MRSA

Antimicrobial resistance

An NT perspective

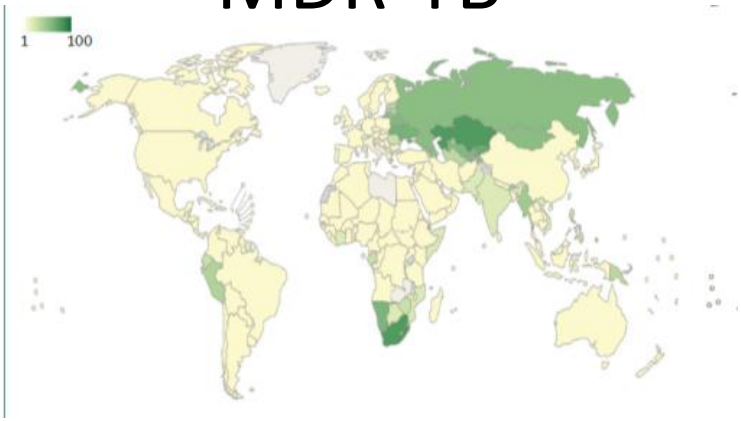
Anna Ralph | HOT NORTH | Menzies | RDH | RHDA


HANDLE
ANTIBIOTICS
WITH CARE


ANTIMICROBIAL
RESISTANCE
A GROWING THREAT

MRSA

MDR-TB



MR E. coli

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CAUSES OF ANTIBIOTIC RESISTANCE

HANDLE ANTIBIOTICS WITH CARE

Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause.

Over-prescribing of antibiotics

Patients not finishing their treatment

Over-use of antibiotics in livestock and fish farming

Poor infection control in hospitals and clinics

Lack of hygiene and poor sanitation

Lack of new antibiotics being developed

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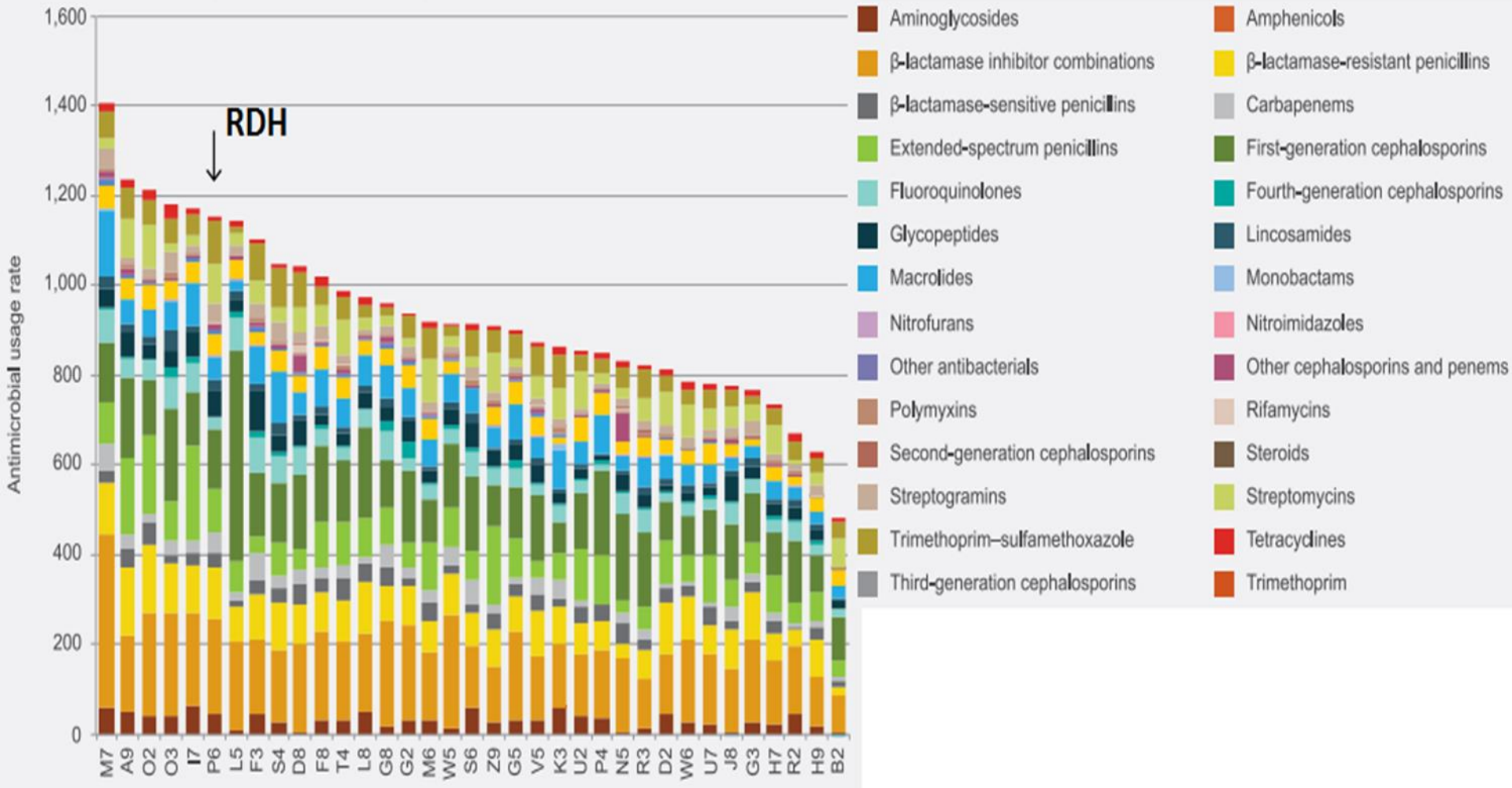
www.who.int/drugresistance

#AntibioticResistance

World Health Organization

Figure A: Annual antimicrobial usage rate (DDD/1,000 OBD) in the Principal Referral Hospital (indicated by an arrow) for total-hospital use



Central Australian Health Service 2016 Antibiogram (% susceptible)

Isolates received at ASH public Lab mid 2015 to Feb 2016*	Number of isolates	ESBL %	AMP C %	Carbapenemases %	Amikacin	Ampicillin	Amoxy -clavulanate	Cefazolin	Ceftriaxone	Ceftazidime	Ciprofloxacin	Clindamycin	Erythromycin	Flucloxacillin	Fusidic acid	Gentamicin	Meropenem	Nitrofurantoin	Penicillin	Piperacillin/tazobactam	Rifampicin	Tobramycin	Trimethoprim	Trimethoprim-SMX	Vancomycin	Teicoplanin	Linezolid
Gram positives																											
Staph aureus	1578																										
MSSA	46.8%					9	100	100	100		99	57	57	100	99	100			9		100			99	100		
nmMRSA	51.5%					0	0	0	0		99	71	71	0	95	100			0		99			81	100		100
MRSA	1.7%					0	0	0	0		78	0	0	0	100	0			0		100			85	100		100
*S. pneumoniae (meningitis)***	108								98										72						100		
*S. pneumoniae (non meningitis)***	108								100				72						99						100		
Enterococcus faecalis	108					99	99											99	99						98	99	100
Enterococcus faecium	64					7	7											14	7						16	97	100

Top End Health Service 2017 Antibiogram (% susceptible)

All isolates received at RDH Microbiology in the six months prior to April 1st 2017	Number of isolates	ESBL %	AMP C %	Carbapenemases %	Amikacin	Ampicillin	Amoxy -clavulanate	Cefazolin	Ceftriaxone	Ceftazidime	Ciprofloxacin	Clindamycin	Erythromycin	Flucloxacillin	Fusidic acid	Gentamicin	Meropenem	Nitrofurantoin	Penicillin	Piperacillin/tazobactam	Rifampicin	Tobramycin	Trimethoprim	Trimethoprim-SMX	Vancomycin	Teicoplanin	Linezolid
Gram positives																											
Staph aureus	2515																										
MSSA	63.0%					9	100	100	100		99	82	81	100	95	100			9		100			99	100		
nmMRSA	34.6%					0	0	0	0		98	77	77	0	92	100			0		99			88	100		100
HA-MRSA	2.4%					0	0	0	0		8	1	1	0	94	0			0		99			0	100		100
*S. pneumoniae (meningitis)**	72								97										73						100		
*S. pneumoniae (non meningitis)**	72								99										99						100		
Enterococcus faecalis	157					100	100											100	98						97	99	100
Enterococcus faecium	72					4	4											55	0						8	99	100

Community-acquired methicillin-resistant *Staphylococcus aureus* in Central Australia

Claire L Stevens,[1] Anna Ralph,[2] James ET McLeod,[3] Malcolm I McDonald[4]

Abstract

To date, there has been scant information about the burden of methicillin-resistant *Staphylococcus aureus* infections in Central Australia. Our aims were to determine the proportion of *Staphylococcus aureus* infections due to methicillin-resistant strains in Central Australia, to characterise resistance to non-beta lactam antibiotics and to correlate findings with available demographic information. We retrospectively reviewed *S. aureus* isolates identified by the Microbiology Laboratory of the Pathology Department, Alice Springs Hospital between September 2005 and February 2006. Multi-resistance was defined as resistance to three or more non-beta lactam antibiotics. We identified the recovery site and extended antibiotic resistance profile of each isolate. Demographic data included place of residence, discharge diagnosis and ethnicity. There were 524 *S. aureus* isolates: 417 (79.6%) methicillin-sensitive *S. aureus*, 104 (19.7%) non-multi-resistant MRSA (nmrMRSA) and 3 (0.7%) multi-resistant MRSA (mrMRSA). MRSA accounted for 7/22 (32%) invasive infections and 91/474 (19.2%) cases of staphylococcal skin infections. Aboriginal people comprised 89 per cent (93/104) of patients with nmrMRSA; 57 per cent lived in remote communities, 21 per cent in suburban Alice Springs, and 18 per cent in Alice Springs Town Camps. Six per cent (6/104) of nmrMRSA were hospital-acquired. Of the nmrMRSA isolates, 57 per cent (59/104) were resistant to erythromycin and 7 per cent (7/104) to fusidic acid. All MRSA isolates were susceptible to co-trimoxazole. In conclusion, Central Australia has high rates of community-acquired nmrMRSA and low rates of multi-resistant MRSA. Erythromycin resistance in *S. aureus* is also common. These findings should prompt the review of antimicrobial prescribing guidelines for the region, especially for treatment of skin and soft tissue infections. *Commun Dis Intell* 2006;30:462–466.

Central Australian Health Service 2016 Antibiogram (% susceptible)

Isolates received at ASH public Lab mid 2015 to Feb 2016*	Number of isolates	ESBL %	AMP C %	Carbapenemases %	Amikacin	Ampicillin	Amoxy -clavulanate	Cefazolin	Ceftriaxone	Ceftazidime	Ciprofloxacin	Clindamycin	Erythromycin	Flucloxacillin	Fusidic acid	Gentamicin	Meropenem	Nitrofurantoin	Penicillin	Piperacillin/tazobactam	Rifampicin	Tobramycin	Trimethoprim	Trimethoprim-SMX	Vancomycin	Teicoplanin	Linezolid
Gram negatives																											
Escherichia coli urine	535	13	13	0	100	35	76	70	87	97	85					85	100	97		92		83	58	68			
other	98	13	9	0	100	34	74	74	87	98	85					85	100			89		81	58	61			
Klebsiella species	286	9	5	0	100		89	84	91	91	97					93	100	35		89		92	87	89			
Proteus mirabilis	79					86	84	76	97		99					100	98			98		100	94	94			
Enterobacter sp	124				100				84	85	100					100	98			84		100		90			
Salmonella sp	80					96	98		100		100						100							97			
Pseudomonas aeruginosa	199				97					91	96					96	93			82		99					
Acinetobacter sp	26				96				58	92	100					100	100			100		96		96			

Top End Health Service 2017 Antibiogram (% susceptible)

All isolates received at RDH Microbiology in the six months prior to April 1st 2017	Number of isolates	ESBL %	AMP C %	Carbapenemases %	Amikacin	Ampicillin	Amoxy -clavulanate	Cefazolin	Ceftriaxone	Ceftazidime	Ciprofloxacin	Clindamycin	Erythromycin	Flucloxacillin	Fusidic acid	Gentamicin	Meropenem	Nitrofurantoin	Penicillin	Piperacillin/tazobactam	Rifampicin	Tobramycin	Trimethoprim	Trimethoprim-SMX	Vancomycin	Teicoplanin	Linezolid
Gram negatives																											
Escherichia coli urine	958	11	6	0	100	40	73	83	89	95	87					89	100	97		92		89	60	65			
other	147	13	12	0	100	38	73	76	87	90	88					92	100			92		91	59	63			
Kleb pneumo sp	281	12	5	0	100		83	82	89	90	91					90	99	27		91		90	80	81			
Proteus mirabilis	80					85	89	81	100	100	99					98	100			100		99	90	91			
Enterobacter sp	126				100				71	74	99					94	99			71		94		89			
Salmonella sp	99					95	100		100		100						100							99			
Pseudomonas aeruginosa	487				97					95	96					97	95			92		99					
Acinetobacter sp	86				100				21	94	96					99	99			99		93		83			
Burkholderia pseudomallei	82									100							100							100			

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Antimicrobial stewardship TEHS

JAMES COOK UNIVERSITY AUSTRALIA | TELETHON KIDS INSTITUTE | THE UNIVERSITY OF SYDNEY | Doherty Institute | SAHMRI South Australian Health & Medical Research Institute | QIMR Berghofer Medical Research Institute | Burnet Institute

Staffing and structure

- One full time AMS pharmacist
- FTE 0.1 Infectious Diseases Physician
- AMS Committee with RDH, KDH, GDH representation
- Restricted antimicrobials system
- Strong culture of Infectious Diseases consultation
- New electronic prescribing support

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AMS rounds, RDH

- Daily ward list produced from electronic prescribing and pathology databases to identify:
  - Any prescription of a restricted antimicrobial
  - Drug-bug mismatch
  - Creatinine-dose mismatch
  - Wrong dose
  - Drug interaction
  - Illogical combination of antibiotics
  - IV antibiotic order continued for >3 days

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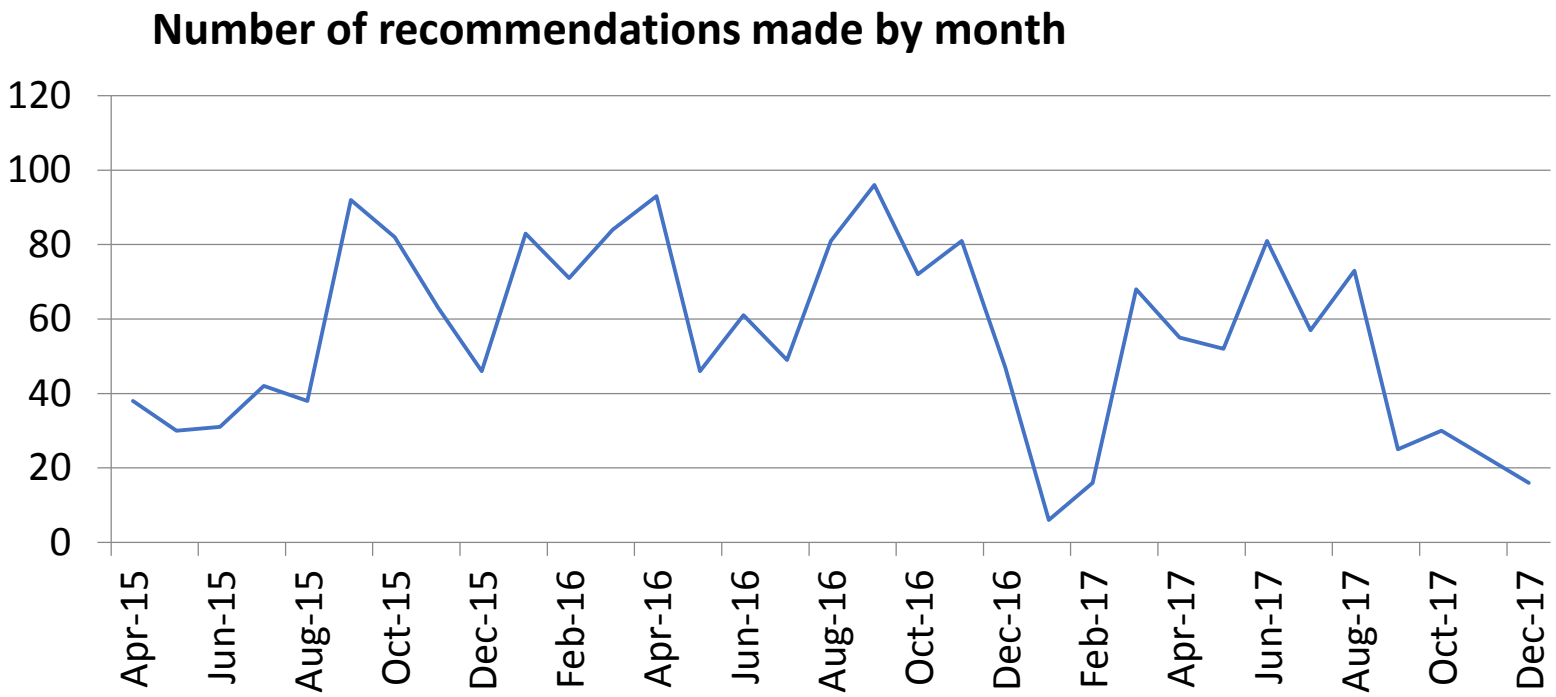
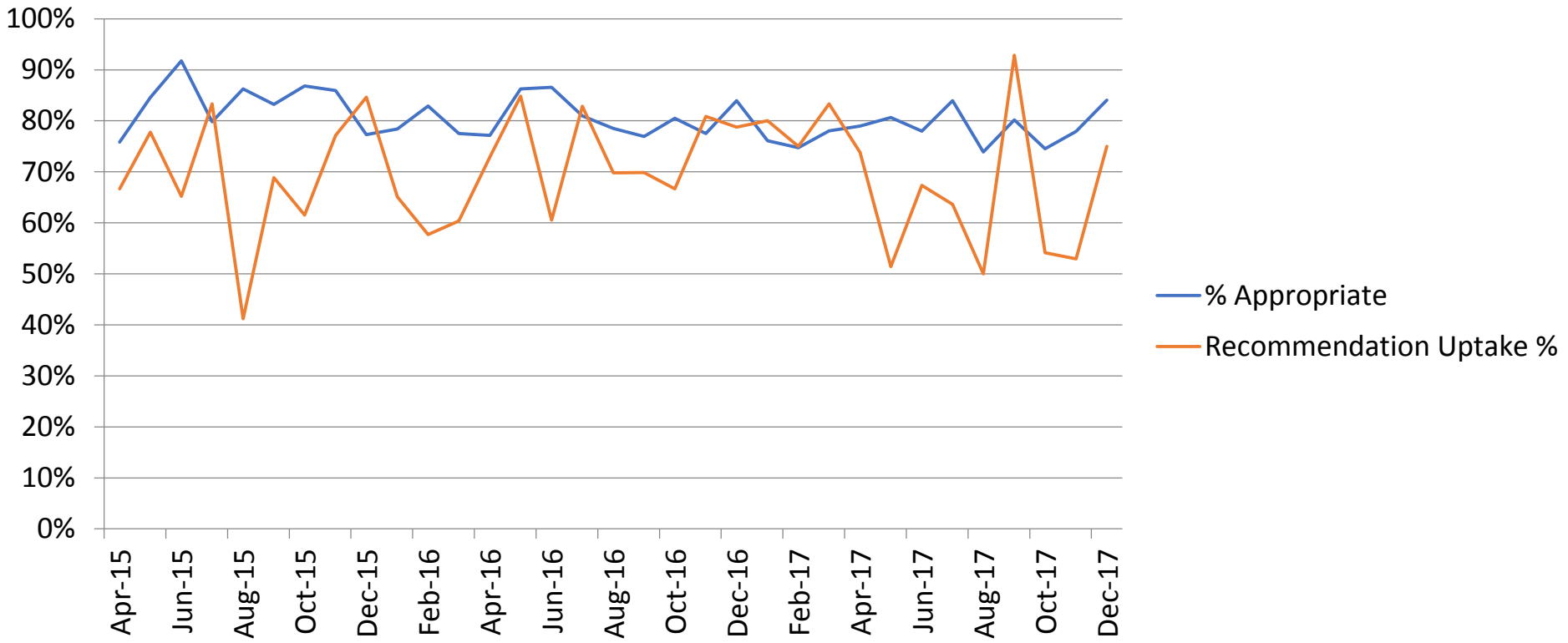

Number of recommendations made by month
120
100
80
60
40
20
0
Apr-15
Jun-15
Aug-15
Oct-15
Dec-15
Feb-16
Apr-16
Jun-16
Aug-16
Oct-16
Dec-16
Feb-17
Apr-17
Jun-17
Aug-17
Oct-17
Dec-17

% Appropriate and % Uptake



- ✓ 80% appropriate prescribing
- ✓ 69% of AMS team recommendations followed

Medical Recommendation Type Summary

Type of Error	Number	Percentage of	Percentage Changed Following Recommendation
IV antibiotic treatment continuing long term for non-severe infection	28	0.26%	72.7%
Overly broad antimicrobial used	19	0.18%	73.7%
Duplication of therapy	18	0.17%	100.0%
Dosage incorrect	12	0.11%	33.3%
Over/underdosage in respect to poor renal/hepatic function	12	0.11%	100.0%
Ceftriaxone used first line for pyelonephritis	11	0.10%	18.2%
Penicillin/cephalosporin not used despite minor reaction or no allergy present to other class	7	0.07%	50.0%
Drug - bug mismatch	7	0.07%	80.0%
TOTAL	114		68.6%

TEAMS - Top End AntiMicrobial Stewardship

Please email any recommendations for improvement (big or small) to john.shanks@nt.gov.

Filter Items

- Antibiogram TEHS
- Ascending cholangitis
- Bites (animal and human)
- Carbuncle/Abscess
- Cellulitis
- Cellulitis of the eye
- Diabetic foot infection
- Dosing nomograms and calculators
- Epiglottitis
- Febrile neutropenia
- Influenza infection

Cellulitis

Is there a purulent focus for infection such as an abscess or carbuncle?

- **Yes**
- **No**

Cellulitis

Does the patient have a penicillin allergy? (See below for details on penicillin allergy severity)

No penicillin allergy

Minor penicillin allergy

Anaphylaxis/life-threatening reaction

History of penicillin allergy or adverse reaction

No penicillin allergy

- This includes non-severe reactions such as nausea and limited diarrhoea
- Such reactions are frequently not replicable or generalizable to the whole class. It is safe to prescribe penicillin class antibiotics (with the patient's knowledge), and if rec

Minor penicillin allergy

- This includes non-severe reactions such as isolated rash.
- There is only a 2-3% chance of cephalosporin allergy in a patient with a previous IgE mediated allergy to penicillin, and probably even less for other types of allergies. Ir to penicillin

Anaphylaxis/life-threatening reaction

- This includes anaphylaxis (see below) and other life-threatening reactions such as Stevens-Johnson Syndrome (SJS), Toxic epidermal necrolysis (TEN), Drug reaction

Minor penicillin allergy

Severe cellulitis treatment

For empirical therapy in a patient with no penicillin allergy, while awaiting the results of cultures and susceptibility use:

Flucloxacillin 2 g (child: 50 mg/kg up to 2 g) IV, 6-hourly

Switch to oral therapy when systemic features have improved (see switch to oral guideline on the PGC for details)

- In addition to treating cellulitis examine patient for tinea of the feet and treat if necessary
- This is a guide for empirical treatment only. It is imperative that cultures are taken prior to administration of antibiotics (where possible) for targeted therapy
- For patients with significant systemic symptoms, assess for necrotising fasciitis or underlying myonecrosis, see the Therapeutic Guidelines section on necrotising skir
- For patients with associated bacteraemia see the severe sepsis section or the severe sepsis: directed therapy section of the Therapeutic Guidelines
- Vancomycin may also be needed in patients with severe sepsis or septic shock. (see the severe cellulitis treatment in a patient with severe penicillin allergy for the do

References:

See section on cellulitis and erysipelas - Antibiotic Expert Groups. Therapeutic guidelines: antibiotic. Version 15. Melbourne: Therapeutic Guidelines Limited; 2014.

Key points

- Rationale use of antibiotics requires intensive, ongoing education and oversight at prescriber and user levels
- Antibiotic consumption is necessarily high in the NT – with scope for improvement
- Knowing the local antibiogram important for informing local guidelines

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