
**Many Bugs, One House?
The Different Souls of Clinical
Microbiology**

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Objectives of a Clinical Microbiology Service

The Patient

Delivering safe, rapid, efficient & effective care

The Hospital

Creating a microbiologically safe environment for patients & healthcare workers

The Community & Society

Creating a microbiologically safe environment, locally, nationally & globally

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
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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

Which also implies that:

When one of the roles is poorly delivered, that poor quality adversely affects other roles & functions

e.g. not investigating an infected patient appropriately affects the patient & epidemiological data

The Challenges Facing Clinical Microbiology

- **Increasing relevance of healthcare-associated infections (HCAI) & antimicrobial resistance (AMR)**
 - **Consumerism – the drive from patients and 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 and globally**
 - **Climate change – new or re-emerging diseases, e.g. West Nile Virus**
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The Options & the Different Models

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**

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 Clinical Microbiology Service

- **Located on a clinical site, e.g. acute hospital**
- **Comprehensive service available locally to include bacteriology, virology, clinical consultation service, HCAI prevention & control, etc**
- **Only very specialised tests referred elsewhere**
- **Clinical liaison available**

e.g. many Dutch examples (University Hospitals, Franciscus Rotterdam, Nieuwegein Utrecht, Isala Zwolle etc.)

Diversity of Services Available

Smaller Hospital (~200 Beds)

Basic microbiology service with urgent specimens processed locally & less urgent specimens, e.g. urines processed off-site in a satellite laboratory. Can't be comprehensive on-site for logistical & cost reasons but meets the acute or emergency clinical need

Larger University Hospital (1,500 Beds)

Full range of services with research & reference services available on many sites

Issue 1 - 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**

Issue 2 – Surveillance

Acquiring epidemiological data with molecular epidemiology, used locally, nationally & internationally

- + Fewer laboratories facilitates collection of data
Similar IT systems
 - Lack of ownership locally
Dissociation from hospital and local patient care
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Antibiotic Stewardship

J Hosp Infect 2007; 65(S2): 73-81

- 86% of laboratories examined blood cultures >1 a day, more likely in North & West (e.g. Netherlands, UK)
 - 75% provided an emergency laboratory service & prescribing advice in 71%
 - 73% of hospitals provided summary antibiotic susceptibility data to guide empiric (“blind”) therapy
 - Antibiotic stewardship relevant locally, nationally & regionally
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Issue 3 – Research & Development

The assessment of new technologies, the involvement in basic research & the translation of advances in microbiology to the benefit of patients

- + Large laboratories have the capacity
Broad range of expertise
 - Research may be removed from the patient
Translational research more difficult
Realising clinical research trials more difficult
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Research & Development

J Med Microbiol 2008; 57: 601-604

- **Real-Time PCR assay to detect the causes of fever in neutropenic patients**

Light Cycler	BacT/Alert		No. of samples
	+ve	-ve	
+ve	20 (19%)	14 (13%)	34 (33%)
-ve	1 (1%)	68 (66%)	69 (67%)
Total	21 (20%)	82 (80%)	103 (100%)

Issue 4 - Quality Assurance

*Providing equal & cutting edge quality.
Laboratories providing poor quality do not survive*

- + Can designate specific staff to prioritise this
Sufficient throughput to participate in
internal & external systems
 - Quality not inbedded in all staff but involves
designated staff
High job satisfaction inversely related to
laboratory size
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Staff Attitudes & Quality of Service

Br J Biomed Sci 2002; 59: 69-75

- **Self-reported questionnaire about 'job satisfaction' in the UK, 1998-99**
 - **Biomedical scientists reported lower job satisfaction than previous study in the US**
 - **Perception influenced by size of laboratory, i.e. optimal number of staff <30**
 - **Positive laboratory climate important for good performance in internal & external measures of technical quality**
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Issue 5 - Better Patient Service

Frequent performance of tests, regular collection of appropriate samples & rapid reporting in real time

- + High throughput facilitates extended working day
Greater numbers of staff provide flexibility in response to needs
 - Failure to reflect clinical need: off-site tests not customised for individual patient needs
Lacking sense of urgency of patient care
Bureaucracy
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Issue 6 - Better Continuity

Employing a larger workforce facilitates testing on a 24-hour basis at weekends & on holidays

- + **Quicker results**
Extensive range of tests
 - **Abuse of out-of-hours testing**
Failure to prioritise tests as available
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Conclusions & Perspectives - 1

- **The needs of patients & the public are of paramount importance.**
 - **Services are provided for individuals and for local, regional, national & international agencies.**
 - **The potential conflict between integration & specialisation can be resolved.**
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Conclusions & Perspective - 2

- **A team-based approach that incorporates diversity is likely to benefit the patient best.**
 - **One size or model does not necessarily fit all. However, we need to define a Gold Standard for Clinical Microbiology in the delivery of care.**
 - **We all belong to the One House!**
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