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Culture change: the modern diagnosis and management of bacterial infection

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INTRODUCTION

Despite medical advances, infection poses a significant threat to global health. Overuse of antibiotics has allowed the development of resistance and caused iatrogenic disease. In parallel with infections in novel situations (e.g. joint prostheses, vascular access devices), ancient diseases such as leprosy and tuberculosis remain problematic.

This symposium brought together experts in different aspects of infection and antimicrobial management. It was streamed to centres around the world including Sudan, Malaysia and Pakistan, and pertinent questions were posed from these locations.

MOLECULAR DIAGNOSTICS IN BACTERIOLOGY

Professor Kate Gould (Lead Public Health Microbiologist, Public Health England) imagined the near future where point of care blood culture testing could be used. Sequencing of ribosomal RNA can provide limited sensitivity information to guide treatment. Current molecular techniques (e.g. MALDI-TOF and PCR) are still supported by conventional culture and identification but the field is advancing quickly.

Dr Prema Singh (Consultant Microbiologist, Watford General Hospital) showed that 180,000 hip or knee joints are replaced annually in the UK of which 1.2% and 1.7%, respectively, become infected. Of these, 10–30% are culture negative and it is postulated this relates to biofilm formation on the prosthesis. Ultrasonic washing of the removed prosthesis dislodges the biofilm, increasing the yield from culture.[1]

Dr Ian Laurenson (Director, Scottish Mycobacterial Reference Laboratory) told us that, in the UK, 6% of MTB isolates are isoniazid resistant, with MDR in 2%. Molecular techniques (PCR, line probe and genetic testing) to identify resistant strains overestimate rates of resistance in areas of low prevalence. Mycobacterial culture and sensitivity testing remains the gold standard but, in future, whole genome sequencing will allow rapid identification with resistance testing within days of diagnosis .

WHEN ANTIBIOTICS GO WRONG

Macrolides are included in all major guidelines for empirical treatment of community acquired pneumonia. Dr Ian Gould (Consultant Microbiologist, Aberdeen Royal Infirmary) showed their survival benefit has not been demonstrated in randomised controlled trials.[2] In chronic lung disease, macrolides are used for their immunomodulatory properties, and reduction in biofilm formation. Cardiovascular effects (QTc prolongation and plaque destabilisation), and drug interactions are a concern, as are their contribution to rates of *C difficile* and *MRSA*. Further comparison with use of beta-lactams alone is needed to rationalise their use.

SYDNEY WATSON SMITH LECTURE

Professor Ed Kuijper (Professor of Experimental Bacteriology, Leiden University Medical Centre, the Netherlands) explained that while *C difficile* causes 12.1% of hospital acquired infections, it is also a cause of morbidity in the community. In the Leiden study, 1.5% of diarrhoeal samples in patients in the community (no hospital admissions within four weeks), aged over two years, isolated toxigenic *C difficile*. There is complex interaction between agriculture, communities and hospitals contributing to *C difficile* carriage. *C difficile*

infection reduces diversity of the gut microbiota which is restored with faecal transplant.[3]

THE OTHER MYCOBACTERIA

Dr Prith Venkatesan (Consultant in Infectious Diseases, City Hospital, Nottingham) presented cases illustrating infections with rapidly growing mycobacteria (of which abscessus, chelonae and fortuitum are the most relevant). Atypical mycobacteria are ubiquitous in the environment and infections occur in the context of immunosuppression or chronic disease. They are difficult to treat, requiring lengthy courses of combination antibiotics. Person to person transmission has been postulated.[4]

Professor Diana Lockwood (Professor of Tropical Medicine, London School of Hygiene and Tropical Medicine) continued the mycobacterial theme. Between 1995 and 2001, 133 cases of leprosy were diagnosed in the UK, taking an average of 2 years to diagnose with consequent neurological damage. No reliable skin or serological test exists so skin biopsy is the investigation of choice. Treatment with rifampicin and dapsone (paucibacillary disease) or with additional clofazamine (multibacillary disease) is 98% effective.

PRACTICAL ASPECTS OF ANTIBIOTIC MANAGEMENT

Dr Alison Thomson (Senior Lecturer, University of Strathclyde, Glasgow) discussed aminoglycoside use. Accurate dosing and monitoring ensures efficacy with minimal adverse effects. Clinicians should involve pharmacists in difficult dosing decisions for vancomycin and gentamicin.

Dr Morgan Evans (Consultant in Infectious Diseases, Ninewells Hospital, Dundee) presented three cases of infection in pregnancy, which can be associated with worsened outcomes. He highlighted the importance of imaging in unexplained infection, and the need to consider ascending infection from the genital tract. Antibiotic treatment in pregnancy is complicated by altered pharmacokinetics, absorption and teratogenicity.

Dr Claire Mackintosh (Consultant in Infectious Diseases, Edinburgh) showed that vertebral osteomyelitis is increasing in incidence. Thirty percent of cases are associated with endocarditis and 50% are due to Staphylococcus aureus infection. Modic changes seen on MRI are postulated to represent an infectious cause of chronic back pain and some studies have shown positive cultures of extracted discs. One study, using long term antibiotic treatment for chronic back pain with modic changes, demonstrated some symptomatic improvement[5] but robust evidence for this is lacking.

The symposium provided a perspective on current issues in infection worldwide. There was a focus on uncommon or difficult to manage infections and all the presentations were thought-provoking and stimulated audience discussion.

Bacteriological techniques are advancing fast but the effective management of infection still depends on good clinical skills, knowledge of disease patterns and judicious use of antibiotics. The infection specialties have, and will continue to have, a key role in antimicrobial stewardship and this symposium elucidated many of the reasons why this is of paramount importance both now and in the future.

EDUCATION

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