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Antimicrobial prescribing practice in Australian hospitals

Results of the 2022 Hospital National Antimicrobial Prescribing Survey

2022

NCAS
National Centre for Antimicrobial Stewardship

HOSPITAL NAPS
National Antimicrobial Prescribing Survey

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Preface

This report is best interpreted when read in conjunction with the National Antimicrobial Prescribing Survey Technical Supplement 2022.

Acknowledgements

Contributing facilities

On behalf of the National Centre for Antimicrobial Stewardship (NCAS) and the Royal Melbourne Hospital (RMH) Guidance Group, we would like to thank all contributing facilities and auditors for their time and effort in collecting and entering the data, in contributing data to this report and to the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System, and for their continued commitment to improving safety and quality across the Australian healthcare system.

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Abbreviations

Abbreviation	Definition
AIHW	Australian Institute of Health and Welfare
AMS	Antimicrobial stewardship
AURA	Antimicrobial Use and Resistance in Australia
COPD	Chronic obstructive pulmonary disease
EMM	Electronic medication management
GEM	Geriatric evaluation and management
Hospital NAPS	Hospital National Antimicrobial Prescribing Survey
NAPS	National Antimicrobial Prescribing Survey
NCAS	National Centre for Antimicrobial Stewardship
RMH	Royal Melbourne Hospital

Summary

The Hospital National Antimicrobial Prescribing Survey (Hospital NAPS) continues to play a pivotal role in the antimicrobial stewardship programs of hospitals across Australia. The survey's focus on the measurement of antimicrobial prescribing quality, combined with clear data visualisation and clinical program support, means that it provides meaningful data for action for all participating facilities.

A total of 411 hospitals participated in the 2022 survey – a number which has remained stable over the last few years. Approximately three-quarters were public hospitals and one-quarter were private hospitals. This represented 42.1% of all eligible Australian hospitals.

Results for key indicators

- **Documentation of indication** has reached a high standard: indications were documented for 85.3% of antimicrobial prescriptions. Hospitals with an electronic medication management (EMM) system had substantially higher rates of documentation (92.3%) compared with non-EMM hospitals (77.5%).
- **Documentation of review and stop date** was steady at 53.7% of prescriptions. Whilst documentation was better in EMM hospitals (54.9%) compared with non-EMM hospitals (45.0%), both are still well below the expected best practice target of 95%.
- Of those audited prescriptions that were for **surgical prophylaxis**, 30.9% extended beyond 24 hours.
- There was a continued improvement in the rate of **non-compliance with prescribing guidelines**, with 24.8% of prescriptions deemed as non-compliant. Although this has consistently improved since 2019, it continues to be an issue. Indications with the highest rates of guideline non-compliance were surgical prophylaxis, cystitis and chronic obstructive pulmonary disease (COPD).
- Approximately three-quarters of all prescriptions were deemed to be **appropriate**. Despite minor fluctuations, this metric has remained unchanged over the years. Indications with the poorest rates of appropriateness were surgical prophylaxis and COPD.

Implications for clinical practice

The steady improvement in documentation rates year on year is an encouraging sign that hospital antimicrobial stewardship (AMS) programs and prescribers attribute importance to continually improving this metric. Nonetheless, documentation of review and stop date remains poor despite this being a fundamental principle for ensuring that prescribed antimicrobials are reviewed in a timely manner to ensure their optimal efficacy and minimise unnecessary treatment. As more hospitals adopt an EMM system, we expect these measures to increase.

Despite the presence of clear national prescribing guidelines, consistently high rates of guideline non-compliance and inappropriateness in the prescribing of antimicrobials for surgical prophylaxis and COPD have persisted throughout multiple years of the NAPS. This suggests there is still considerable work to be done in supporting and educating prescribers to make good prescribing choices for these indications.

Further in-depth analysis, and education of target areas for practice improvement will be incorporated into upcoming clinical circulars which will provide more in-depth analysis into the prescribing of antimicrobials for specific clinical conditions.

1. Introduction

The judicious use of antimicrobials is a key component of good patient care across all health settings. Australia's National Antimicrobial Resistance Strategy has recommended the adoption of antimicrobial stewardship (AMS) programs, with the aim of enhancing patient healthcare outcomes whilst reducing the emergence and spread of antimicrobial resistance.[1]

Now in its 10th year, the Hospital National Antimicrobial Prescribing Survey (Hospital NAPS) has been adopted as an important platform to support the AMS programs in hospitals by facilitating meaningful measurement, reporting and benchmarking of the quality of antimicrobial prescribing. NAPS program staff also continue to provide clinical program support and training for participants. Internationally, it remains the only tool to measure appropriateness of antimicrobial prescribing.

Furthermore, participation in the Hospital NAPS assists health service organisations to demonstrate that they meet the AMS action requirements of the National Safety and Quality Health Service (NSQHS) Standards and the Antimicrobial Stewardship Clinical Care Standard.[2,3]

The Australian Government Department of Health and Aged Care provides funding for the Royal Melbourne Hospital (RMH) Guidance Group and the National Centre for Antimicrobial Stewardship (NCAS) to conduct the Hospital NAPS and contribute data to the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System.[4]

For details on definitions, survey methodology, analysis methodology and considerations for data interpretation, please refer to the National Antimicrobial Prescribing Survey Technical Supplement 2022.[5]
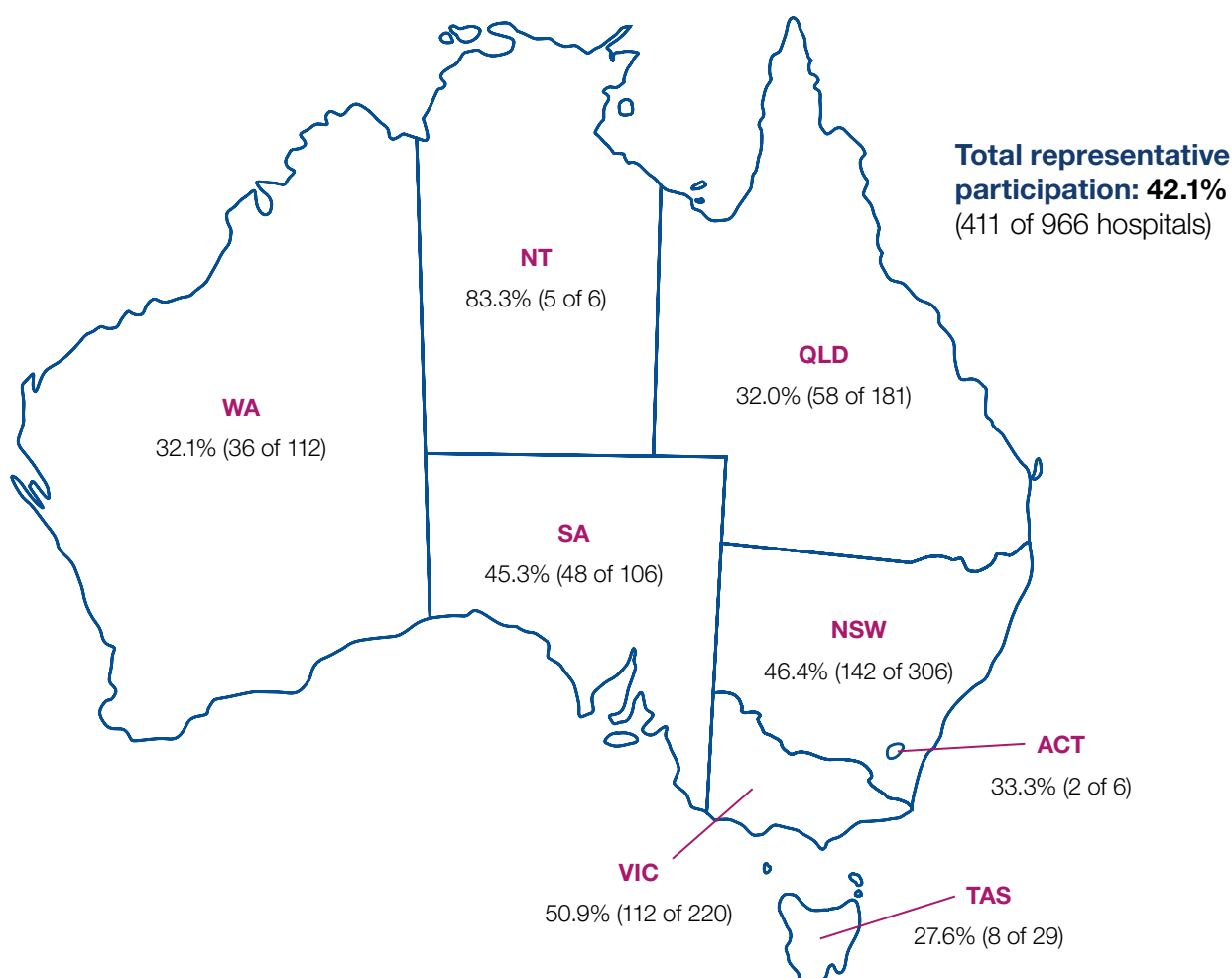
2. Results

2.1 Participation

The Hospital NAPS remains a voluntary program; nonetheless there has been consistent participation by hospitals across all Australian states and territories, remoteness areas[6] and funding types since the program's initiation.

This report analyses the data submitted by 411 hospitals (300 public and 111 private) that met the Hospital NAPS inclusion criteria. Participation has remained steady the last few years with 411 hospitals (295 public, 116 private) in 2021 and 409 hospitals (285 public, 124 private) in 2020.

Overall, 42.1% of all eligible Australian hospitals participated in the survey, with slightly higher participation from public hospitals (44.2%, 300 of 678) compared with private hospitals (38.3%, 111 of 288). All Australian states and territories were represented (Figure 1).

Figure 1: Representative participation of hospitals that contributed to the Hospital NAPS by state and territory, 2022*

Total representative participation: 42.1% (411 of 966 hospitals)

NT 83.3% (5 of 6)

QLD 32.0% (58 of 181)

WA 32.1% (36 of 112)

SA 45.3% (48 of 106)

NSW 46.4% (142 of 306)

ACT 33.3% (2 of 6)

VIC 50.9% (112 of 220)

TAS 27.6% (8 of 29)

* Total numbers of hospitals in each state and territory represent all eligible hospitals in the Australian Institute of Health and Welfare reporting groups for public and private, states and territories, and remoteness classifications.[6,7]

Data from 23,645 patients were submitted, generating 34,105 prescriptions for analysis. The majority of prescriptions were gathered from Victorian and NSW hospitals, which together represented 60.7% of all prescriptions submitted. The majority of auditing was performed in September, October and November, which is consistent with previous years' surveys.

2.2 Key indicators

Results for the key indicators are summarised in Table 1. Encouragingly, the vast majority of antimicrobial prescriptions had an indication documented in the patient medical history. This measure has continued to improve year on year from 72.0% in 2015 to 85.3% in 2022.

As expected, indication documentation was substantially higher in hospitals with an electronic medication management (EMM) system (92.3%) than in those without EMM (77.5%). This is not surprising given that most EMM systems require indication as a mandatory field before the antimicrobial prescription can be confirmed.

Documentation was also higher in public hospitals (88.6%) compared with private hospitals, (71.0%).

Table 1: Hospital NAPS key indicators, for assessable prescriptions, 2022

Key indicator*	Result
Indication documented Best practice target >95%	85.3%
Review or stop date documented Best practice target >95%	53.7%
Surgical prophylaxis >24hrs†	30.9%
Compliant with guidelines^	69.2%
Appropriate#	77.4%

* Refer to Technical Supplement for definitions.[5]

† Where surgical prophylaxis was selected as the indication (n=4,056).

^ Prescriptions for which compliance was assessable (n=27,549). Excludes prescriptions for which guidelines were not available, as well as prescriptions that were 'directed therapy' or 'not assessable'.

Prescriptions for which appropriateness was assessable (n=32,685). Excludes prescriptions deemed to be 'not assessable'.

For a full breakdown of Hospital NAPS key indicators by funding type, state and territory, peer group and remoteness classification, refer to the Appendix.

Documentation of review or stop date

There has been a consistent improvement in the documentation of antimicrobial review or stop date since the measure was first introduced in 2015, when it was documented in only 29.7% of prescriptions. The 2022 result of 53.7% is the highest rate recorded to date. Private hospitals performed better than public hospitals (57.2% and 52.9% respectively).

Interestingly, whilst documentation of review or stop date was better in EMM hospitals (54.9%) compared with non-EMM hospitals (45.0%), these results are still well below the expected best practice level of 95%.

Surgical prophylaxis greater than 24 hours

The point prevalence nature of the Hospital NAPS methodology limits the meaningful interpretation of surgical prophylaxis results.[5] This is because post-operative antimicrobial prophylaxis is not required in the majority of procedures and hence these patients do not meet the inclusion criteria for the Hospital NAPS.

Nonetheless, of those audited prescriptions that were for surgical prophylaxis, 30.9% extended beyond 24 hours. This remains a concern given that it is now widely accepted that administration of antimicrobials for surgical prophylaxis should not continue beyond 24 hours after the procedure.[8]

The Surgical NAPS has a more accurate methodology for capturing surgical antimicrobial prophylaxis data. Further in-depth analyses of the types and durations of post-operative surgical prophylaxis procedures can be found in the 2022 Surgical NAPS report.[9]

Compliance with guidelines

Encouragingly, there has been a continued reduction in the rate of non-compliance with prescribing guidelines for the last few years (Figure 2). The release of the new Therapeutic Guidelines antimicrobial recommendations in 2018[8] saw an associated peak in the rate of non-compliance with guidelines; this is not surprising as it takes time for clinicians to digest new prescribing recommendations and change their prescribing behaviour. A similar pattern was observed after the 2014 update of the Therapeutic Guidelines.

Figure 2: Non-compliance with guidelines for all prescriptions in the Hospital NAPS, 2015–2022*
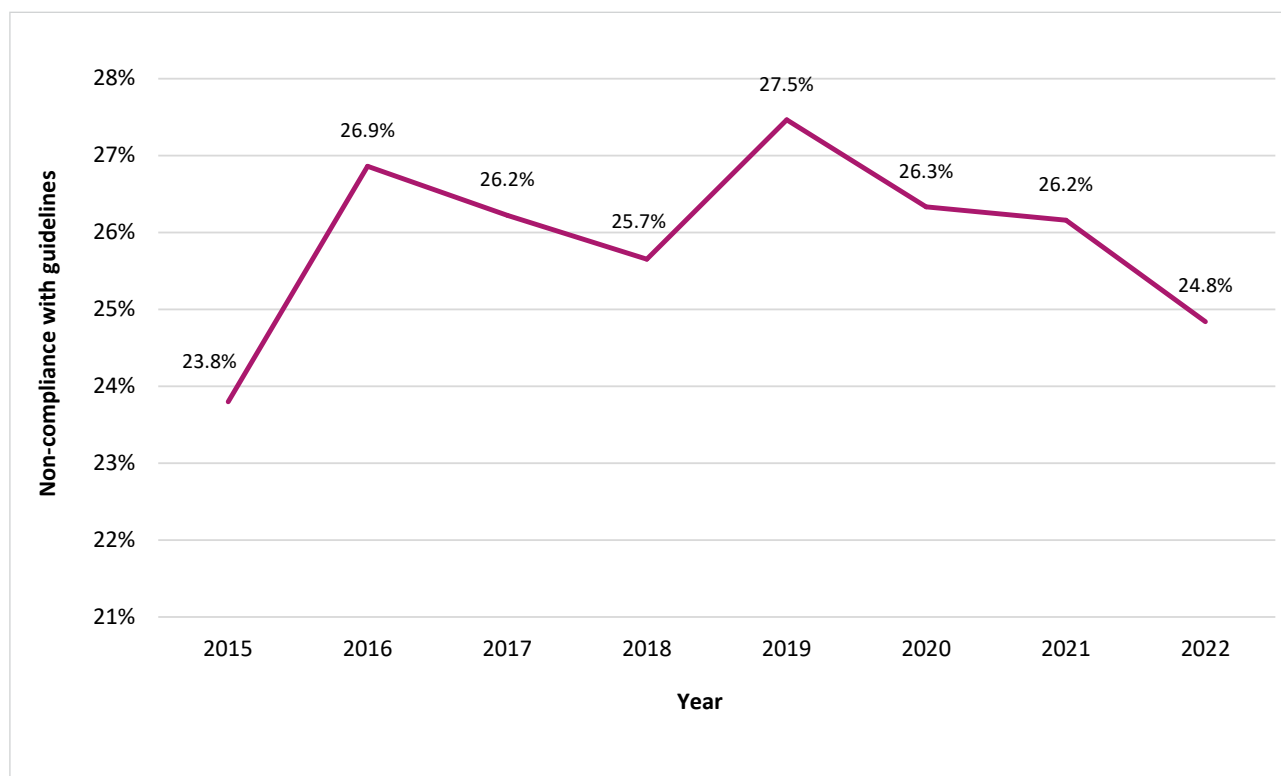
* There may be small differences in results compared with the previously published NAPS reports. This is because participants are free to amend their data at any time and the historical data is reanalysed each year

Appropriateness

The percentage of prescriptions deemed to be appropriate[5] in 2022 was 74.1%, a figure which has essentially remained unchanged over many years. Appropriateness was generally higher in public hospitals compared with private hospitals (76.1% vs 65.7%).

Reasons for inappropriateness

Of all prescriptions, 21.7% were assessed as inappropriate (suboptimal and inadequate) by the auditors. Nearly one-quarter of inappropriate prescriptions (23.3%) were for conditions that do not require any antimicrobial therapy. The remaining reasons for inappropriateness (Table 2) were primarily antimicrobial spectrum being too broad, incorrect dose or frequency, and incorrect duration.

Table 2: **Reasons for inappropriateness for all prescriptions assessed as being inappropriate* in the Hospital NAPS, 2022**

Reason for inappropriateness		Number of prescriptions*
Microbiology mismatch		495 (6.7%)
Allergy mismatch		174 (1.3%)
Indication does *not* require any antimicrobials		1,720 (23.3%)
Indication *does* require antimicrobials	Spectrum too broad	1,954 (34.4%)
	Incorrect dose/frequency	1,626 (28.6%)
	Incorrect duration	1,602 (28.2%)
	Spectrum too narrow	574 (10.1%)
	Incorrect route	360 (6.3%)

* Each prescription is assessed against each quality indicator and thus can be represented in more than one category. There were a total of 7,398 reasons for inappropriateness.

2.3 Most commonly prescribed antimicrobials

Figure 3 shows the 10 most commonly prescribed antimicrobials and their corresponding appropriateness assessment. This distribution of antimicrobials has remained relatively consistent throughout previous NAPS results.

The 5 most commonly prescribed antimicrobials (cefazolin, ceftriaxone, amoxicillin-clavulanic acid, cefalexin and piperacillin–tazobactam) also had amongst the highest rates of inappropriateness (Figure 3). These results are relatively consistent compared with previous years' results.

Figure 3: The 10 most commonly prescribed antimicrobials and associated appropriateness assessment, Hospital NAPS, 2022
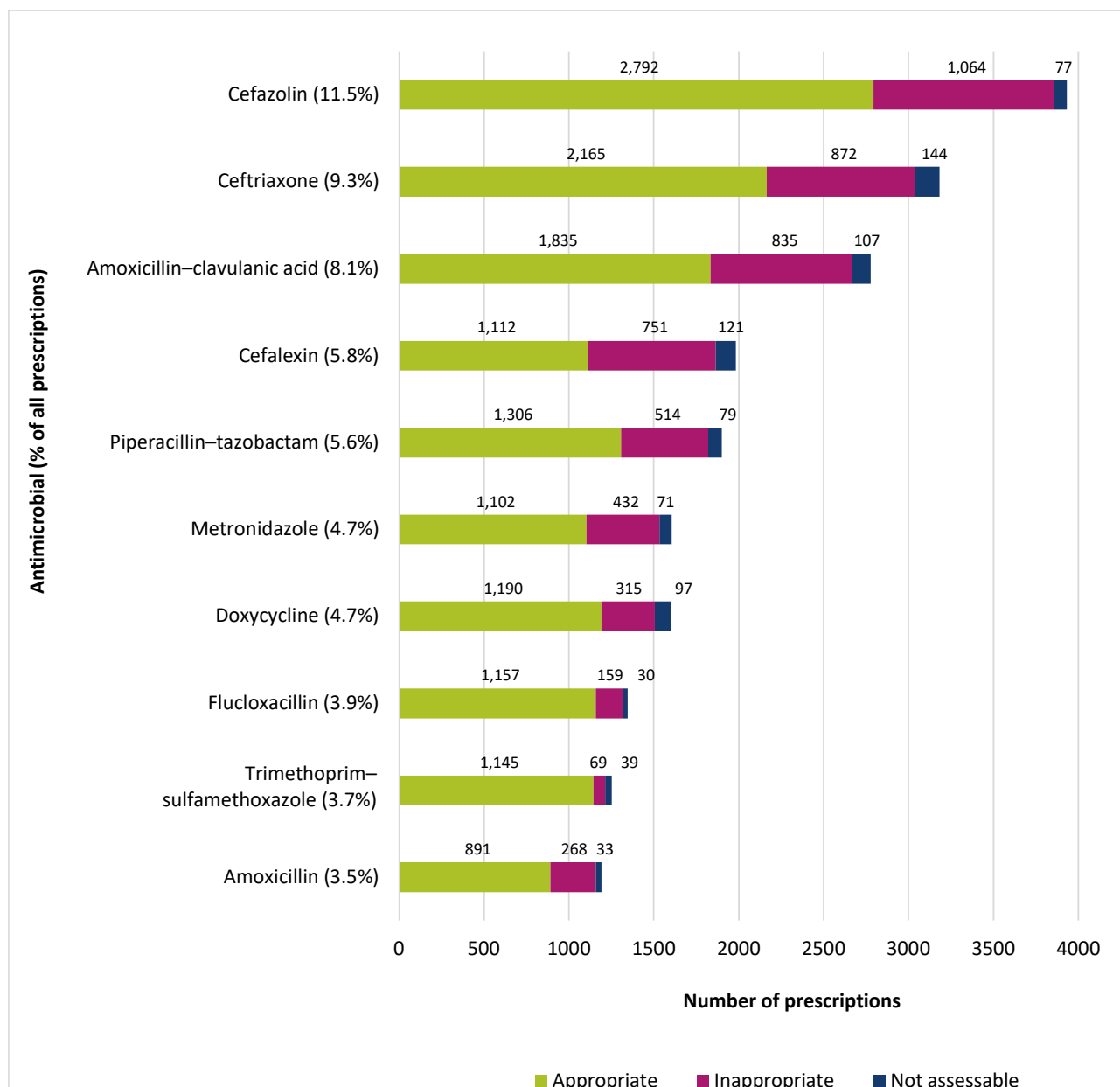
2.4 Most common indications for antimicrobial prescribing

The 10 most common indications for antimicrobial prescribing are shown in Figure 4.

Amongst these, the indications with the most inappropriate prescribing continue to be surgical prophylaxis and chronic obstructive pulmonary disease (COPD).

Surgical prophylaxis is a clinical area with heavily protocolised prescribing, yet inappropriateness remains high. In contrast, other indications with clear prescribing protocols such as medical prophylaxis had very high rates of appropriate prescribing.

Figure 4: The 10 most common indications for antimicrobial prescribing and their associated appropriateness assessment, Hospital NAPS contributors, 2022
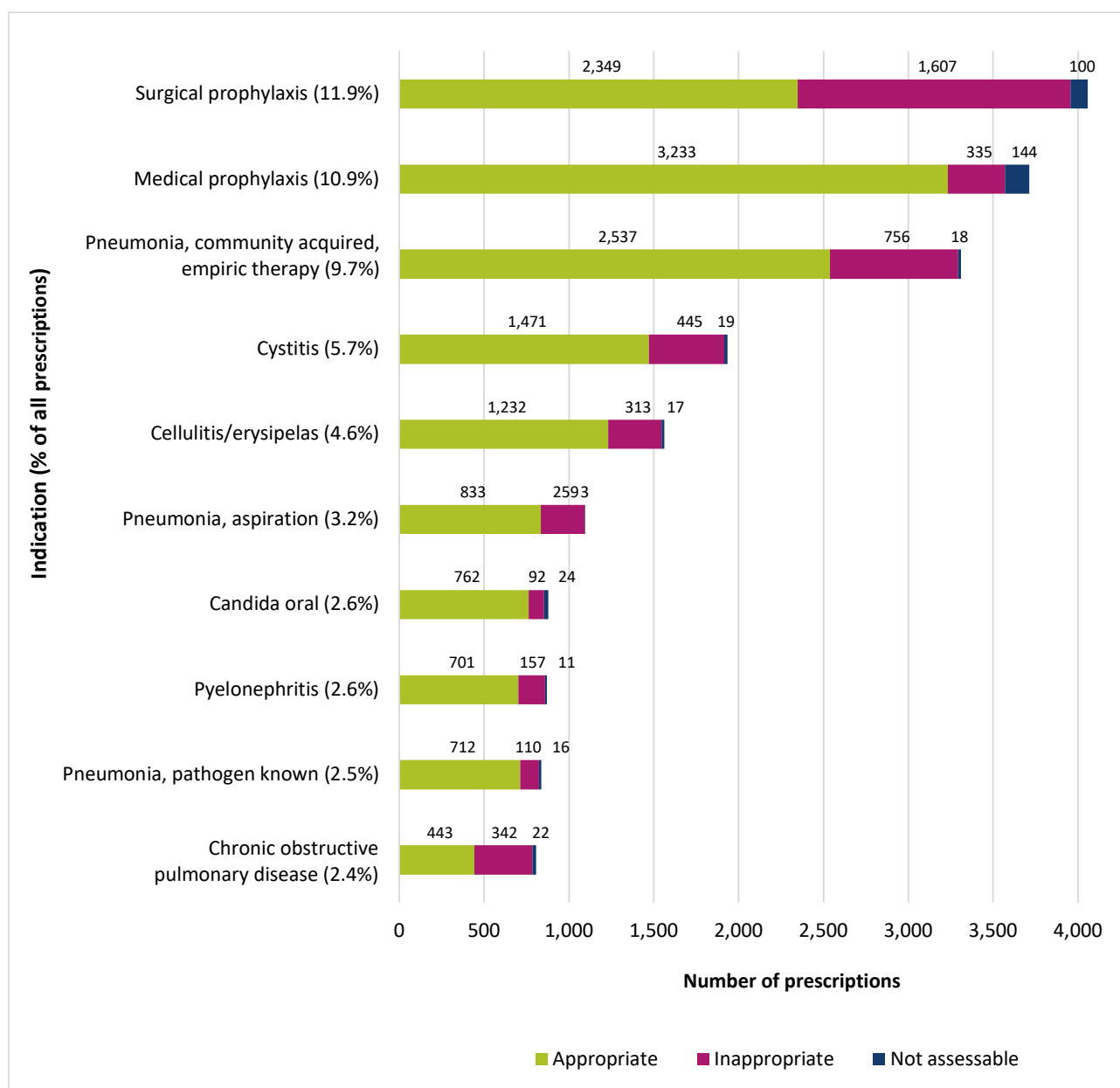
Compliance with guidelines

Indications with the highest rates of guideline non-compliance were COPD, surgical prophylaxis and cystitis (Figure 5). Both COPD and surgical prophylaxis have consistently remained areas of high non-compliance; not surprisingly these were also the indications with the highest rates of inappropriateness (Figure 4). These findings have remained consistent across many years of NAPS surveys despite the existence of clear national guidelines and a substantial revision to the antimicrobial recommendations in the Therapeutic Guidelines in 2019. This suggests there is still considerable work to be done in supporting and educating prescribers in good antimicrobial prescribing.

In contrast, indications such as oral candida, medical prophylaxis and pneumonia with a known pathogen had high levels of guideline-concordant prescribing.

Figure 5: Compliance with guidelines* for the 10 indications^ most commonly requiring antimicrobials in Hospital NAPS contributors, 2022
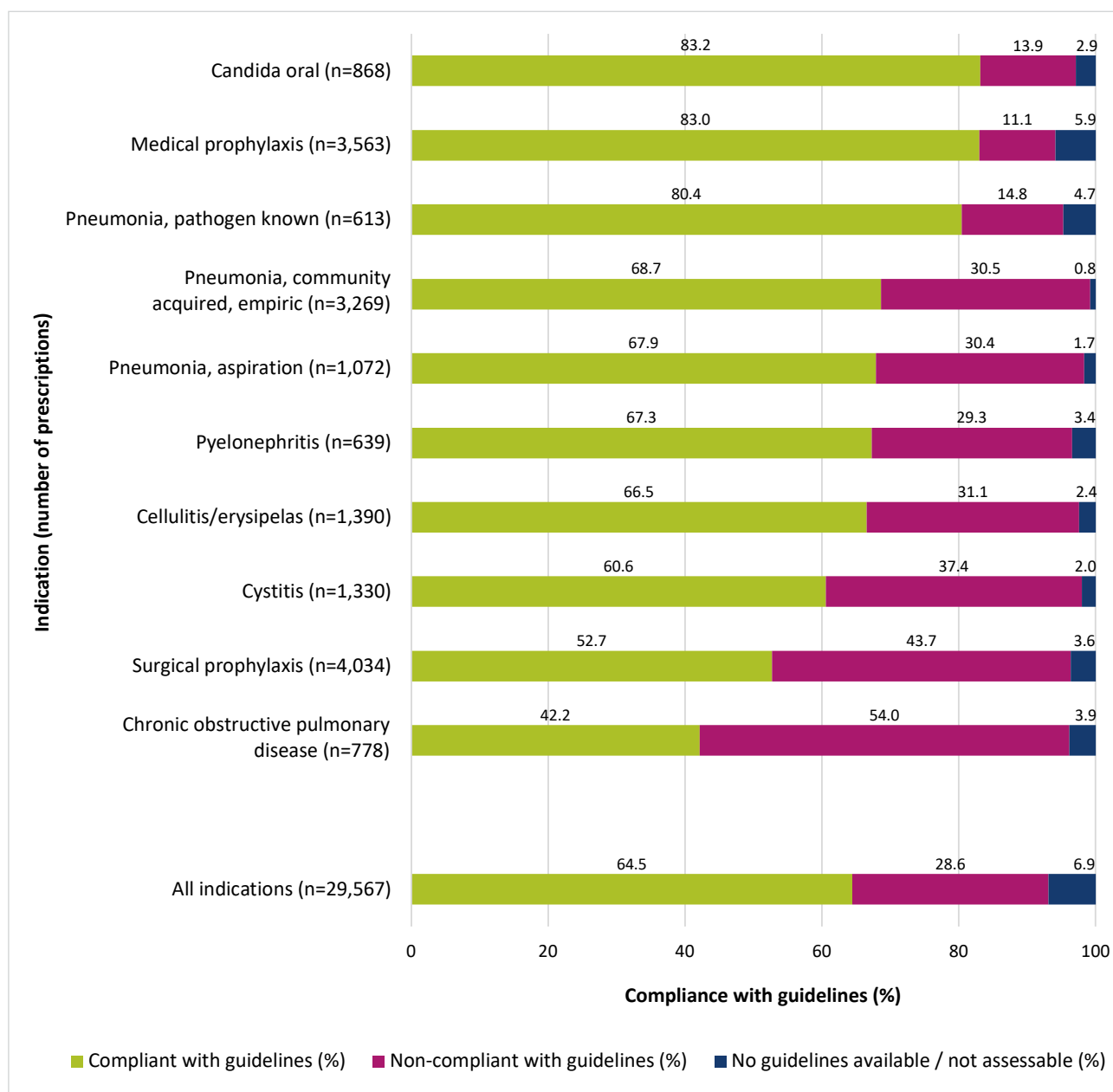
* Excludes prescriptions marked as 'Directed therapy' (n=4,505)

^ Excludes prescriptions where the indication for prescribing was unknown (n=887).

3. Conclusion

Now in its 10th year, the Hospital NAPS continues to have strong adoption by hospitals around Australia. There have been some encouraging signs of continued prescribing improvement, particularly in the areas of documentation of indication and review and stop dates. Similarly, rates of non-compliance with guidelines have fallen over the last several years.

There are some areas of antimicrobial prescribing that continue to be done poorly – namely, the prescribing of antimicrobials for COPD and surgical prophylaxis. Rectifying these issues will require purposeful, large-scale interventions to improve the quality of prescribing.

Appendix

Table A1: Results for key indicators in Hospital NAPS contributors, by state and territory, remoteness area^, AIHW peer group^^ and funding type, 2022

		Number of participating hospitals (n)	Percentage of participating hospitals (%)	Number of prescriptions (n)	Percentage of prescriptions (%)	Indication documented (%)	Review or stop date documented (%)	Surgical prophylaxis >24 hours (%)*
State or territory	ACT	2	0.5	215	0.6	91.6	51.6	46.9
	NSW	142	34.6	11,421	33.5	89.8	58.4	36.9
	NT	5	1.2	460	1.3	97.4	58.7	84.6
	QLD	58	14.1	5,626	16.5	84.8	44.1	31.3
	SA	48	11.7	2,989	8.8	77.2	51.7	17.6
	TAS	8	2.0	681	2.0	71.2	46.7	28.8
	VIC	112	27.3	9,282	27.2	85.6	56.3	32.4
	WA	36	8.8	3,431	10.1	78.6	49.1	21.8
Remoteness^	Major cities	187	45.5	22,378	65.6	85.7	55.6	29.2
	Inner regional	116	28.2	6,026	17.7	84.9	56.2	29.5
	Outer regional	94	22.9	5,157	15.1	83.9	44.2	48.3
	Remote	11	2.7	454	1.3	91.4	34.8	N/A
	Very remote	3	0.7	90	0.3	85.6	51.1	N/A
Public hospital peer group^^	Principal referral	28	6.8	9,267	33.4	90.6	51.3	36.4
	Public acute group A hospitals	53	12.9	7,268	26.2	88.9	52.7	37.1
	Public acute group B hospitals	34	8.3	2,234	8.1	85.8	49.7	34.6
	Public acute group C hospitals	85	20.7	4,765	17.2	82.9	51.3	51.7
	Public acute group D hospitals	52	12.7	1,445	5.2	89.4	54.9	71.4
	Other acute specialised hospitals	1	0.2	100	0.4	98.0	78.0	N/A
	Children's hospitals	6	1.5	1,052	3.8	91.5	54.7	51.2
	Women's and children's hospitals	1	0.2	128	0.5	96.1	35.2	17.6
	Women's hospitals	4	1.0	312	1.1	99.4	71.5	18.7
	Mixed subacute and non-acute hospitals	9	2.2	267	1.0	94.8	78.3	N/A
	Rehabilitation and GEM hospitals	6	1.5	352	1.3	86.9	61.4	N/A
	Very small hospitals	18	4.4	266	1.0	95.8	59.4	N/A
	Psychiatric hospitals	2	0.5	224	0.8	96.0	88.4	N/A
	Unpeered	1	0.2	50	0.2	86.0	58.0	N/A

		Number of participating hospitals (n)	Percentage of participating hospitals (%)	Number of prescriptions (n)	Percentage of prescriptions (%)	Indication documented (%)	Review or stop date documented (%)	Surgical prophylaxis >24 hours (%)*
Private hospital peer group^^	Private acute group A hospitals	18	4.4	2,412	37.8	70.4	47.1	28.2
	Private acute group B hospitals	29	7.1	1,585	24.9	71.6	57.7	32.6
	Private acute group C hospitals	30	7.3	1,169	18.3	63.7	69.2	21.0
	Private acute group D hospitals	16	3.9	589	9.2	72.7	57.6	N/A
	Other acute specialised hospitals	2	0.5	185	2.9	75.1	75.7	3.8
	Private rehabilitation hospitals	10	2.4	295	4.6	87.8	69.5	N/A
	Private acute psychiatric hospitals	4	1	112	1.8	85.7	69.6	N/A
	Women's hospitals	1	0.2	N/A	N/A	N/A	N/A	N/A
	Mixed subacute and non-acute hospitals	1	0.2	N/A	N/A	N/A	N/A	N/A
Funding type	Public	300	73.0	27,730	81.3	88.6	52.9	38.3
	Private	111	27.0	6,375	18.7	71.0	57.2	25.8
Combined national result		**411**	**100.0**	**34,105**	**100.0**	**85.3**	**53.7**	**30.9**

^ Remoteness category as per the Australian Bureau of Statistics.[6]

^^ Australian Institute of Health and Welfare (AIHW).[7]

* Where surgical prophylaxis was selected as the indication (n=4,056).

N/A = Not applicable as there were fewer than 30 prescriptions.

GEM = Geriatric evaluation and management.

Table A2: Compliance with guidelines and prescription appropriateness in Hospital NAPS contributors, by state and territory, remoteness area^, AIHW peer group^^ and funding type, 2022

		% Compliance with guidelines						% Appropriateness				
		Therapeutic guidelines[8] compliant	Local guidelines compliant	Non-compliant	Directed therapy	Not available	Not assessable	Optimal	Adequate	Suboptimal	Inadequate	Not assessable
State or territory	ACT	43.7	5.1	26.5	14.0	8.4	2.3	60.5	10.2	16.7	9.3	3.3
	NSW	46.7	7.3	25.5	16.2	1.9	2.4	59.5	14.3	13.2	10.0	3.1
	NT	50.9	15.4	14.8	17.0	0.9	1.1	70.2	10.7	14.3	4.8	0.0
	QLD	48.8	6.0	24.1	13.5	3.3	4.3	60.7	12.2	12.5	9.3	5.3
	SA	53.3	8.0	26.7	8.8	2.0	1.2	62.6	14.1	12.8	8.3	2.3
	TAS	46.8	6.0	28.0	10.7	4.6	3.8	57.7	16.2	14.8	7.0	4.3
	VIC	47.6	11.3	23.8	9.3	2.4	5.6	58.8	15.0	11.2	9.0	6.0
	WA	38.3	13.2	25.6	17.0	3.1	2.7	62.2	13.3	9.7	11.5	3.3
Remoteness^	Major cities	43.9	11.3	24.8	14.0	2.8	3.2	61.5	12.6	11.9	10.2	3.8
	Inner regional	52.4	4.5	27.1	11.1	1.7	3.3	60.1	13.5	14.3	8.1	4.0
	Outer regional	53.5	3.7	22.1	13.0	2.2	5.4	54.7	19.8	11.3	8.0	6.1
	Remote	53.5	7.3	30.6	5.5	2.2	0.9	57.3	20.9	12.6	8.6	0.7
	Very remote	66.7	1.1	15.6	10.0	1.1	5.6	52.2	24.4	11.1	4.4	7.8

	Therapeutic guidelines[8] compliant	Local guidelines compliant	Non-compliant	Directed therapy	Not available	Not assessable	Optimal	Adequate	Suboptimal	Inadequate	Not assessable
	% Compliance with guidelines						**% Appropriateness**				
Principal referral	42.1	12.5	22.8	17.2	3.1	2.5	64.4	11.9	12.4	8.8	2.5
Public acute group A hospitals	45.9	8.3	25.0	14.6	3.4	2.8	61.5	13.2	13.2	9.0	3.1
Public acute group B hospitals	50.0	5.8	26.1	13.5	2.1	2.5	61.9	14.8	14.2	6.2	2.9
Public acute group C hospitals	58.3	3.5	23.0	8.0	1.3	5.9	54.6	20.7	11.7	6.1	6.8
Public acute group D hospitals	47.1	2.4	32.5	16.5	1.0	0.6	54.6	13.9	19.4	10.5	1.5
Other acute specialised hospitals	60.0	24.0	10.0	5.0	1.0	0.0	82.0	5.0	4.0	8.0	1.0
Children's hospitals	27.7	39.0	10.2	17.5	4.1	1.6	70.0	15.3	7.2	5.1	2.4
Women's and children's hospitals	46.1	27.3	3.1	17.2	5.5	0.8	87.5	4.7	4.7	0.0	3.1
Women's hospitals	43.6	36.5	6.4	5.1	5.4	2.9	84.9	5.8	3.5	3.5	2.2
Mixed subacute and non-acute hospitals	53.9	1.9	15.7	24.7	0.4	3.4	70.8	10.9	8.6	4.9	4.9
Rehabilitation and GEM hospitals	44.0	5.1	29.0	15.6	0.3	6.0	59.4	9.9	15.6	8.8	6.3
Very small hospitals	66.9	2.6	22.2	7.5	0.0	0.8	63.9	20.7	7.1	7.1	1.1
Psychiatric hospitals	83.5	1.8	9.4	0.4	1.3	3.6	75.0	13.4	5.8	1.8	4.0
Unpeered	38.0	16.0	18.0	14.0	0.0	14.0	64.0	0.0	16.0	6.0	14.0

(Public hospital peer group^^)

		% Compliance with guidelines						% Appropriateness				
		Therapeutic guidelines[8] compliant	Local guidelines compliant	Non-compliant	Directed therapy	Not available	Not assessable	Optimal	Adequate	Suboptimal	Inadequate	Not assessable
Private hospital peer group^^	Private acute group A hospitals	43.5	4.1	34.0	9.2	2.6	6.6	49.4	15.7	11.8	14.8	8.4
	Private acute group B hospitals	46.6	4.7	31.3	10.7	1.8	4.9	51.7	14.1	10.0	18.0	6.1
	Private acute group C hospitals	44.8	3.4	37.6	6.4	1.1	6.6	49.7	8.6	12.5	20.8	8.5
	Private acute group D hospitals	51.3	9.0	28.2	6.3	2.2	3.1	54.5	14.1	9.8	16.6	4.9
	Other acute specialised hospitals	77.8	5.9	10.3	5.4	0.0	0.5	85.9	3.2	1.1	9.2	0.5
	Private rehabilitation hospitals	56.9	6.4	18.6	13.2	1.4	3.4	61.7	11.9	13.6	8.1	4.7
	Private acute psychiatric hospitals	61.6	14.3	18.8	3.6	0.0	1.8	60.7	21.4	6.3	8.0	3.6
	Women's hospitals	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mixed subacute and non-acute hospitals	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Funding type	Public	47.0	9.8	23.3	14.2	2.6	3.1	52.4	13.3	10.9	16.3	3.5
	Private	47.2	4.9	31.7	8.7	2.0	5.4	61.9	14.1	12.5	7.9	7.1
Combined national result		**47.0**	**8.9**	**24.8**	**13.2**	**2.5**	**3.5**	**60.2**	**14.0**	**12.2**	**9.5**	**4.2**

^ Remoteness category as per the Australian Bureau of Statistics.[6]

^^ Australian Institute of Health and Welfare.[7]

N/A = Not applicable as there were fewer than 30 prescriptions.

GEM = Geriatric evaluation and management.

References

1. Australian Government. Australia's National Antimicrobial Resistance Strategy: 2020 and beyond. Canberra: Department of Health and Department of Agriculture; 2020.

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