AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

AURA Antimicrobial Use and Resistance in Australia

AURA: A resource for medical practitioners

The World Health Organization has described antimicrobial resistance (AMR) as one of the greatest threats to human and animal health, as well as food safety and agriculture. It threatens the ability to provide safe healthcare in the future. AMR can develop when you use antimicrobials or when you are exposed to AMR organisms in your environment. Unlike other medications, antibiotics can affect not only your patient but other people and the wider community. Antibiotic use inevitably leads to resistance, but overuse of antibiotics has accelerated this process.

A case study: a community-onset infection complicated by emerging AMR

A 32 year old female presents with urinary frequency and dysuria. She has recently returned from Asia where she experienced a mild episode of gastroenteritis, self-medicating with azithromycin from her travel pack. She has also been to India and Greece within the last 9 months. She is prescribed empiric cefalexin after her urine dipstick demonstrated nitrites and leukocytes. Her adequately sampled urine culture demonstrated an inflammatory urine and a multi-resistant *Escherichia coli*. No oral therapies are reported as susceptible. After further microbiological testing, she is admitted to a hospital in the home service for intravenous (IV) ertapenem to treat her cystitis. She suffers an intravenous line soft tissue infection on day 3 of her IV therapy with a boil at her IV insertion site. She was found to have a community-type methicillin-resistant *Staphylococcus aureus* (MRSA) resistant to clindamycin (and ertapenem) on her wound swab.

AURA 2019 data relevant to the case study

Considerable data are available through AURA 2019, this section includes only a snapshot of this data. Find out more about the clinical impact of data from AURA.

Trimethoprim is prescribed less than half the time for urinary tract infection
In 2017, only 44.9% of females older than 18 years of age were prescribed trimethoprim for urinary tract infection in the community.

What is the AURA Surveillance System and why is it important?

Monitoring and reporting on Australia's antimicrobial usage and resistance patterns over time is important to inform clinical policy and practice. In Australia, this is coordinated through the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System.

The AURA National Coordination Unit (NCU) works with stakeholders to inform action at the local, state and territory, and national levels to prevent and contain the spread of AMR. The Third Australian report on antimicrobial use and resistance in human health (AURA 2019) gives the most current and comprehensive picture of AMR in Australia.

This factsheet describes components of the AURA Surveillance System relevant to medical practitioners that monitor resistance and inform actions and response.

Nitrofurantoin is the oral agent with the least resistance in urine samples with *E. coli*
In 2017, nitrofurantoin resistance was 1.1% in urine specimens compared to 8% for cefalexin and 10% for ciprofloxacin.

Resistant gram-negative organisms such as *E.coli* are now commonplace in Australia
21.2% of *E. coli* bloodstream isolates had multiple acquired resistances. The extended spectrum β-lactamase (ESBL) phenotype was present in 12.7% of bloodstream infections nationally in 2016 [AGAR link].

Clindamycin resistance is higher than trimethoprim–sulfamethoxazole resistance in methicillin-susceptible and -resistant *S. aureus* isolates
In 2017, clindamycin resistance in methicillin resistant blood stream *S. aureus* isolates was 29.9%. Resistance was only 9.7% for trimethoprim–sulfamethoxazole. Clindamycin resistance in methicillin-resistant *S. aureus* isolates in aged care homes is 41.2%.

Proportions of methicillin resistance in *S. aureus* vary by state and territory and setting, with the highest figures occurring in rural areas and aged care homes
35.1% of *S. aureus* isolates from aged care homes are methicillin-resistant [AURA 2019]. Regional variation is considerable with the lowest in the ACT (9.5%) and highest in the Northern Territory (42.4%) (Chapter 4).

Individual risk assessment for gram-negative resistance needs to be a core part of clinical assessment
As the frequency of multidrug resistance in gram-negative infections such as cystitis and bloodstream infection is now common, ensuring accurate risk assessment including travel history, recent antibiotic exposure and personal past history of resistance is important to deliver timely and appropriate antibiotics.

Oral empiric clindamycin use for suspected community-associated MRSA infections is now unreliable
Sulfamethoxazole-trimethoprim resistance is less common than clindamycin-resistance in all *S. aureus* infections, particularly in MRSA isolates. When oral therapy is required, sulfamethoxazole-trimethoprim may be a more appropriate empirical choice compared to clindamycin. This may result in a decreased need for the provision of alternate scripts after culture results are returned and possibly representations for failure of therapy.

Rates of methicillin resistance in *S. aureus* in the community and aged care homes vary considerably making accurate MRSA risk assessment more important
Empiric *S. aureus* treatment approaches may be different dependent on where you work. Resistance varies geographically, from the "Top End" to the coastal areas along the eastern seaboard, and also by care setting. The risk of MRSA in a resident of an aged care home (35.1%) is vastly different to a community patient in the ACT (9.5%). You can find setting-specific data in Chapter 4.

Suggested Future Actions

All antimicrobial use can lead to increased resistance. Improving the necessity and appropriateness of all antimicrobial prescriptions is important. Hospital based antimicrobial stewardship teams or local microbiology laboratories will have data on your local MRSA-resistance profiles developed through the AURA Surveillance System and local systems. Talking with them about this data and information will help to inform clinical decisions and local practice.

Ensure Therapeutic Guidelines: Antibiotic[1], or local guidelines endorsed by your health service organisation, are tailored to your local epidemiology by working with your local microbiologists so they are relevant for your setting. Revisiting dosing and durations of antimicrobials such as trimethoprim and nitrofurantoin may be of use.

[1] eTG complete [Internet]. Melbourne: Therapeutic Guidelines Limited; 2019 Apr. Accessed 2019 May 3 < https://tgldcdp.tg.org.au/etgAccess

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Consider opportunities for local clinical updates about risk factor assessment for antimicrobial resistance in different geographical areas and clinical situations. Your Primary Health Network, infectious diseases specialist or microbiologist may be able to assist.

Further Information

AURA Surveillance System https://www.safetyandquality.gov.au/AURA

Preventing and Controlling Healthcare-Associated Infection Standard https://www.nationalstandards.safetyandquality.gov.au/3.-healthcare-associated-infection/antimicrobial-stewardship

AMS - Antimicrobial Stewardship https://www.safetyandquality.gov.au/HAI/AMS

Contact AURA@safetyandquality.gov.au with enquiries.

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