveillance definitions is dependent on the completeness of resident records and other official documents for data from the Antimicrobial form. For completion of the Infections form, non-official documents and verbal reports were able to be additionally used. Therefore, the suspected infections and McGeer *et al* surveillance data represents infections that could be confirmed via these sources. A lack of documentation of signs and symptoms that occurred prior to a therapeutic prescription would underestimate this data point. There was no validation undertaken of these assessments.

Seasonal variation

The survey was conducted during winter. The results may have been different in another season. Certain respiratory infections, for example, are usually more frequent in winter.

Validation

The analysis relied on the validity of local assessments. There was no additional external validation undertaken.

Comparison of 2018 AC NAPS data with previously published 2016 and 2017 AC NAPS data

The 2016 and 2017 data included in the analyses for this report may differ from previous reports because some data were retrospectively entered, omitted due to anomalies or included that had previously been omitted. In addition, prescriptions for prn administration were captured for the first time in 2018.

Survey results

Participation

In 2018, 342 aged care homes and 65 multi-purpose services (n = 407 facilities) collected and submitted AC NAPS data to NCAS; this is a large increase compared with 2016 and 2017 (Table 1). Since 2016, 120 facilities have participated twice and 31 facilities have participated three times.

In 2018, 83.1% (338/407) of facilities collected data according to Method 1 (single day only) and 17.0% (69/407) facilities collected data according to Method 2 (single day and one month retrospective).

In 2018, compared with 2016 and 2017, there was an increase in the number of participating facilities located outside of Victoria (n = 205, 50.4%); facilities from the Australian Capital Territory and the Northern Territory participated for the first time. As for 2016 and 2017, all remoteness areas and provider types were represented. About two thirds were located in either major cities (n = 148, 36.4%) or inner regional areas (n = 136, 33.4%) and the majority were government- (n = 236, 58.0%) or not-for-profit (n = 148, 36.4%) operated.

Table 1: Facilities by state, remoteness area classification and provider type, AC NAPS contributors, 2016–2018

Category		Participating facilities					
		2016		2017		2018	
		No.	%*	No.	%*	No.	%*
State and Territory	ACT	-	-	-	-	3	0.7
	NSW	36	12.5	38	13.0	62	15.2
	NT	-	-	-	-	2	0.5
	QLD	28	9.8	19	6.5	50	12.3
	SA	7	2.4	8	2.7	39	9.6
	TAS	11	3.8	8	2.7	10	2.5
	VIC	190	66.2	198	67.8	202	49.6
	WA	15	5.2	21	7.2	39	9.6
Remoteness	Major Cities	82	28.6	87	29.8	148	36.4
	Inner regional	120	41.8	128	43.8	136	33.4
	Outer regional	73	25.4	68	23.3	96	23.6
	Remote	9	3.1	8	2.7	24	5.9
	Very remote	3	1.0	1	0.3	3	0.7
Provider type	Not for profit	83	28.9	81	27.7	148	36.4
	Private	21	7.3	10	3.4	22	5.4
	Government	183	63.8	201	68.9	236	58.0
Total		287	-	292	-	407	-

* Percentage of AC NAPS contributor cohort

Of the 20,030 residents audited, most resided in not-for-profit (n = 11,841, 59.1%) and government- (n = 6,115, 30.5%) operated facilities. Representation of aged care facilities across states and territories varied from 6.6% (NSW) to 26.2% (VIC) and across remoteness areas from 7% (very remote) to 32.0% (remote) (Table 2). Nationally, over half (56.7%) of the government-operated facilities participated, whilst very small proportions of private (2.4%) and not-for-profit facilities (9.5%) participated (Table 2).

Table 2: Facilities by state, remoteness area classification and provider type, AC NAPS contributors, 2018

Category		Residents audited	Facilities in reporting group*	Participating facilities from the reporting group
		No.	No.	%
State and Territory	ACT	356	26	11.5
	NSW	1,976	946	6.6
	NT	211	13	15.4
	QLD	3,476	490	10.2
	SA	3,303	272	14.3
	TAS	840	76	13.2
	VIC	7,758	771	26.2
	WA	2,110	279	14.0
Remoteness	Major cities	11,386	1,680	8.8
	Inner regional	6,076	671	20.3
	Outer regional	2,235	404	23.8
	Remote	270	75	32.0
	Very remote	63	43	7.0
Provider type	Not for profit	11,841	1,551	9.5
	Private	2,074	906	2.4
	Government	6,115	416	56.7
Total		20,030	-	-

*Source: Aged care service list: 30 June 2018 AIHW GEN Aged Care Data. Transition Care, Innovative Pool, National Aboriginal and Torres Strait Island and Short term restorative care services are excluded.

Most participating facilities reported that they employed a person who is responsible for coordinating an infection prevention and control program (92.4%); and that policies and procedures detailing the requirements for standard and transmission-based precautions were in place (97.1%). Less frequently, facilities reported that they employed a person with responsibility for coordinating an antimicrobial stewardship (AMS) program (78.1%), and policies and procedures detailing AMS requirements (75.4%) (Table 3).

Table 3: Infection Prevention and Control and Antimicrobial Stewardship Programs implemented, AC NAPS contributors, 2018

Infection Prevention and Control (IPC) Program	Facilities	
	No.	%
A multidisciplinary team or committee is established that oversees an IPC program	335	82.3
A person who is responsible for coordinating the IPC program is employed	376	92.4
An appointed ICP Coordinator has dedicated time for completing assigned tasks	336	82.6
The facility has IPC policies and procedures that detail requirements for standard and transmission based precautions	395	97.1
Antimicrobial Stewardship (AMS) Component	No.	%
A person who is responsible for leading and coordinating the AMS component of the IPC program is employed	318	78.1
The facility has IPC policies and procedures that detail requirements for AMS	307	75.4
Staff prescribers are easily able to access the Therapeutic Guidelines: Antibiotic	349	85.7
Staff prescribers are easily able to access the Australian Medicines Handbook: Aged Care Companion.	314	77.1

Resident characteristics

Similar to 2016 and 2017, over half (n = 11,914, 59.5%) of the residents were aged greater than 85 years and about one-third (n = 6563, 32.8%) were male. One in 25 residents (n = 852, 4.3%) had been admitted to a hospital in the previous 30 days and 3.7% (n = 744) had an indwelling urinary catheter on the survey day (Table 4).

Table 4: Number and characteristics of all residents on the survey day, AC NAPS contributors, 2016–2018

Measurement	2016		2017		2018	
	No.	%	No.	%	No.	%
Present on survey day	13,398	-	12,307	-	20,030	-
Aged >85 years	7,355	54.9	7,072	57.5	11,914	59.5
Male	4,448	33.2	4,167	33.9	6,563	32.8
Admitted to hospital in previous 30 days	630	4.7	507	4.1	852	4.3
Indwelling urinary catheter present	513	3.8	432	3.5	744	3.7

Prevalence of infections and antimicrobial use

The prevalence of antimicrobial use was calculated based on the proportion of residents present on the survey day who were prescribed at least one antimicrobial. The prevalence of infection was calculated using the proportion of residents present on the survey day who had signs and/or symptoms of at least one suspected infection, as recorded on the Infections form.

The prevalence of residents prescribed at least one antimicrobial was 9.9% (n = 1,988) (Table 5). If all prescriptions for residents receiving topical antimicrobials were excluded, the prevalence was 6.7% (n = 1,347) in 2018, compared with 7.5% (n = 1,010) and 6.7% (n = 824) in 2016 and 2017 respectively.

The prevalence of residents who had signs and/or symptoms of at least one suspected infection was 2.9% (n = 581).

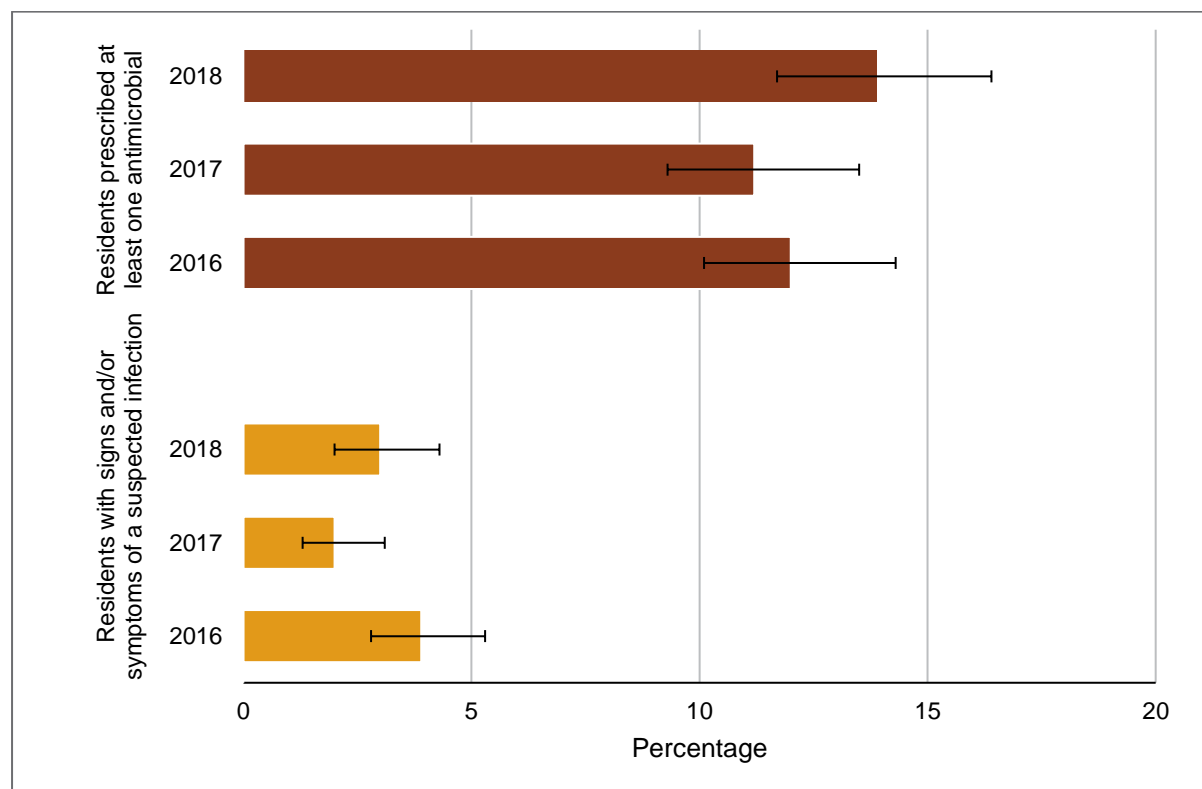
Table 5: Prevalence of infections and antimicrobial use in all participating facilities, AC NAPS contributors, 2016–2018*

On survey day	2016			2017			2018			p-value
	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI	
Residents with signs and/or symptoms of at least one suspected infection	417	3.1	2.8–3.4	349	2.8	2.5–3.1	581	2.9	2.7–3.1	0.48
Residents prescribed at least one antimicrobial	1,321	9.9	9.4–10.4	1,087	8.8	8.3–9.3	1,988	9.9	9.5–10.4	0.97
Number of residents present	13,398	-	-	12,307	-	-	20,030	-	-	-

* Source: Residents with signs and symptoms of infection: Infections form; Residents prescribed at least one antimicrobial: Antimicrobial form; Number of residents present: Facility form

For those facilities that participated in AC NAPS annually from 2016 to 2018 ($n = 31$), there was no significant change in either the prevalence of residents with signs and/or symptoms of at least one suspected infection or the prevalence of residents prescribed at least one antimicrobial (Figure 1).

Figure 1: Prevalence of infections and antimicrobial use for facilities that have participated all three years and confidence intervals, AC NAPS contributors, 2016–2018*



Source: Residents with signs and symptoms of infection: Infections form; Residents prescribed at least one antimicrobial: Antimicrobial form

* See Table A4.1 for percentage and confidence interval values

Tasmania had the lowest prevalence of residents with signs and/or symptoms of at least one suspected infection ($n = 3$, 0.4%); NSW had the highest prevalence of residents with signs and/or symptoms of at least one suspected infection ($n = 84$, 4.3%) (Table 6).

Of the five remoteness classifications, both major city ($n = 323$, 2.8%) and inner regional ($n = 170$, 2.8%) facilities had the lowest prevalence of residents with signs and/or symptoms of at least one suspected infection; very remote facilities had the highest prevalence ($n = 5$, 7.9%) (Table 6).

Table 6: Prevalence of residents with signs and/or symptoms of a suspected infection on the survey day, by state and territory, remoteness and provider type, AC NAPS contributors, 2016–2018

Category		Residents with signs and/or symptoms of at least one suspected infection*					
		2016		2017		2018	
		No.	Prevalence (%)	No.	Prevalence (%)	No.	Prevalence (%)
State and Territory	ACT	-	-	-	-	9	2.5
	NSW	59	4.0	71	5.2	84	4.3
	NT	-	-	-	-	6	2.8
	QLD	48	2.4	23	1.7	73	2.1
	SA	21	3.6	50	6.3	108	3.3
	TAS	8	1.2	8	2.1	3	0.4
	VIC	226	3	162	2.4	254	3.3
	WA	55	4.5	35	2.1	44	2.1
Remoteness	Major Cities	184	3.1	135	2.3	323	2.8
	Inner regional	148	2.8	156	3.2	170	2.8
	Outer regional	65	3.2	50	3.5	71	3.2
	Remote	17	12.4	8	7.1	12	4.4
	Very remote	3	4.4	0	0.0	5	7.9
Provider type	Not for profit	166	2.7	131	2.3	278	2.3
	Private	48	2.8	22	2.3	81	3.9
	Government	203	3.7	196	3.5	222	3.6
Total		417	3.1	349	2.8	581	2.9

* Source: Infections form

Tasmania has consistently reported the lowest prevalence of residents prescribed at least one antimicrobial: 7.1% (n = 47), 3.9% (n = 15) and 1.9% (n = 16) in 2016, 2017 and 2018 respectively.

Of the five remoteness classifications, remote facilities have consistently reported the highest prevalence of residents prescribed at least one antimicrobial: 19.0% (n = 26), 24.8% (n = 28) and 12.2% (n = 33) in 2016, 2017 and 2018 respectively (Table 7).

Table 7: Prevalence of antimicrobial use on the survey day, by state, remoteness and provider type, AC NAPS contributors, 2016–2018

Category		Residents prescribed at least one antimicrobial*					
		2016		2017		2018	
		No.	Prevalence (%)	No.	Prevalence (%)	No.	Prevalence (%)
State and Territory	ACT	-	-	-	-	28	7.9
	NSW	196	13.2	121	8.8	161	8.1
	NT	-	-	-	-	31	14.7
	QLD	235	11.9	130	9.5	440	12.7
	SA	81	13.8	136	17.3	330	10.0
	TAS	47	7.1	15	3.9	16	1.9
	VIC	616	8.2	560	8.3	735	9.5
	WA	146	12.1	125	7.7	247	11.7
Remoteness	Major Cities	661	11.1	474	8.1	1,191	10.5
	Inner regional	439	8.4	431	8.7	500	8.2
	Outer regional	189	9.2	154	10.9	259	11.6
	Remote	26	19.0	28	24.8	33	12.2
	Very remote	6	8.8	0	0.0	5	7.9
Provider type	Not-for-profit	698	11.3	486	8.5	1,188	10.0
	Private	109	6.4	49	5.0	149	7.2
	Government	514	9.3	552	9.9	651	10.5
Total		1,321	9.9	1,087	8.8	1,988	9.9

* Source: Antimicrobials form

Suspected infections on the survey day

In 2018, 674 suspected infections were reported for 581 residents on the survey day, suggesting 16% of residents were receiving therapies for more than one suspected infection. Suspected skin or soft tissue (35.3%), respiratory tract (28.5%) or urinary tract (19.0%) infections were most commonly reported. About four-fifths (n = 540, 80.1%) of these suspected infections were facility-associated and 32.8% (n = 221) met the McGeer *et al* infection surveillance definitions (Table 8).

Table 8: Number and percentage of suspected infections by body system and location of acquisition, AC NAPS contributors, 2018

Body system	No. of suspected infections [†]	Facility-associated suspected infections		Suspected infections that met McGeer <i>et al</i> definition	
		No.	%	No.	%
Skin or soft tissue	238	192	80.7	112	47.1
Respiratory tract	192	165	85.9	49	25.5
Urinary tract	128	106	82.8	6	4.7
Eye	60	44	73.3	50	83.3
Oral	17	8	47.1	4	23.5
Other systems	39	25	47.1	0	-
Total	674	540	80.1	221	32.8

* Source: Infections form

[†]Some residents had signs and/or symptoms of more than one suspected infection

Antimicrobial use

Antimicrobial use data collected by both Method 1 and Method 2 were combined for the analyses presented in this section. The unit of analysis is antimicrobial prescriptions.

A total of 2,341 antimicrobials were prescribed for 1,988 residents. Almost one third of these residents (n = 665, 28.4%) were reported to have allergies; allergy status was either not known (n = 1650, 70.5%) or not documented (n = 26, 1.1%) for the remainder.

Start date

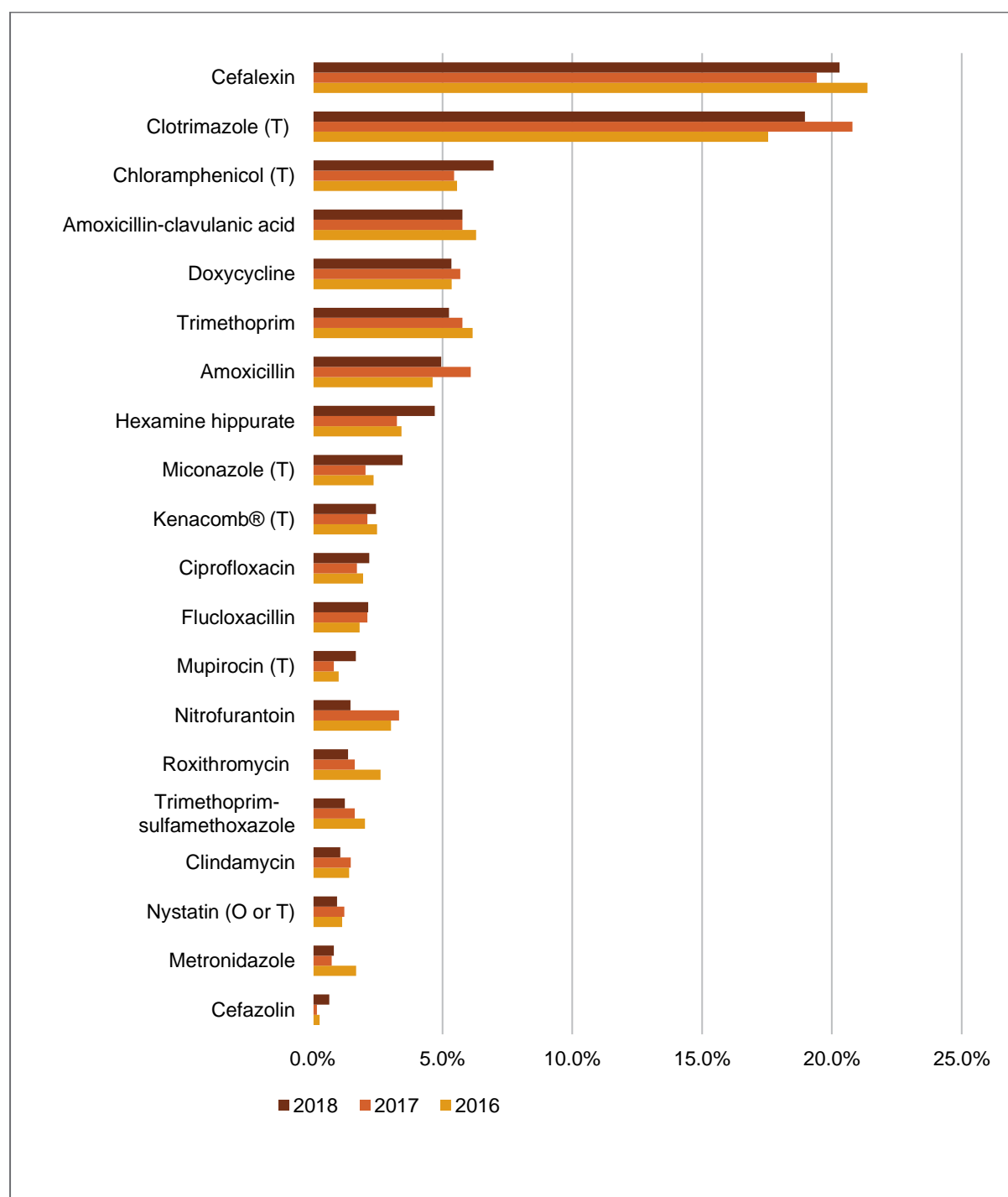
The start date was unknown for 4.9% (n = 115) of the antimicrobial prescriptions and more than a quarter (n = 663, 28.3%) were commenced more than six months prior to the survey day. For those antimicrobial prescriptions with a known start date that were commenced less than six months prior to the survey day (n = 1,563, 66.7%), 41.2% (n = 644) had been commenced more than seven days prior to the survey day. Only 39.2% (n = 919) of all prescriptions with a known start date were prescribed in the seven days prior to survey.

Most commonly prescribed antimicrobials

Most antimicrobials were prescribed for oral (n = 1,459, 62.3%) or topical (n = 849, 36.3%) administration. In 2016 and 2017, 32.1% (n = 483) and 32.9% (n = 407) of antimicrobials respectively were for prescribed topical administration. The majority of prescriptions were for therapeutic use (n = 1,710, 73%), the remainder were for prophylaxis.

The most commonly prescribed antimicrobials were cefalexin (n = 475, 20.3%), clotrimazole (n = 444, 19.0%), chloramphenicol (n = 163, 7.0%), amoxicillin–clavulanic acid (n = 135, 5.8%), doxycycline (n = 125, 5.3%) and trimethoprim (n = 123, 5.3%) (Figure 2). The five most commonly prescribed topical antimicrobials were clotrimazole (n = 437, 51.5%), chloramphenicol (n = 161, 19.0%), miconazole (n = 79, 9.3%), gramicidin–neomycin–nystatin (Kenacomb®) (n = 56, 6.6%), and mupirocin (n = 38, 4.5%) (Figure 2).

Figure 2: Most commonly prescribed antimicrobials, percentage of all antimicrobials prescribed, AC NAPS contributors, 2016–2018*



T = topical; Kenacomb® contains triamcinolone, neomycin, nystatin and gramicidin

* See Table A4.2 for percentage values

The majority (90.1%) of clotrimazole was prescribed for therapeutic use. Prolonged duration of prescriptions (greater than six months) was reported for prophylactic cefalexin prescriptions and both therapeutic (44.1%) and prophylactic (47.5%) prescriptions for clotrimazole (Table 9). Clotrimazole prescriptions of greater than six months' duration accounted for 10.4% of all therapeutic prescriptions.

Table 9: Cefalexin and clotrimazole prescriptions, therapeutic and prophylactic use, AC NAPS contributors, 2018

Antimicrobial	Category	No.	%	% of therapeutic prescriptions (n = 1,710)	% of prophylactic prescriptions (n = 631)	% of total prescriptions (n = 2,341)	% > 6 months duration	% of unknown duration
Cefalexin (n = 475)	Therapeutic	265	55.8	15.5	NA	11.3	1.0	0.8
	Prophylactic	210	44.2	NA	33.3	9.0	51.9	9.1
Clotrimazole (n = 444)	Therapeutic	404	90.1	23.6	NA	17.3	44.1	6.9
	Prophylactic	40	9.0	NA	6.3%	1.7	47.5	5.0

Source: Antimicrobials form
NA = Not applicable

Almost one in five (19.0%, n = 445) antimicrobial prescriptions were for prn administration; the majority of these (92.8%, n = 413) were for topical antimicrobials (Table 10). The most commonly prescribed antimicrobial for prn administration was clotrimazole (65.4%, n = 291); 12.1% (n = 54) of prn orders were administered on the survey day or in the six days prior (Tables 10 and 11).

Table 10: Antimicrobials prescribed for prn administration, AC NAPS contributors, 2018

Antimicrobial	Number	Percentage
Clotrimazole	291	65.4
Chloramphenicol	35	7.9
Kenacomb®, Oticomb Otic®	28	6.3
Miconazole	32	7.2
Mupirocin	15	3.4
Other topical	19	4.3
Other, oral administration	20	4.5%
Other, intramuscular administration	5	1.1%
Total	445	-

Source: Antimicrobials form
Kenacomb® and Oticomb Otic® contain triamcinolone, neomycin, nystatin and gramicidin

Table 11: Antimicrobials prescribed for prn administration, duration of administration and administration on the survey day or in the six days prior, AC NAPS contributors, 2018

Antimicrobial start date compared with survey day	Number	Administration on antimicrobial start date or six days prior	
		No.	%
Less than 1 week	12	6	50.0
1 week–6 months	119	15	12.6
Greater than 6 months	275	33	12.0
Unknown	38	0	0
Total	445	54	12.1

Source: Antimicrobials form

Quality indicators

The two key quality indicators that are consistently monitored using AC NAPS are ‘indication documented for prescribing an antimicrobial’ and ‘review or stop date documented’. In 2018, 74.9% (n = 1,754) of antimicrobial prescriptions had the indication documented, and 41.1% (n = 961) of antimicrobial prescriptions had a review or stop date documented (Table 12). Of the 663 prescriptions commenced more than six months prior to the survey day, 93.2% (n = 618) did not have a review or stop date documented. Similarly, of the 115 prescriptions for which the start date was unknown, 89.6% (n = 103) did not have a review or stop date documented.

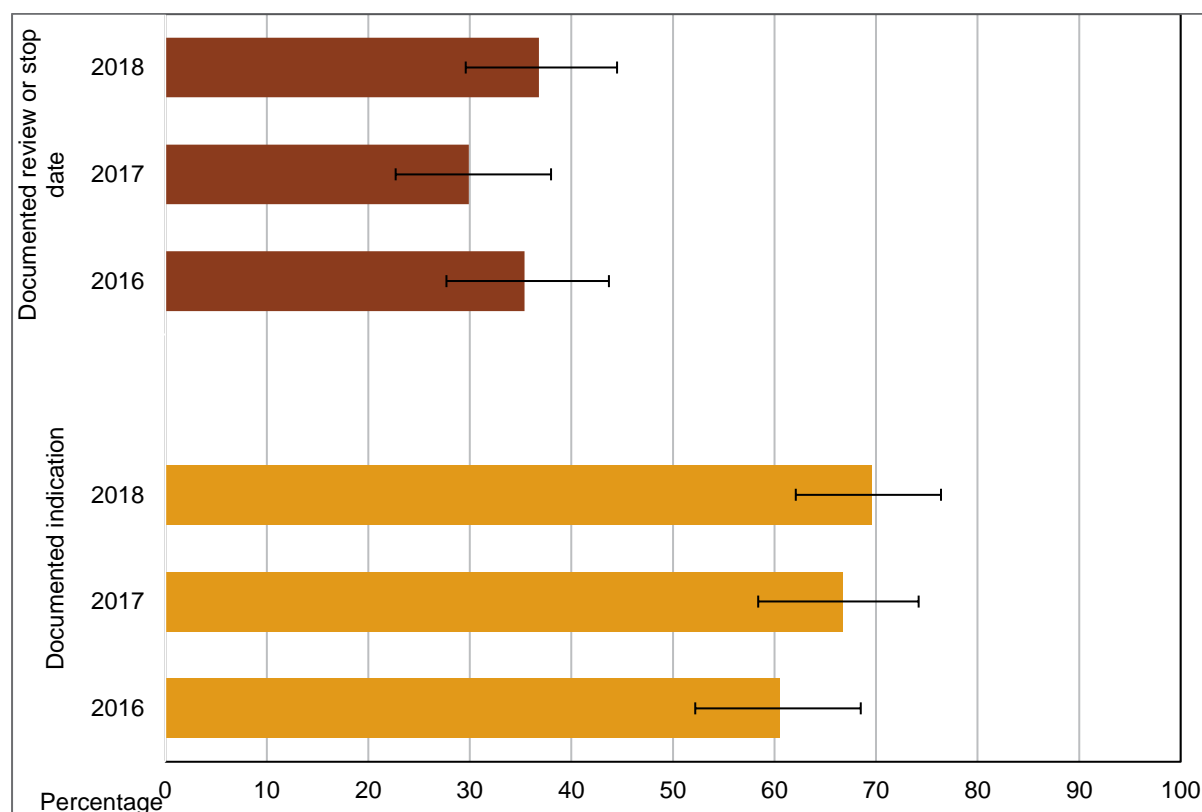
Prescriptions for prn administration generally do not have review dates documented.

Table 12: Key quality indicators for all participating facilities, AC NAPS contributors, 2016–2018

Indicator	2016			2017			2018		
	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI
Indication for prescribing an antimicrobial									
Documented	1,111	74.4	72.1–76.6	939	76.3	73.8–78.6	1,754	74.9	73.1–76.7
Not documented	382	25.6	23.4–27.9	292	23.7	21.4–26.2	587	25.1	23.3–26.9
Review or stop date									
Documented	609	40.8	38.3–43.3	547	44.4	41.6–47.3	961	41.1	39.0–43.1
Not documented	884	59.2	56.7–61.7	784	55.6	60.9–66.4	1,380	58.9	56.9–61.0
Total	1,493	-		1,231	-		2,341	-	

For those facilities that have participated annually from 2016 to 2018 (n = 31), there has been an improvement in documentation of the indication for prescribing an antimicrobial; documentation of the review or stop date has not changed significantly (Figure 3).

Figure 3: Key quality indicators for facilities that have participated for three years, percentage and confidence intervals, AC NAPS contributors, 2016–2018*



Source: Antimicrobials form

* See Table A4.3 for percentage and confidence interval values

Documentation of the clinical indication for prescribing an antimicrobial and review or stop date was highest in Tasmanian facilities (Table 13).

Table 13: Key quality indicators, by state, remoteness and provider type, AC NAPS contributors, 2016–2018

		No. of prescriptions			Clinical indication documented (%)			Review or stop date documented (%)		
		2016	2017	2018	2016	2017	2018	2016	2017	2018
State and Territory	ACT	-	-	31	-	-	67.7	-	-	58.1
	NSW	237	136	182	77.6	67.6	81.3	46.0	41.9	51.1
	NT	-	-	31	-	-	67.7	-	-	45.2
	QLD	276	147	532	77.9	87.8	75.2	35.1	44.9	27.4
	SA	92	155	376	70.7	79.4	76.9	50.0	61.3	48.7
	TAS	48	15	16	68.8	100.0	93.8	45.8	73.3	100.0
	VIC	656	639	857	73.3	71.5	71.3	37.8	40.4	42.7
	WA	184	139	316	72.3	88.5	78.8	47.3	43.2	39.6
Remoteness	Major cities	777	543	1417	75.4	81.2	75.5	42.2	51.0	41.2
	Inner regional	475	482	571	70.5	77.2	76.5	39.6	43.8	46.2
	Outer regional	208	171	313	76.9	63.7	70.3	37.5	29.8	31.6
	Remote	27	35	35	92.6	48.6	65.7	33.3	22.9	28.6
	Very remote	6	0	5	83.3	0	80.0	100.0	0	80.0
Provider type	Not for profit	816	548	1412	74.4	82.5	73.3	40.4	49.5	38.7
	For profit	114	54	154	91.2	85.2	93.5	50.0	53.7	61.0
	Government	563	629	775	71.0	70.1	74.2	39.4	39.3	41.5
Total		1,493	1,231	2,341	74.4	76.3	74.9%	40.8	44.4	41.1

Source: Antimicrobials form

In 2018, the majority (n = 1,455, 93.1%) of antimicrobial prescriptions were written by a prescriber (Table 14), which is a small improvement compared with 2016. A very small percentage of prescriptions (n = 64, 4.1%) were given by a telephone or facsimile order. Of those telephone and facsimile prescriptions, half (n = 32) were for residents who were examined by a prescriber within three days of the antimicrobial start date; 40.6% (n = 26) were for residents who were not examined by a prescriber during this time period.

Table 14: Mode of prescription, AC NAPS contributors, 2016–2018*

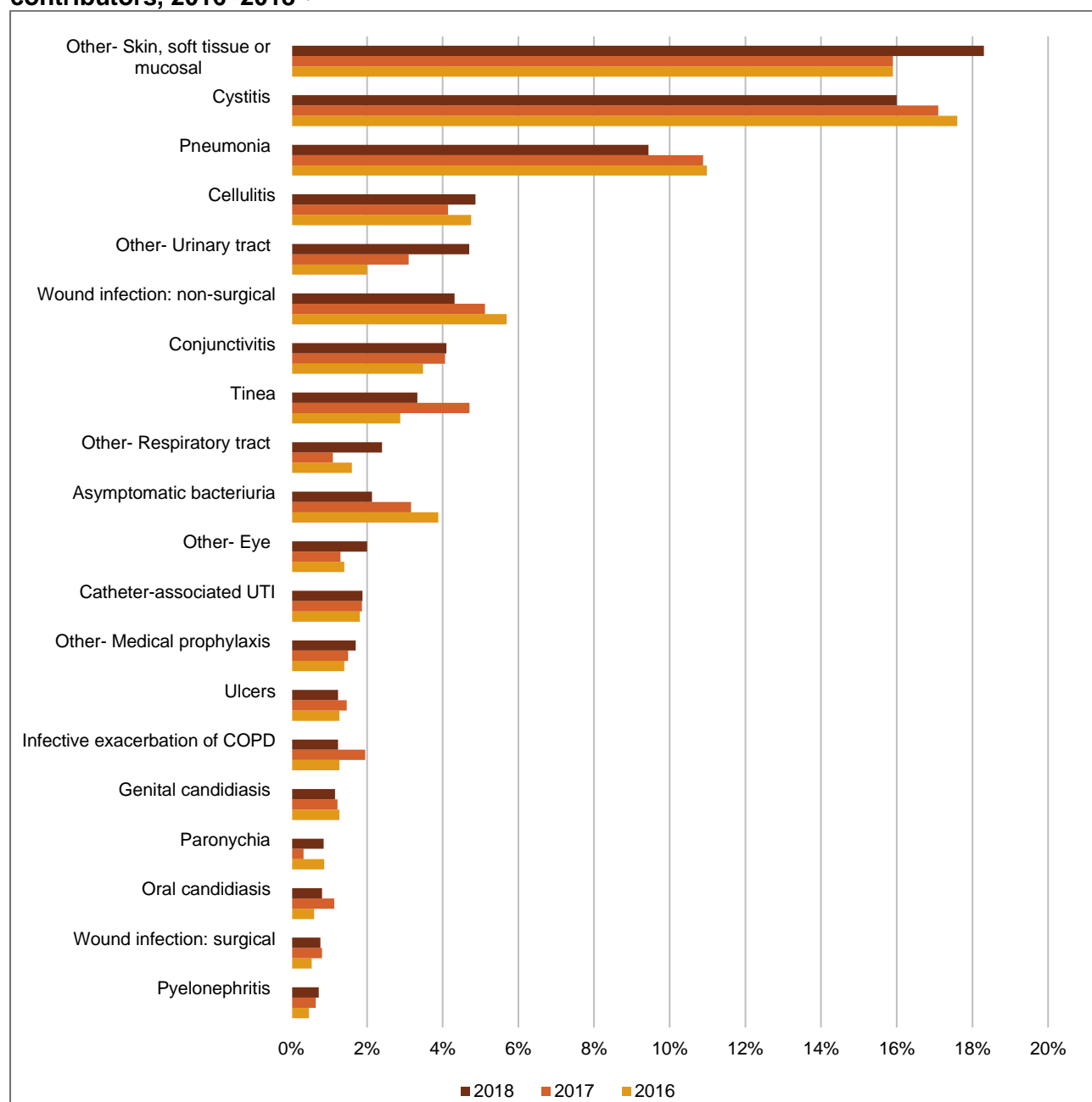
Mode of prescription	2016		2017		2018	
	No.	%	No.	%	No.	%
Written by prescriber	893	90.5	739	86.9	1,455	93.1
Phone or fax order	73	7.4	71	8.4	64	4.1
Unknown	21	2.1	40	4.7	44	2.8
Total	987	100	850	100	1,563	100

*Only prescriptions with a known start date less than six months prior to the survey day were included.

Common indications for prescribing antimicrobials

The top five known indications for prescribing antimicrobials were other – skin, soft tissue or mucosal (n = 428, 18.3%), cystitis (n = 375, 16.0%), pneumonia (n = 221, 9.4%), cellulitis (n = 114, 4.9%) and other – urinary tract (n = 110, 4.7%) (Figure 4). Indication was reported as unknown for a small proportion of prescriptions (n = 150, 6.4%).

Figure 4: Most common indications for antimicrobial prescriptions, AC NAPS contributors, 2016–2018*†



Source: Antimicrobials form

*Indications categorised by surveyors as 'Unknown' are not included

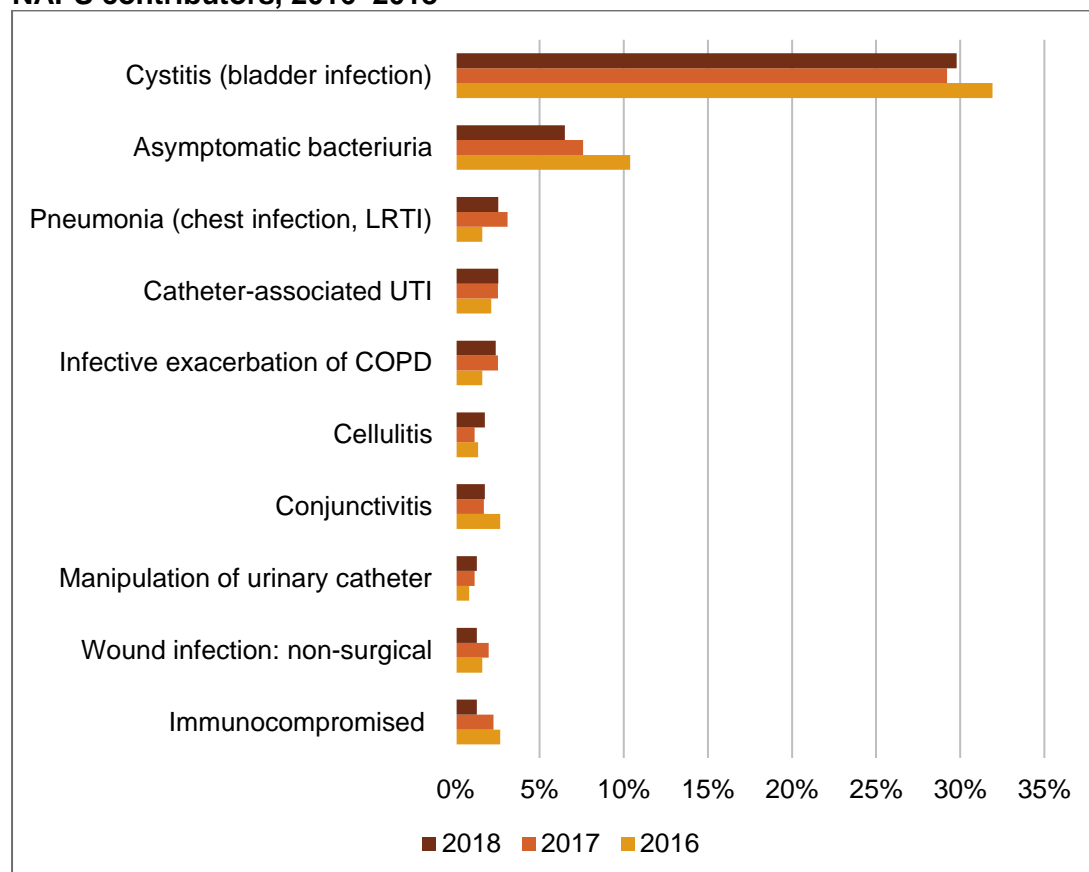
† See Table A4.4 for percentage values

COPD = Chronic obstructive pulmonary disease

Ulcers include pressure, venous and arterial ulcers

For all antimicrobial prescriptions where the indication was known, 73.0% (n = 1,710) were for therapeutic use; the remainder were for prophylaxis. Chest and lower respiratory tract infections were consistently the most frequently reported known indications for prescriptions for therapeutic use: 14.1% (n = 158), 14.1% (n = 123) and 12.0% (n = 205) in 2016, 2017 and 2018 respectively. Cystitis was consistently the most frequently reported known indication for prescriptions for prophylaxis in 2016, 2017 and 2018 (31.9% [n = 120], 29.2% [n = 104] and 29.8% [n = 188] respectively) (Figure 5). Prescriptions for asymptomatic bacteriuria reduced by 46% from 2016 (3.9%) to 2018 (2.1%).

Figure 5: Most common prophylactic indications for antimicrobial prescriptions, AC NAPS contributors, 2016–2018*



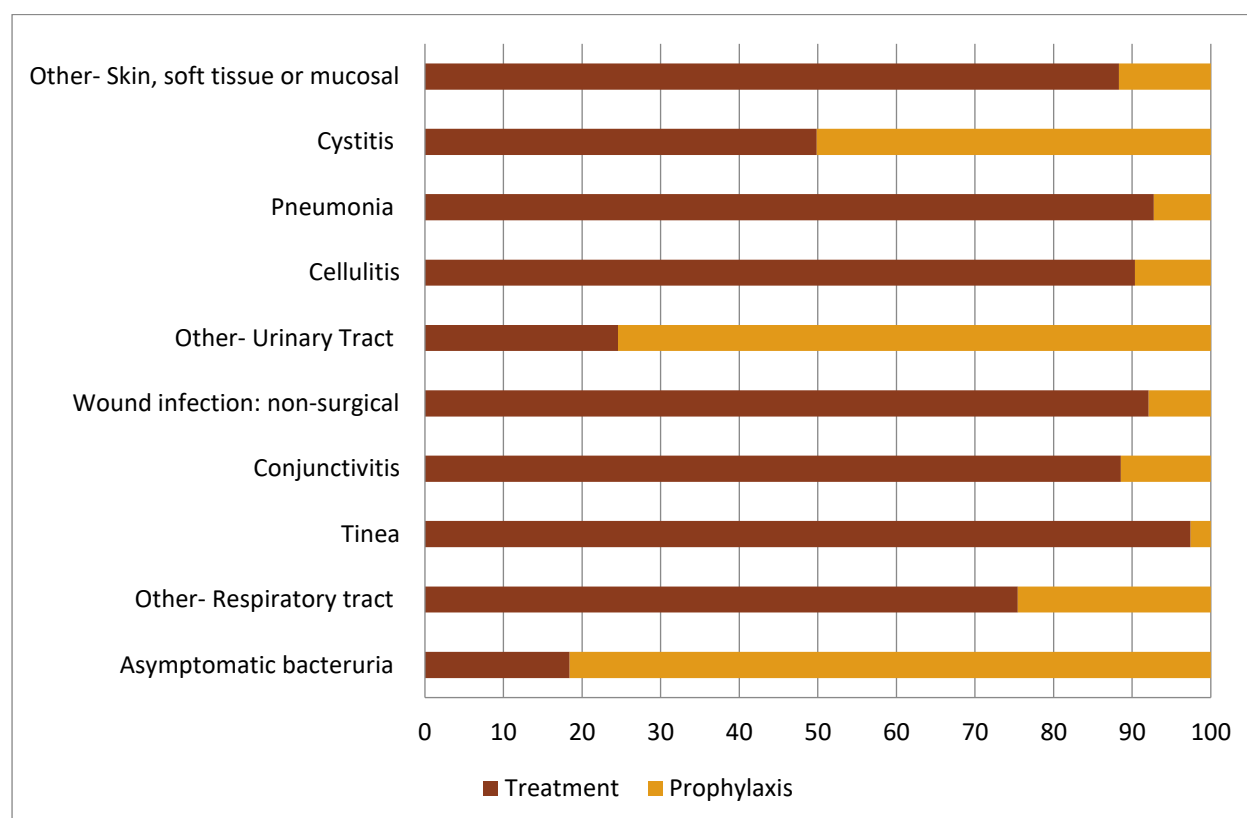
Source: Antimicrobials form, AC NAPS Indications list

* Indications categorised by surveyors as 'Unknown' are not included

Note: LRTI = lower respiratory tract infection; COPD = chronic obstructive pulmonary disease

Therapeutic use of antimicrobials was more common in skin and soft tissue and respiratory tract infections, whilst prophylactic use was more commonly reported for urinary tract indications (Figure 6).

Figure 6: Comparison of therapeutic and prophylactic antimicrobial prescriptions for common indications, AC NAPS contributors, 2018*†



Source: Antimicrobials form

* Indications categorised by surveyors as 'Unknown' are not included

† See Table A4.5 for percentage values

Most commonly prescribed antimicrobials for common indications

The most commonly prescribed antimicrobials for cystitis were cefalexin (44.3%), trimethoprim (20.8%) and hexamine hippurate (13.6%), which is an antibacterial antiseptic agent. Whilst there is insufficient evidence to support the use of hexamine hippurate for urinary prophylaxis, it does not appear to promote development of antimicrobial resistance (AMR), and it accounted for 8.8% of all prescriptions for prophylaxis. The most commonly prescribed antimicrobials for pneumonia were amoxicillin–clavulanic acid (25.8%), amoxicillin (19.9%) and doxycycline (16.7%) (Table 15).

Table 15: Commonly prescribed antimicrobials for cystitis, pneumonia and cellulitis, ACNAPS contributors, 2016–2018*

Cystitis (n = 375)			Pneumonia (n = 221)			Cellulitis [†] (n= 114)		
Antibiotic	No.	%	Antibiotic	No.	%	Antibiotic	No.	%
Cefalexin	166	44.3	Amoxicillin–clavulanic acid	57	25.8	Cefalexin	49	43.0
Trimethoprim	78	20.8	Amoxicillin	44	19.9	Flucloxacillin	22	19.3
Hexamine hippurate	51	13.6	Doxycycline	37	16.7	Dicloxacillin	7	6.1
Nitrofurantoin	20	5.3	Cefalexin	33	14.9	Clindamycin	6	5.3
Amoxicillin	14	3.7	Roxithromycin	20	9.0	Doxycycline	5	4.4

Source: Antimicrobials form

* Only top ten antimicrobials listed.

† Some residents were prescribed more than one antimicrobial for cellulitis.

§ Kenacomb® contains triamcinolone, neomycin, nystatin and gramicidin

Microbiology, urinary investigations and infection signs and/or symptoms

Additional information was collected about microbiology results, urinary investigations and catheter devices, and the presence of signs and/or symptoms of a suspected infection for 1,563 (66.8%) of the total 2,341 antimicrobial prescriptions. For these prescriptions, the start date was known and less than six months prior to the survey day. Approximately one in five were for prophylaxis (n = 278, 17.8%).

At least one microbiological sample was collected for 14.6% (n = 228) of the 1,563 prescriptions within the week prior to the antimicrobial start date. Of the total 234 samples, there were 149 urine (63.7%), 41 swab (17.5%), 15 respiratory virus test (6.4%), eight blood (3.4%), eight stool (3.4%), seven sputum (3.1%) and six other (2.6%) samples taken.

More than one-third (n = 554, 35.4%) of the antimicrobial prescriptions were for residents who had signs and/or symptoms of a suspected infection in the week prior to the antimicrobial start date. When prescriptions for prophylactic purposes were removed, this figure rose to 43.1%. Three quarters (n = 419, 75.6%) of the antimicrobial prescriptions for residents with signs and/or symptoms were for facility-associated infections, representing 26.8% of all prescriptions. This is lower than in previous years in 2016 (36.5%) and 2017 (40%). About 22% (n = 346) of the antimicrobial prescriptions were for residents who had signs and/or symptoms of a McGeer *et al* confirmed infection. Compliance with the McGeer *et al* infection criteria was highest for eye (n = 50, 39.7%) and gastrointestinal infections (n = 2, 25.0%) (Table16).

Table 16: Number and percentage of antimicrobial prescriptions where infection signs and/or symptoms were recorded and McGeer et al criteria were met, by body system, AC NAPS contributors, 2018*

Body system	No. of prescriptions	No. of suspected infections		Facility-associated suspected infections		Suspected infections that met McGeer et al definition	
		No.	%	No.	%	No.	%
Skin or soft tissue	527	198	37.6	152	28.8	97	18.4
Urinary tract	388	98	25.3	79	20.4	14	3.6
Respiratory tract	306	145	47.4	134	43.8	45	14.7
Eye	126	58	46.0	47	37.3	50	39.7
Oral	34	7	20.6	5	14.7	2	5.9
Gastrointestinal tract	8	4	50.0	2	25.0	2	25.0
Other systems	174	44	25.3	-	-	-	-
Total	1,563	554	35.4	419	26.8	346	22.1

Source: Antimicrobials form

* Some prescriptions may have had infection signs and/or symptoms recorded for more than one body system

Discussion

Aged care homes are recognised nationally and internationally as an important community setting for monitoring infections, antimicrobial use and antimicrobial resistance. Residents colonised or infected by multidrug-resistant organisms and high levels of inappropriate antimicrobial use has been reported in these settings.¹⁰⁻¹⁴

In 2018, there was a pleasing increase in the number of AC NAPS contributors from all states and territories, remoteness areas and provider types. This indicates that these aged care facilities recognise AC NAPS as a valuable tool for monitoring the safety of care they provide to residents in relation to antimicrobial use.

The introduction of the new Aged Care Quality Standards, which apply to all aged care services from 1 July 2019, may also have been a factor that influenced participation in AC NAPS. The Standards of specific relevance to antimicrobial use and infections are:

- Standard 3: Personal care and clinical care includes requirements for minimisation of infection-related risks through implementing infection control and prevention precautions; and practices to promote appropriate antibiotic prescribing and use
- Standard 8: Organisational governance notes that where clinical care is provided, the organisation is required to demonstrate antimicrobial stewardship. Data from AC NAPS directly support these standards.¹⁵

It is pleasing to note most facilities that participated in the 2018 AC NAPS appear well positioned to address the issues identified by AC NAPS and the requirements of the Aged Care Quality Standards. These facilities have established teams and designated staff to lead infection prevention and control and AMS programs; have policies and procedures in place; and provide staff with access to antimicrobial prescribing guidelines.

Longitudinal data spanning three years, and improved geographic representativeness of the cohort in 2018, also mean that the survey database can contribute to a greater extent to understanding of the prevalence of infections and antimicrobial use in Australian residential aged care. The very low participation by private aged care homes (2.4%) and not-for-profit aged care homes (9.5%) indicates that there is a need for targeted communication with these sectors to promote the value of the survey as a tool for identifying opportunities for improving the safety of care provided to residents. Higher rates of participation by private and not-for-profit facilities will also increase the representativeness of the AC NAPS cohort and the capacity to generalise AC NAPS findings.

In 2018, the prevalence of residents in AC NAPS contributor facilities who had signs and/or symptoms of at least one suspected infection was 2.9%. One in five (19.9%) suspected infections were not facility-associated; this warrants further investigation as these infections may be attributable to hospital care or community-onset infections prior to admission to the aged care facility. This finding has potential implications for infection prevention and control practices in aged care facilities, and discharge and transfer communication practices.

Whilst not directly comparable to AC NAPS, the 2016 HALT study found that in European long term care facilities, including 'nursing homes', the prevalence of residents with at least one healthcare-associated infection was marginally higher (3.7%) and the prevalence of residents prescribed at least one antimicrobial was lower (4.9%).^{12, 13} As the AC NAPS database and representativeness of the cohort increases further, it may be possible to make meaningful international comparisons.

The collection, for the first time in 2018, of data on prescription of antimicrobials for prn administration, identified a range of opportunities for improvement action. Almost one-fifth (19.0%) of antimicrobials were prescribed for prn administration. A large proportion of these prn prescriptions (94.4%) were for topical antimicrobials – most commonly clotrimazole (65.4%), followed by chloramphenicol (7.9%), miconazole (7.2%) and

Kenacomb®/Otocomb® (6.3%) and mupirocin (3.4%); however, only 12.1% of the prn antimicrobials were administered on the survey day or in the six days prior.

Four of the five most commonly prescribed prn antimicrobials are classified as Schedule 3 medicines by the Therapeutic Goods Administration.¹⁶ This means they are available for purchase from a pharmacy, without a prescription; a pharmacist must personally hand these medicines to the patient. However, they may also be prescribed under the Pharmaceutical Benefits Schedule (PBS) by either a medical practitioner or a nurse practitioner; mupirocin may only be prescribed under the PBS by a medical practitioner.¹⁷ Whilst there are no data on direct purchase of these antimicrobials for use in AC NAPS contributor facilities, it is possible that AC NAPS data understates use of Schedule 3 antimicrobials purchased directly from a pharmacist, and not recorded on the resident medication chart.

In 2018, similar to previous AC NAPS surveys, one-third (36.3%) of antimicrobial prescriptions were for topical use. The adverse impact on antimicrobial resistance of antimicrobials administered via this route is increasing.¹⁸ Whilst topical clotrimazole is indicated for a number of conditions, including mucocutaneous candidiasis, chloramphenicol use is generally restricted to ophthalmic conditions. Prescribing guidelines for clotrimazole generally recommended a duration of two weeks, rather than the duration of use reported by AC NAPS contributors, including 10% of therapeutic prescriptions of clotrimazole continuing for longer than six months.¹⁹ Of note, 8% of all infections with an identifiable indication reported by AC NAPS contributor facilities in 2018 were for eye infections. The use of prn prescriptions may be limiting the capacity for clinical review of antimicrobial use, in addition to the potential risks of prolonged exposure of residents to topical antimicrobials and their use for unconfirmed infections.

About two-thirds (64.6%) of antimicrobial prescriptions reported to AC NAPS in 2018 were for residents without signs and/or symptoms of a suspected infection in the week prior to the antimicrobial start date. Antimicrobial prescriptions were also reported for indications for which they are not recommended; for example, for prophylaxis and treatment of asymptomatic bacteriuria (6.5%).¹⁹ Almost half of cefalexin prescriptions were for prophylaxis (44.2%) comprising one third (33.3%) of all antimicrobial prescriptions for prophylactic indications. Half of these prophylactic cefalexin prescriptions had a duration of greater than six months (51.9%).

A resident with a suspected infection should have samples taken for microbiology testing as clinically indicated, preferably before commencing antimicrobials.²⁰ The 2018 AC NAPS found that only 14.6% of all prescriptions had microbiological samples taken in the week prior to prescription start date. Whilst in many cases microbiological sampling is difficult or not indicated, ensuring that therapy is consistent with microbiological results is becoming increasingly important, particularly in the setting of high rates of AMR in aged care homes. Evidence-based treatment guidelines have recently been expanded to include guidance on initial assessment of residents with suspected UTI and community-associated pneumonia.^{19, 21} Importantly, clinical criteria for suspected UTI are recommended as the basis for treatment, and urine dipstick testing is discouraged in other circumstances.¹⁹

Broad-spectrum agents are known to cause diarrhoea and candidiasis. The use of narrow spectrum antimicrobials in accordance with guidelines, where clinically appropriate, can be expected to reduce the risk of adverse effects for residents, and may have flow on benefits of reducing the need for other antimicrobial uses to treat antibiotic-related complications such as candidiasis and diarrhoea.

The prescribing patterns reported to AC NAPS indicate that there are opportunities to improve the safety of care provided to residents by promoting concordance with national treatment guidelines, which will lead to reductions in use of broad-spectrum antimicrobials. For example, amoxicillin is recommended as the first-line treatment for pneumonia in aged care facility residents rather than amoxicillin–clavulanic acid; dicloxacillin is recommended in cellulitis where susceptible *Staphylococcus aureus* is suspected, rather than cefalexin.¹⁹

Trimethoprim is the recommended first line therapy for uncomplicated cystitis in *Therapeutic Guidelines: Antibiotic* rather than cefalexin. The *Australian Medicines Handbook* also recommends trimethoprim with amoxicillin–clavulanic acid or cefalexin as alternative choices, whilst noting the need to balance the adverse effects of antibiotic therapy and consideration of non-antibacterial therapies such as intravaginal oestrogen in post-menopausal women.²¹

Whilst there was a small improvement in documentation of the indication for prescribing an antimicrobial in facilities that participated in AC NAPS for three consecutive years (2016 to 2018), the indication was not recorded for 25.1% of prescriptions in 2018. The antimicrobial review or stop date was not documented for 58.9% of prescriptions in 2018.

An allergy was documented for 28.3% of the antimicrobial prescriptions in the 2018 AC NAPS. Previous studies have suggested many antimicrobial allergy labels recorded for elderly medical inpatients are not clearly explained.²²

When a resident is prescribed an antimicrobial, the minimum information that should be recorded includes: the indication, drug name, dose, route of administration, intended duration and review plan.²⁰ Documentation of allergies should include a clear description of reaction(s). The use of medication charts that are consistent with the Commission's National Residential Medication Chart will support documentation of these elements.²³

The initial prescription of an antimicrobial should be for the shortest possible duration, consistent with the condition being treated and the expected clinical response. In general, a prescription should be reviewed as soon as possible, at least prior to seven days.¹⁹ This is particularly important for empirical therapy, which is prescription of antimicrobials for an unconfirmed pathogen and its antimicrobial susceptibilities. Promoting routine antimicrobial review processes may assist with reducing duration of use, particularly for topical clotrimazole and cefalexin prescribed for prophylaxis for urinary tract conditions, and switching from broad to narrow spectrum agents where appropriate. *Therapeutic Guidelines: Antibiotic* recommends trimethoprim as the first-line choice for urinary tract conditions, if indicated, for six months duration with subsequent review.

In summary, there are several aspects of the management of antimicrobial prescribing and infections in aged care facilities that should be considered for action to improve the safety of care provided to residents. These include promoting:

- Use of evidence-based infection assessment tools, such as those included in *Therapeutic Guidelines: Antibiotic*
- Implementation of infection prevention and control practices consistent with the Australian Guidelines for the Prevention and Control of Infection in Health Care to reduce the risk of residents acquiring a preventable infection and support appropriate management of infections if they occur²⁴
- Use of microbiological testing to confirm infections and inform antimicrobial treatment choices
- Access to and use of evidence-based guidelines for prescribing antimicrobial treatment to improve appropriateness in relation to choice of agent, duration of use and the volume of topical antimicrobial use
- Use of medication charts that are consistent with the Commission's National Residential Medication Chart to improve documentation for antimicrobial prescriptions
- Routine antimicrobial therapy review, including prescriptions for prophylaxis, prn administration and topical antimicrobial use.

The Commission will support the Aged Care Quality and Safety Commission to promote ongoing surveillance of infections and antimicrobial use, the development and

implementation of effective infection prevention and control and AMS programs and action to improve the safety of care provided to residents of aged care facilities.

Appendix 1: Aged care facility form

Aged Care Home (ACH) name

Survey date

/ /

1. Facility Data

Infection Prevention and Control (IPC)

A multidisciplinary team or committee is established that oversees an IPC program ☐ yes ☐ no

A person who is responsible for coordinating the IPC program is employed. ☐ yes ☐ no

The appointed IC Coordinator has dedicated time for completing assigned tasks. ☐ yes ☐ no

The ACH has IPC policies and procedures that detail requirements for standard and transmission based precautions. ☐ yes ☐ no

Antimicrobial stewardship (AMS)

A person who is responsible for leading and coordinating the AMS component of the IPC program is employed. ☐ yes ☐ no

The ACH has IPC policies and procedures that detail requirements for AMS. ☐ yes ☐ no

Staff that prescribe are easily able to access the following **prescribing guidelines**:

- Therapeutic Guidelines: Antibiotic ☐ yes ☐ no
- Australian Medicines Handbook: Aged Care Companion ☐ yes ☐ no

The ACH follows **endorsed** guidelines for **managing**

- Bronchitis or tracheo- bronchitis ☐ yes ☐ no ☐ unknown
- Cellulitis, soft tissue or wound infections ☐ yes ☐ no ☐ unknown
- Common cold syndrome or pharyngitis ☐ yes ☐ no ☐ unknown
- Conjunctivitis ☐ yes ☐ no ☐ unknown
- Fungal skin infection ☐ yes ☐ no ☐ unknown
- Herpesvirus skin infections ☐ yes ☐ no ☐ unknown
- Influenza ☐ yes ☐ no ☐ unknown
- Oral candidiasis ☐ yes ☐ no ☐ unknown
- Pneumonia ☐ yes ☐ no ☐ unknown
- Scabies ☐ yes ☐ no ☐ unknown
- Urinary tract infections ☐ yes ☐ no ☐ unknown

2. Resident Data

Enter the total number of residents with the following characteristics **on the survey day**

You may wish to use the [Worksheet](#) on the following page to help identify these residents

	Total
Number of residents present	<input type="text"/>
Residents aged > 85 years	<input type="text"/>
Male residents	<input type="text"/>
Residents admitted to hospital in previous 30 days	<input type="text"/>
Residents currently in hospital with a suspected or confirmed infection	<input type="text"/>
Residents with a urinary catheter present on the survey day	<input type="text"/>
Residents that have an antimicrobial prescription on the survey day - Complete an Antimicrobials Form	<input type="text"/>
Residents with signs and/or symptoms of infection on the survey day - Complete an Infections Form	<input type="text"/>

3. Additional Resident Data *(if conducting method 2, see pg.4 of the [User Guide](#))*

Residents prescribed an antimicrobial during the last month (that were ceased prior to the survey day)	- Complete an Antimicrobials Form	<input type="text"/>
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Appendix 2: Antimicrobials form

Antimicrobials Form



Does the resident have an antimicrobial prescription? ☐ no ☐ yes; complete an **Antimicrobials Form** (separate forms required for antimicrobials that have different start dates)

Does the resident have signs and / or symptoms of infection on the survey day? ☐ no ☐ yes; complete an **Infections Form**

1. Demographics	Identification number	Date of birth / age	Gender
	Admitted to hospital within the last 30 days Yes / No		
Allergies and adverse drug reactions to antimicrobials <input type="checkbox"/> nil known <input type="checkbox"/> not documented <input type="checkbox"/> yes; specify drug and nature			

2. Antimicrobials								Initial mode of prescription			Indication documented				
Start date*	Started at this ACH	Still prescribed today	Antimicrobial	Dose	Route	Freq	PRN	Unknown or > 6 months	Written by prescriber	Phone or fax order	Resident examined by a prescriber; within 3 days of start date	Indication documented	Specify documented or presumed indication	Was this for prophylaxis?	Review/stop date documented
/ /											Yes / No / Not applicable				
/ /															
/ /															
/ /															

*If the start date is unable to be determined or if > 6 months, document; 'unknown' or '> 6 months' and do not complete Sections 3, 4 and 5

3. Microbiology ; complete for specimens collected on the antimicrobial start date or in the 6 days prior <input type="checkbox"/> not collected; proceed to section 4 <input type="checkbox"/> collected; complete below and if multiple specimens of the same type, only include the one immediately previous to the start date			4. Urinary investigations and devices		
<input type="checkbox"/> Urine Date collected / / <input type="checkbox"/> final report attached			<input type="checkbox"/> Stool Date collected / / <input type="checkbox"/> final report attached		
<input type="checkbox"/> Sputum Date collected / / <input type="checkbox"/> final report attached			<input type="checkbox"/> Blood Date collected / / <input type="checkbox"/> final report attached		
<input type="checkbox"/> Swab Date collected / / <input type="checkbox"/> final report attached			<input type="checkbox"/> Respiratory virus test Date collected / / <input type="checkbox"/> final report attached		
<input type="checkbox"/> Clostridium difficile test Date collected / / <input type="checkbox"/> final report attached			<input type="checkbox"/> Norovirus test Date collected / / <input type="checkbox"/> final report attached		
<input type="checkbox"/> Other			<input type="checkbox"/> Urinary catheter ; present on antimicrobial start date* or in the 6 days prior <input type="checkbox"/> none <input type="checkbox"/> intermittent (in and out) <input type="checkbox"/> indwelling <input type="checkbox"/> suprapubic <input type="checkbox"/> external <input type="checkbox"/> nephrostomy tube		
			<input type="checkbox"/> Urinary dipstick ; performed on the antimicrobial start date or in the 6 days prior <input type="checkbox"/> not performed <input type="checkbox"/> performed; date / / Nitrite <input type="checkbox"/> negative <input type="checkbox"/> positive <input type="checkbox"/> not recorded Leucocyte esterase <input type="checkbox"/> negative <input type="checkbox"/> 1+ <input type="checkbox"/> 2+ <input type="checkbox"/> 3+ <input type="checkbox"/> not recorded		
* Do not include if the catheter was inserted after the antimicrobial was first administered					
Comments					

5. Signs and symptoms; complete for all new or increasing signs and / or symptoms of suspected or confirmed infections documented on the antimicrobial start date or in the 6 days prior				
5a. Constitutional criteria <input type="checkbox"/> No constitutional criteria identified Fever <input type="checkbox"/> Single oral temperature >37.8°C <input type="checkbox"/> Repeated oral temperature >37.2°C, or rectal temperature >37.5°C <input type="checkbox"/> Single temperature > 1.1°C over baseline from any site <input type="checkbox"/> Chills or rigors Change in mental status from baseline <i>(confusion, forgetfulness, etc.)</i> <input type="checkbox"/> Acute onset (hours to a few days) <input type="checkbox"/> Fluctuating course <input type="checkbox"/> Inattention <input type="checkbox"/> Disorganised thinking or altered level of consciousness Acute functional decline from baseline: <i>(hours to a few days)</i> Tick all relevant: <input type="checkbox"/> Bed mobility <input type="checkbox"/> Transfer <input type="checkbox"/> Locomotion within facility <input type="checkbox"/> Dressing <input type="checkbox"/> Toilet use <input type="checkbox"/> Personal hygiene <input type="checkbox"/> Eating As according to full blood examination results <input type="checkbox"/> White blood cells elevated <i>(WBC, leucocytes, etc.)</i> <input type="checkbox"/> Left shift documented	5b. System criteria; multiple system criteria are possible			
	Urinary tract <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated All urinary tract criteria <input type="checkbox"/> Acute pain on urination <input type="checkbox"/> Acute pain, swelling or tenderness of the testes, epididymis or prostate <input type="checkbox"/> New onset low blood pressure, with no alternate site of infection <input type="checkbox"/> Either acute change in mental status or acute functional decline with no alternate diagnosis <input type="checkbox"/> New onset chest wall pain, back pain or tenderness <input type="checkbox"/> New onset suprapubic pain <input type="checkbox"/> Pus discharging from the urethra or around a catheter <input type="checkbox"/> Blood in urine New or marked increase in: <input type="checkbox"/> incontinence <input type="checkbox"/> urgency <input type="checkbox"/> frequency <input type="checkbox"/> Urinary retention <input type="checkbox"/> Other urinary signs and symptoms	Respiratory tract <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated All respiratory tract criteria <input type="checkbox"/> Runny nose or sneezing <input type="checkbox"/> Stuffy nose <input type="checkbox"/> Sore throat <input type="checkbox"/> Hoarseness <input type="checkbox"/> Pain on swallowing <input type="checkbox"/> Swollen or tender neck glands <input type="checkbox"/> New headache or eye pain <input type="checkbox"/> Myalgia or muscle pain <input type="checkbox"/> Malaise <input type="checkbox"/> Loss of appetite <input type="checkbox"/> New or increased cough <input type="checkbox"/> New or increased sputum <input type="checkbox"/> O ₂ saturation < 94% on room air or a reduction of > 3% from baseline <input type="checkbox"/> New or changed lung abnormalities <input type="checkbox"/> Chest wall pain <input type="checkbox"/> Respiratory rate ≥ 25 breaths per minute <input type="checkbox"/> Chest X-ray showing pneumonia or new infiltrate <input type="checkbox"/> Other respiratory signs and symptoms	Skin or soft tissue <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated Cellulitis*, soft tissue or wound infection <input type="checkbox"/> Pus present at wound, skin or soft tissue site <input type="checkbox"/> Heat <input type="checkbox"/> Redness <input type="checkbox"/> Swelling <input type="checkbox"/> Tenderness or pain <input type="checkbox"/> Serous discharge* <input type="checkbox"/> Unhealthy granulation tissue <input type="checkbox"/> hypergranulation, friable tissue, pocketing* <input type="checkbox"/> Epithelial bridging* <input type="checkbox"/> Increasing unpleasant smell <input type="checkbox"/> Delayed wound healing* <input type="checkbox"/> Increase in wound size or new areas of satellite breakthrough <input type="checkbox"/> Wounds that probe to bone* Herpes simplex or zoster <input type="checkbox"/> Vesicular rash* <input type="checkbox"/> Doctor or laboratory confirmation Fungal skin infection <input type="checkbox"/> Characteristic rash or lesions <input type="checkbox"/> Doctor or laboratory confirmation Scabies* <input type="checkbox"/> Maculopapular and/or itching rash* <input type="checkbox"/> Doctor or laboratory confirmation <input type="checkbox"/> Linkage to laboratory confirmed case of scabies <input type="checkbox"/> Other skin or soft tissue signs and symptoms * See User Guide glossary	Gastrointestinal tract <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated All gastrointestinal tract criteria <input type="checkbox"/> Nausea <input type="checkbox"/> Abdominal pain or tenderness Vomiting <input type="checkbox"/> 1 episode in 24 hours <input type="checkbox"/> 2 or more episodes in 24 hours Diarrhoea <input type="checkbox"/> 1 or 2 episodes in 24 hours <input type="checkbox"/> 3 or more liquid or watery stools above what is normal for the resident within 24 hours <input type="checkbox"/> Pseudomembranous colitis is identified <input type="checkbox"/> Toxic megacolon is identified <input type="checkbox"/> Other gastrointestinal signs and symptoms
	Oral <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated Oral candidiasis <input type="checkbox"/> Presence of raised white patches or plaques in mouth <input type="checkbox"/> Doctor or dental provider confirmation <input type="checkbox"/> Other oral signs and symptoms	Eye <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated Conjunctivitis <input type="checkbox"/> Pus from one or both eyes present > 24 hours <input type="checkbox"/> New or increased conjunctival redness <input type="checkbox"/> Itching or pain > 24 hours <input type="checkbox"/> Other eye signs and symptoms		
	Other infections not listed above			

Aged Care NAPS: Indications list

Site	Indication	Site	Indication
Bone and Joint	Osteomyelitis (bone infection) Prosthetic joint infection (hip/knee replacement) Septic arthritis/ septic bursitis (joint infection) Other	Genital	Genital candidiasis (thrush) Herpes simplex virus (HSV) Genital Herpes Vulvovaginitis (vaginal infection) Other
Cardiovascular System	Endocarditis (heart valve infection) Implantable cardiac device infection e.g. pacemaker) Intravascular prosthesis infection Other	Medical Prophylaxis	Prophylaxis of infection in immunocompromised residents Prophylaxis of infection in residents without a spleen Other
Central Nervous System	Meningitis Other	Respiratory Tract	Asthma: infective exacerbation Bronchiectasis Bronchitis Chronic obstructive pulmonary disease (COPD): infective exacerbation Influenza Pertussis (whooping cough) Pneumonia (chest infection, lower respiratory tract infection) Common cold Other
Oral/ Dental	Dental abscess Gingivitis (gum infection) Herpes simplex virus (HSV) (Cold sores) Oral candidiasis (thrush) Other	Skin, Soft Tissue or Mucosal	Abscess/boils/folliculitis Bite injuries Cellulitis Diabetic infection (including foot) Lice Herpes simplex virus (HSV) Herpes zoster virus (HZV, shingles) Paronychia (fungal nail infection) Rosacea Scabies Skin tear Tinea Ulcers (including pressure, venous and arterial) Wound infection: non-surgical Wound infection: surgical Other
Eye	Blepharitis Conjunctivitis Herpes zoster eye infection (shingles) Stye Other	Systemic	Sepsis (bloodstream infection) Fever/ pyrexia of unknown origin (FUO/PUO) Tuberculosis (TB) Human Immunodeficiency Virus (HIV/ AIDS) Anti-inflammatory Other
Ear, Nose and Throat	Mastoiditis (ear bone infection) Otitis externa (outer ear infection) Otitis media (inner ear infection) Oesophageal candidiasis (thrush) Pharyngitis/tonsillitis (throat/tonsil infection) Sinusitis Other	Urinary Tract	Asymptomatic bacteriuria (No clinical symptoms but bacteria identified in urine) Candiduria (Candida in urine) Catheter associated urinary tract infection (UTI) Manipulation of urinary catheter Prostatitis (prostate infection) Urinary tract infection (UTI): Pyelonephritis (kidney infection) Urinary tract infection (UTI): Cystitis (bladder infection) Other
Gastrointestinal/ abdominal	<i>Clostridium difficile</i> Diverticulitis Gastroenteritis <i>Helicobacter pylori</i> (infected stomach ulcer) Hepatic encephalopathy Hepatitis B virus (HBV) Hepatitis C virus (HCV) Worm infection Other	Other site	

Appendix 3: Infections form

Does the resident have antimicrobial prescription? ☐ no ☐ yes; complete an **Antimicrobials Form** (separate forms required for antimicrobials that have different start dates)

Does the resident have signs and / or symptoms of infection on the survey day? ☐ no ☐ yes; complete an **Infections Form**

1. Demographics	Identification number	Date of birth / age / /	Gender M / F / O	Admitted to hospital within the last 30 days Yes / No
2. Constitutional criteria; completed for all residents with any signs and/or symptoms of a suspected or confirmed infection on the survey day or in the 2 days prior <input type="checkbox"/> No constitutional criteria identified				
Fever <input type="checkbox"/> Single oral temperature > 37.8°C <input type="checkbox"/> Repeated oral temperature > 37.2°C, or rectal temperature > 37.5°C <input type="checkbox"/> Single temperature > 1.1°C over baseline from any site <input type="checkbox"/> Chills or rigors As according to full blood examination results <input type="checkbox"/> White blood cells elevated (WBC, leucocytes, etc.) <input type="checkbox"/> Left shift documented		Change in mental status from baseline (confusion, forgetfulness, etc.) <input type="checkbox"/> Acute onset (hours to a few days) <input type="checkbox"/> Fluctuating course <input type="checkbox"/> Inattention <input type="checkbox"/> Disorganised thinking or altered level of consciousness		Acute functional decline from baseline; (hours to a few days) Tick all relevant: <input type="checkbox"/> Bed mobility <input type="checkbox"/> Transfer <input type="checkbox"/> Locomotion within facility <input type="checkbox"/> Dressing <input type="checkbox"/> Toilet use <input type="checkbox"/> Personal hygiene <input type="checkbox"/> Eating
3. System criteria; complete for all residents with any signs and / or symptoms of a suspected or confirmed infection on the survey day or in the 2 days prior				
Urinary tract <input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated	All urinary tract criteria <input type="checkbox"/> Acute pain on urination <input type="checkbox"/> Acute pain, swelling or tenderness of the testes, epididymis or prostate <input type="checkbox"/> New onset low blood pressure, with no alternate site of infection <input type="checkbox"/> Either acute change in mental status or acute functional decline with no alternate diagnosis <input type="checkbox"/> New onset chest wall or back pain or tenderness <input type="checkbox"/> New onset suprapubic pain <input type="checkbox"/> Pus discharging from the urethra or around a catheter <input type="checkbox"/> Blood in urine		New or marked increase in; <input type="checkbox"/> incontinence <input type="checkbox"/> urgency <input type="checkbox"/> frequency <input type="checkbox"/> Urinary retention <input type="checkbox"/> Other <u>urinary</u> signs and symptoms	Urinary catheter <input type="checkbox"/> none <input type="checkbox"/> intermittent (in and out) <input type="checkbox"/> indwelling <input type="checkbox"/> suprapubic <input type="checkbox"/> external <input type="checkbox"/> nephrostomy tube Urine dipstick <input type="checkbox"/> not performed <input type="checkbox"/> performed; date / / Nitrite <input type="checkbox"/> negative <input type="checkbox"/> positive <input type="checkbox"/> not recorded Leucocyte esterase <input type="checkbox"/> negative <input type="checkbox"/> 1+ <input type="checkbox"/> 2+ <input type="checkbox"/> 3+ <input type="checkbox"/> not recorded Urine specimen <input type="checkbox"/> not collected <input type="checkbox"/> collected Date collected / / <input type="checkbox"/> final report attached



<p style="text-align: center;">Respiratory tract</p> <p><input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated</p>	<p>All respiratory tract criteria</p> <p><input type="checkbox"/> Runny nose or sneezing <input type="checkbox"/> Stuffy nose <input type="checkbox"/> Sore throat <input type="checkbox"/> Hoarseness <input type="checkbox"/> Pain on swallowing <input type="checkbox"/> Swollen or tender neck glands <input type="checkbox"/> New headache or eye pain <input type="checkbox"/> Myalgia or muscle pain <input type="checkbox"/> Malaise</p> <p><input type="checkbox"/> Loss of appetite <input type="checkbox"/> New or increased cough <input type="checkbox"/> New or increased sputum <input type="checkbox"/> O₂ saturation < 94% on room air or a reduction of > 3% from baseline <input type="checkbox"/> New or changed lung abnormalities <input type="checkbox"/> Chest wall pain <input type="checkbox"/> Respiratory rate ≥ 25 breaths per minute <input type="checkbox"/> Chest X-ray showing pneumonia or new infiltrate <input type="checkbox"/> Other respiratory signs and symptoms</p>	<p>Sputum specimen</p> <p><input type="checkbox"/> not collected <input type="checkbox"/> collected Date collected / / <input type="checkbox"/> final report attached</p> <p>Respiratory virus test</p> <p><input type="checkbox"/> not collected <input type="checkbox"/> collected Date collected / / <input type="checkbox"/> final report attached</p>
<p style="text-align: center;">Skin or soft tissue</p> <p><input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated</p>	<p>Cellulitis*, soft tissue or wound infection</p> <p><input type="checkbox"/> Pus present at wound, skin or soft tissue site <input type="checkbox"/> Heat <input type="checkbox"/> Redness <input type="checkbox"/> Swelling <input type="checkbox"/> Tenderness or pain <input type="checkbox"/> Serous discharge* <input type="checkbox"/> Unhealthy granulation tissue* (hypergranulation, friable tissue, pocketing) <input type="checkbox"/> Epithelial bridging* <input type="checkbox"/> Increasing unpleasant smell <input type="checkbox"/> Delayed wound healing* <input type="checkbox"/> Increase in wound size or new areas of satellite breakthrough <input type="checkbox"/> Wounds that probe to bone*</p> <p>Herpes simplex or zoster</p> <p><input type="checkbox"/> Vesicular rash* <input type="checkbox"/> Doctor or laboratory confirmation</p> <p>Fungal skin infection</p> <p><input type="checkbox"/> Characteristic rash or lesions <input type="checkbox"/> Doctor or laboratory confirmation</p> <p>Scabies*</p> <p><input type="checkbox"/> Maculopapular an/or itching rash* <input type="checkbox"/> Doctor or laboratory confirmation <input type="checkbox"/> Linkage to laboratory confirmed scabies</p> <p><input type="checkbox"/> Other skin or soft tissue signs and symptoms</p> <p>* See User Guide Glossary</p>	<p>Swab</p> <p><input type="checkbox"/> not collected <input type="checkbox"/> collected Date collected / / <input type="checkbox"/> final report attached</p>
<p style="text-align: center;">Oral</p> <p><input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated</p>	<p>Oral candidiasis</p> <p><input type="checkbox"/> Presence of raised white patches or plaques in mouth <input type="checkbox"/> Doctor or dental provider confirmation <input type="checkbox"/> Other oral signs and symptoms</p>	
<p style="text-align: center;">Eye</p> <p><input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated</p>	<p>Conjunctivitis</p> <p><input type="checkbox"/> Pus from one or both eyes present > 24 hours <input type="checkbox"/> New or increased conjunctival redness <input type="checkbox"/> Itching or pain > 24 hours <input type="checkbox"/> Other eye signs and symptoms</p>	
<p style="text-align: center;">Other infections not listed above</p> <p><input type="checkbox"/> ACH associated <input type="checkbox"/> Non-ACH associated</p>		

Appendix 4: Additional data on infections and antimicrobials

Table A4.1: Prevalence of infections and antimicrobial use for facilities that have participated all three years and confidence intervals, AC NAPS contributors, 2016–2018*

On survey day	2016			2017			2018			p-value
	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI	
Residents with signs and/or symptoms of least one suspected infection	43	3.9	2.8–5.3	21	2.0	1.3–3.1	31	3.0	2.0–4.3	0.68
Residents prescribed at least one antimicrobial	132	12.0	10.1–14.3	116	11.2	9.3–13.5	144	13.9	11.7–16.4	0.52
Number of residents present	1,097	-	-	1,032	-	-	1,034	-	-	-

* See also Figure 1

Table A4.2: Most commonly prescribed antimicrobials, AC NAPS contributors, 2016–2018*

Antimicrobial	2016	2017	2018
Cefalexin	21.4	19.4%	20.3%
Clotrimazole (T)	17.5	20.8%	19.0%
Chloramphenicol (T)	5.6	5.4%	7.0%
Amoxicillin-clavulanic acid	6.3	5.8%	5.8%
Doxycycline	5.4	5.7%	5.3%
Trimethoprim	6.2	5.8%	5.3%
Amoxicillin	4.6%	6.1%	5.0%
Hexamine hippurate	3.4%	3.2%	4.7%
Miconazole (T)	2.3%	2.0%	3.5%
Kenacomb® (T)	2.5%	2.1%	2.4%
Ciprofloxacin	1.9%	1.7%	2.2%
Flucloxacillin	1.8%	2.1%	2.1%
Mupirocin (T)	1.0%	0.8%	1.7%
Nitrofurantoin	3.0%	3.3%	1.5%
Roxithromycin	2.6%	1.6%	1.4%
Trimethoprim-sulfamethoxazole	2.0%	1.6%	1.2%
Clindamycin	1.4%	1.5%	1.1%
Nystatin (O or T)	1.1%	1.2%	0.9%
Metronidazole	1.7%	0.7%	0.8%
Cefazolin	0.3%	0.2%	0.6%

* See also Figure 2

Table A4.3: Key quality indicators for facilities that have participated all three years, AC NAPS contributors, 2016–2018*

Indicator	2016			2017			2018		
	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI
Clinical indication									
Documented	89	60.5	52.2–68.5	98	66.7	58.4–74.2	119	69.6	62.1–76.4
Not documented	58	39.5	31.5–47.9	49	33.3	25.8–41.6	52	30.4	23.6–37.9
Review or stop date									
Documented	52	35.4	27.7–43.7	44	29.9	22.7–38.0	63	36.8	29.6–44.5
Not documented	95	64.6	56.3–72.3	103	70.1	62.0–77.3	108	63.2	55.5–70.4

* See also Figure 3

Table A4.4: Most common indications for antimicrobial prescriptions, AC NAPS contributors, 2016–2018* †

Indication	2016 (n = 1506)		2017 (n = 1236)		2018 (n = 2341)	
	No	%	No.	%	No.	%
Other- Skin, soft tissue or mucosal	240	15.9	197	15.9	428	18.3
Cystitis	265	17.6	214	17.1	375	16.0
Pneumonia	164	11.0	134	10.9	221	9.4
Cellulitis	71	4.8	51	4.1	114	4.9
Other- Urinary tract	30	2.0	38	3.1	110	4.7
Wound infection: non-surgical	85	5.7	64	5.1	101	4.3
Conjunctivitis	52	3.5	50	4.1	96	4.1
Tinea	43	2.9	59	4.7	78	3.3
Other- Respiratory tract	24	1.6	14	1.1	57	2.4
Asymptomatic bacteriuria	58	3.9	39	3.2	50	2.1
Other- Eye	21	1.4	16	1.3	47	2.0
Catheter-associated UTI	28	1.8	23	1.9	44	1.9
Other- Medical prophylaxis	26	1.4	19	1.5	33	1.7
Genital candidiasis	19	1.3	24	1.2	29	1.2
Infective exacerbation of COPD	19	1.3	18	1.9	29	1.2
Ulcers	19	1.3	15	1.5	27	1.2
Paronychia	13	0.9	4	0.3	20	0.9
Oral candidiasis	9	0.6	14	1.1	19	0.8
Wound infection: surgical	8	0.5	10	0.8	18	0.8
Pyelonephritis	7	0.5	8	0.6	17	0.7

*Indications categorised by surveyors as 'Unknown' are not included.

† See also Figure 5

Table A4.5: Therapeutic and prophylactic antimicrobial prescriptions for common indications, AC NAPS contributors, 2018* †

Indication	Therapeutic		Prophylactic	
	No.	%	No.	%
Other- Skin, soft tissue or mucosal	378	88.3	50	11.7
Pneumonia	205	92.8	16	7.2
Cystitis	187	49.9	188	50.1
Cellulitis	103	90.4	11	9.6
Wound infection: non-surgical	93	92.1	8	7.9
Conjunctivitis	85	88.5	11	11.5
Tinea	76	97.4	2	2.6
Other- Respiratory tract	43	75.4	14	24.6
Asymptomatic bacteriuria	40	18.4	9	81.6
Other- Urinary Tract	27	24.5	83	75.5

*Indications categorised by surveyors as 'Unknown' are not included.

† See also Figure 6

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