Microbiology Modernisation & Rationalisation - A Professional Challenge

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Full Laboratory Automation

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The views expressed are in a personal but professional capacity & do not necessarily reflect those of the RCSI or Beaumont Hospital, Dublin.

I have recent research collaborations with Steris Corporation, 3M, Pfizer & Cepheid. I have also recently received lecture & other fees from Novartis, AstraZenca, Astellas & Pall Medical.
After general medical training, I have worked & trained in the UK/Ireland in clinical microbiology.

With colleagues, I deliver a pro-active clinically focussed service & I teach & carry out research on healthcare-associated infections (HCAI).

I led in the establishment of the Irish Higher Specialist Training Programme in Clinical Microbiology over 10 years ago.

I am a member of the Professional Affairs Sub-Committee of ESCMID.
Outline of Presentation

1. Role of medically trained microbiologist

2. Changes in microbiology & laboratory medicine

3. Threats & opportunities

4. Qualities & aptitudes required by microbiologists & professionalism
Role of Medically Trained Microbiologists
“We are drowning in information, but starving for knowledge”

John Naisbett, 2002
Microbiology in Europe

Lancet Infect Dis 2011; 11: 408-415
Role of Clinical Microbiology

1. The diagnostic laboratory
2. Clinical input/activities
3. Antibiotic resistance
4. HCAI prevention/outbreak management
5. Antibiotic use
“The roles of clinical microbiologists include the identification of bacterial, viral, fungal and parasitic agents that cause human disease, providing diagnostic and therapeutic support for the clinical management of patients, and preventing the transmission of infectious diseases in both the healthcare system and the community”

Nat Rev Microbiol 2013; 11: 574-585
Microbiology & the Multi-Disciplinary Team

- Public Health
- Scientists/Technologists
- Pharmacy
- Clinical Teams
- Infectious Diseases
- Infection Control Practitioners

Medically Trained Microbiologists
Tasks of an Integrated Clinical Microbiology Service

- Laboratory Diagnosis of Infection
- Clinical Consultation, i.e. diagnosis, treatment, prevention
- Laboratory Management
- Infection Prevention & Control with Hospital Epidemiology
- Public Health Surveillance
- Guideline Development & Implementation
- Education, Teaching, Information Dissemination
- Research & Development
- Civic Role, i.e. member of department, staff in hospital, member of national and international professional groups

Eur J Clin Microbiol Infect Dis 2010; 29: 617-621
Why “Integrated”?

When fulfilling one role, the other roles also contribute & enhance the result
e.g. deciding on which antibiotic to use in one patient is helped by good epidemiology

When one of the roles is badly delivered, that poor quality adversely affects other roles & functions
e.g. not investigating an infected patient appropriately affects the patient & the epidemiological data
Changes in Microbiology & Laboratory Medicine
The Challenges Facing Clinical Microbiology

• Increasing relevance of healthcare-associated infections (HCAI) & antimicrobial resistance (AMR)
• Consumerism – the drive from patients & healthcare staff to improve the quality & safety of patient care
• Growing health care consumption by an ageing population with increasing financial constraints
• Food safety, locally, nationally, throughout the EU & globally
• Climate change – new or re-emerging diseases, e.g. MERS-CoV
Amalgamation & Centralisation

+ greater scope of services, e.g. 24h
+ cost effectiveness
- distance, geographic & service

Accreditation

+ improvement in quality
+ patient reassurance
- demands on time

Automation

+ quicker results
+ safer
- failure to think
Modern training
+ greater comprehensiveness
+ enhances multi-disciplinary team
- less experience

Outsourcing
+ reference laboratories
+ cost effectiveness
- lack of clinical input

On call
+ 24 h seamless service
+ clinical & infection control
- more demanding
Automation

Q. Does it preclude professional/clinical input?

Q. Does it imply the siting of facilities off a hospital site?

Q. Are expert/artificial intelligence systems reliable, e.g. can they cope with no answer?
Does the technology have to meet the needs of medical microbiology or Does medical microbiology have to meet the needs of the technology?
Organisation & Economics

Locate the different clinical microbiology disciplines, i.e. virology, parasitology, molecular microbiology, etc. in separate laboratories (off-site or on-site)

+ Economies of scale → decreased cost per test
  Greater concentration of expertise with specialisation

- Distance from patient, vulnerable transport
  Lack of clinical relevance & integration
  No incentive to eliminate inappropriate testing → increased total costs
The Off-Site High-Throughput Microbiology Laboratory

• Provides regional or national service
• Large volume of specimens
• Often located on a green-field or non-hospital site
• Limited clinical liaison or consultation services
• Transport & IT issues

e.g. National Virus Reference Laboratory, Dublin. Provides routine, e.g. hepatitis serology & reference facilities, e.g. phylogenetic analysis of hepatitis viruses as part of incident investigation
The Integrated Service

- Located on a clinical site, e.g. acute hospital
- Comprehensive service locally, to include bacteriology, virology, clinical consultation service, HCAI prevention, etc
- Very specialised tests referred elsewhere
- Clinical liaison available
Evolving Role of Clinical Microbiology Director in 2015 & Beyond

Technical Aspects
- Account for 40-50% of issues
- More of an engineering than a medical challenge
- Costs will drive automation with haematology, etc.

Clinical Consultant
- About 20% of time
- More computer screens & keyboards
- Laboratory consultations have disappeared

J Clin Microbiol 2011; 49: S68-S71
Evolving Role of Clinical Microbiology Director in 2015 & Beyond

- Management & administration not the responsibility of clinical microbiology director
- Education increase – simulation laboratories
- Research should be a big priority, but under pressure, e.g. less funds for research
- Lay representation

J Clin Microbiol 2011;49: S68-S71
The Clinical Microbiology Laboratory Director

- Does he/she need to be a medically trained microbiologist?

- Should he/she be a manager?

- Does he/she require specific scientific expertise
Potential Threats

- Automation & Centralisation
- Multi-Faceted Role
- Changes in Training
- European Harmonisation & Accreditation
Opportunities

- Profile of Infection
- Antimicrobial Resistance
- Improved Training
- Point-of-Care Testing
- New Technologies & Concepts e.g. whole genome sequencing

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Microbiology & Infectious Diseases Training

Ireland  After full registration, 2 years basic specialist training followed by 5 years HST in MM/MV or ID/TM

UK (New) Core medical training (MRCP), then 2 years combined infection training & 2 years HST with qualifications in ID/TM or MM/MV with other options
Qualities, Aptitudes & Professionalism
Qualities & Aptitudes

Qualities
Intelligence, commitment, communication skills & being a team member

Aptitudes
Strong background in clinical practice such as internal medicine, ICU, oncology, surgery
The Clinical Microbiologist & Professionalism

Professionalism can be defined in terms of character traits & observable behaviour.

Traits – altruism, respect for others, honour, integrity, ethical & moral standards

Behaviour – dealing with tasks/ work, e.g. honouring commitments, dealing with others, e.g. empathising with patients, dealing with oneself, e.g. handling our emotions

*Eur J Intern Med* 2009; 20: e85-e89
Enhancing the Function of Clinical Microbiology Laboratories

- Utilise the human microbiome project
- Address emotional barrier to change in the laboratory workforce
- Leverage technology to our advantage
- Evaluate/standardise, “home brew” assays
- Communicate through Twitter, Facebook, etc.
- Evidence-based trials

*J Clin Microbiol* 2011; 49: S72-S76
Conclusions

1. Exciting developments to meet increasing challenges

2. Risk of being divorced from clinical components

3. Value of consolidation/centralisation

4. Direction of overlapping/joint training
Thank you