Editorial Conference Report 5th International One Health Congress, Saskatoon, Canada, 22–25 June 2018

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AMR is a problem wrapped in a dilemma, trapped in a net of challenges.

The International One Health Congress is the biennial flagship conference of the One Health Platform (www.one-healthplatform.com/international-one-health-congress), which describes itself as ‘a strategic forum of stakeholders and a One Health reference network that aims to enhance understanding of and preparedness for the current and future outbreaks of zoonoses, emerging infectious diseases in humans and animals, and antimicrobial resistance, including the ecological and environmental factors that impact on these diseases’.

Despite a relatively small size, the One Health Platform has established its biennial congress as an interdisciplinary meeting point that acts as a magnet for scientists, clinicians, international public health experts and policy makers. Earlier One Health Congresses reflected a convergence of veterinary science, virology and emerging infectious diseases. But when antimicrobial resistance (AMR) gathered momentum as a driver of emerging infectious disease, its proponents in human and animal health decided to give it its own distinct One Health track. This year’s International One Health Congress was the first such meeting with sessions allocated to a dedicated stream from the beginning to the end of the programme. The result was a golden opportunity to set the AMR narrative in the wider context of human, animal and environmental health.

KNOWLEDGE GAPS

Those of us searching for solutions amid the fiendish complexity of AMR were reminded just how difficult it has become by Aline Dimitri of the Canadian Food Inspection Agency who described AMR as a jigsaw puzzle with a changing picture on the box lid. In his discussion of the need to properly quantify AMR, Jorgen Schlundt of Nanyang Technology University, Singapore noted the lack of accurate comparative data on determining contributors and called for better documentation of antimicrobial use and resistance. In an incisive discussion of the economic value of vaccination in reducing AMR, Jonathan Rushton, University of Liverpool, UK picked up the theme of missing data for vaccine costs and impacts on animal diseases, emphasizing that vaccination in animal husbandry is only one part of the value chain whose cost structure is changed by AMR. Measurements such as marginal abatement cost and antibiotic use/AMR burden response curves may be unfamiliar to us now but will become a more prominent part of the debate about priority countermeasures in the near future. Mishal Khan of Chatham House, UK spoke of the impact animal vaccination programmes could have in developing countries on both real and perceived needs for antimicrobial use, subject to supply, demand and policy considerations.

MACHINE LEARNING

Artificial intelligence (AI) in its various forms is beginning to make its mark in the biomedical sciences. AI surfaced under the guise of machine learning, high throughput bioinformatics and data mining in several AMR symposia. For example, Liese van Gompel from Utrecht, the Netherlands used mathematical modelling to analyse multidimensional data from 179 pig farms in nine European countries to understand the impact of antibiotic use on AMR emergence in piglets. In another application of AI, Brooke Watson from the Ecohealth Alliance, USA demonstrated how open access software (metagear R package) could be used to build a flexible global AMR database. In another paper on data mining applications entitled #AMR, Megan Moore, University of Saskatchewan reported the use of natural language analysis in a study of wider community social media engagement with AMR.

AMR SURVEILLANCE

As readers of this journal are well aware, gene sequencing technology is opening up new possibilities in surveillance of AMR, and unravelling its genetic underpinnings. It was good to hear junior scientists at the cutting edge of molecular biology, present their specific focus areas and ideas on aspects of broad AMR surveillance. Northern Europe has been particularly successful in translating science into practice. Carlo Conçalo das Neves from the Norwegian...
Veterinary Institute, reported on government level collaboration among the Nordic countries to share surveillance data and harmonize control measures. In a separate session, he presented preliminary data from Norway on AMR in the gastrointestinal flora of wildlife. With one notable exception, AMR corresponded to human population density. The exception was the Arctic island of Svalbard, where high levels of resistant Gram-negative species may reflect the influx of international tourists. In other parts of Europe where AMR is much commoner in farmed livestock, antibiotics continue to be used for prophylaxis and growth promotion. Liese van Gompel, Utrecht also reported the early results from a nine-nation study of the association between AMR in young pigs and the corresponding pig farmers.

AMR has been officially labelled one of the greatest contemporary challenges to global health. To coin a phrase; it is a problem wrapped in a dilemma, trapped in a net of challenges. Jurgen Schlundt from Singapore spoke passionately of the need to address the interface between AMR and foodborne infections. Scott McEwen, University of Guelph, Canada outlined the international regulatory measures being taken against antimicrobial use in food animals, both to reduce unnecessary antimicrobial use and to completely eliminate use as animal growth promoters. The dispiriting refrain on this issue was too little, too late. Anna George, Murdoch University, Australia, rounded off the science-policy interface session in AMR with a question: what are we doing about the anticipated impact of AMR on international trade?

**DIAGNOSTICS AND THERAPEUTICS**

Coverage of new and emerging AMR countermeasures was thin. Tara Wahab, Public Health Agency of Sweden, showed that inter-laboratory collaboration has started the validation of antimicrobial susceptibility test standards for a group of level 3 pathogens. Robert Skov, MVZ Synlab, Leverkusen, Germany, updated the AMR stream on the ESCMID collaborative study of rapid direct AST on common blood culture isolates. Malcolm Thomas, Agile Sciences, USA stole the show with new 2-aminoimidazole antimicrobial compounds based on a non-toxic marine sponge extract that appears able to reverse acquired AMR in multidrug-resistant bacteria. As with all potential new antimicrobials, there is a long path between discovery and clinical use, but it is clearly a promising start.

**NEXT MEETING**

Plans are in place for the next International One Health Congress in Edinburgh between 15 and 18 June in Edinburgh in 2020. The AMR elephant in the room is expected to demand even more space in the future timetable. Strengthening the medical microbiology component of the AMR stream, particularly in diagnostics and therapeutics, will be a challenge. The organizers will also need to keep their eyes on session integration with the other One Health disciplines and the science-policy interface.

**STATEMENT ON COMPETING INTERESTS**

The author reports no conflict of interest with any of the subject material covered in the above conference report. He attended the congress on a self-funded basis, in not a member of the One Health Alliance, Platform or congress organizing committee, and has not referenced the conference papers on which he was a co-author.

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