



Antimicrobial Stewardship: Insights from Paediatrics, Intensive Care, Emergency Medicine, and Dental Practice

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ANTIMICROBIAL stewardship (AMS) was a key focus at the 33rd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), which took place both virtually and in-person in Copenhagen, Denmark, between the 15th–18th April 2023. This high priority topic was explored during the symposium entitled 'Antimicrobial stewardship in special populations.' In this thought-provoking session, experts shared perspectives on AMS in different patient groups and settings.

ANTIMICROBIAL STEWARDSHIP IN SPECIAL PATIENT POPULATIONS

With the ongoing threat of antimicrobial resistance, stewardship is of high importance, and the need for AMS strategies to be implemented at local, national, and international levels across all factions of healthcare is becoming increasingly evident. Resistance, combined with a paucity in novel antimicrobials, has seen a shift in focus to optimising antibiotic spectrum, dose, duration, and indication. The special populations discussed in the session were paediatric and dental patients, as well as patients in the intensive care unit (ICU) and emergency department (ED).

Antimicrobial use is often high in special patient populations, and strategies to reduce this is a key facet for AMS. Terhi Tapiainen, Head of Pediatric Infectious Disease, Oulu University Hospital, Finland, and University of Oulu, Finland, discussed paediatric AMS, noting that antimicrobial consumption is high amongst this population. This is largely secondary to respiratory infections, of which acute otitis media is the commonest indication. Child day-care centres are a source for microbial

exposure in young children, and attendance increases acute otitis media risk two- to three-fold.

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Jan De Waele, Department of Intensive Care Medicine, Ghent University Hospital, Belgium, discussed how antibiotic usage in critical care settings is also high. On an average day, 70% of patients in intensive care receive antibiotics. In 30–60% of these cases, antibiotics are inappropriate, unnecessary, or suboptimal, De Waele stated. In addition to this, Teske Schoffelen, Department of Internal Medicine, Division of Infectious Diseases and Radboud Center for Infectious Diseases, Radboud University Medical Center, Nijmegen, the Netherlands, stated that 10–20% of ED attendances are infection-related, and approximately 50% of ED antibiotic prescriptions are unnecessary or inappropriate. These statements highlight the need for AMS strategies and implementation in these settings.



Furthermore, Leanne Teoh, National Health and Medical Council Early Career Fellow, University of Melbourne, Australia, discussed AMS in dentistry. Oral diseases are the most common chronic health condition worldwide, and dental prescribing accounts for 10% of all global antimicrobial prescriptions. Teoh discussed how rates of prophylactic and therapeutic overprescribing can be as high as 80% in some countries, highlighting how dentistry can play a huge role in contributing to global AMS.

Antimicrobial course duration was identified as a target for improving AMS. De Waele discussed findings from the DIANA study,¹ which looked at AMS practices across the world. The results showed that local antimicrobial guidelines were only available in 65% of the 152 hospitals involved, and empirical use of broad-spectrum and combination antibiotic therapy was frequent, but de-escalation was only performed in 16% of cases. The study further found that average antibiotic course duration was approximately 10 days, which is longer than guideline recommendations.

Tapiainen discussed the impact of community-acquired infections on AMS in the paediatric population by presenting data from four randomised controlled trials that evaluated

antibiotic treatment duration for community-acquired pneumonia. These showed that shorter treatment courses were as effective as longer courses. Tapiainen further added that following these results, Finland now recommends a 5-day antibiotic treatment course for community-acquired pneumonia in paediatric outpatient settings. However, trial data regarding antibiotic duration for acute otitis media is less clear.

Tailoring AMS strategies to different settings and patient cohorts was another theme of the session. De Waele discussed how the ICU is a “hotspot for multi-drug resistant pathogens,” which will impact AMS strategies; and explored antimicrobial pharmacokinetics in critical illness, explaining how drug plasma concentrations are altered depending on patient factors, such as abnormal haemodynamics, organ dysfunction, or use of organ support devices. In light of this, De Waele concluded that ICU AMS programmes need to be tailored to the specific requirements of these patients, in whom there are additional factors that need to be considered.

Schoffelen discussed additional considerations for the ED setting, including the rationale for antibiotic prescription, appropriate cultures, and microbiological testing.

These should be performed to aid pathogen identification and antimicrobial sensitivity for de-escalation and directed therapy, given that empirical antibiotics started in ED are often carried on in the community, or by other hospital physicians. Schoffelen further added that these microbiological tests should be followed-up post-ED discharge to ensure that appropriate de-escalation takes place.

Schoffelen further explored whether blood cultures should be performed in the ED setting through data from a systematic literature review. Whilst reiterating that all patients presenting to ED with sepsis should have blood cultures taken, Schoffelen stated that blood cultures may not need to be routinely performed in patients who are not septic and present to the ED with community-acquired pneumonia, urinary tract infection with systemic symptoms, or skin and soft tissue infections, with the exception of special populations, such as those with immune compromise; a diagnosis of diabetes; extensive comorbidities; risk of infections caused by non-standard pathogens; and endovascular devices, pacemakers, or valvular prostheses. Schoffelen highlighted that this is a good practice statement rather than a recommendation, due to the low level of evidence in the literature review, and concluded that there is a need for future clinical trials to help strengthen the evidence on blood culture omission in selected patients.

Improved and rapid diagnostics were identified as an important consideration in the approach towards improving AMS in the future.

Schoffelen stated that rapid diagnostics and biomarkers will aid clinicians in making decisions on whether to commence or withhold antibiotics. Earlier identification of causative pathogens could lead to earlier de-escalation of empirical antibiotics and earlier commencement of targeted antimicrobial therapy, De Waele commented. This would reduce exposure to broad-spectrum antimicrobials, which is key to AMS strategies. Further to this, De Waele discussed that improved diagnostics with the ability to differentiate between infectious disease and infectious disease mimics could help reduce antibiotic consumption, leading to a reduced overall antibiotic exposure. This is not only beneficial from an AMS stance, but could also limit any potential patient harm from unnecessary antibiotic treatment.

CONCLUSION

Antimicrobial resistance is a major concern for not only those working in the field of microbiology and infectious diseases, but for healthcare professionals working across all specialties, and in the community. The speakers highlighted areas that need to be addressed in order to improve AMS across different clinical settings and patient cohorts. The session emphasised the need for these strategies to be adopted in clinical practice globally, and highlighted the challenges with AMS, as well as the considerations for tailoring approaches when developing AMS strategies for different populations. ●

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References

1. De Bus L et al. Antimicrobial de-escalation in the critically ill patient and assessment of clinical cure: the DIANA study. *Intensive Care Med.* 2020;46(7):1404-17.