**Service provided by Infection Departments**

1.1 Infection services encompass a range of historically separate clinical specialties and diagnostic services which are integrated into routine clinical practice in acute hospital, community and general medical and dental practice settings. Current infection specialists include medical microbiologists, infectious disease (ID) physicians, paediatric ID physicians, infection control practitioners, oral microbiologists and public health physicians (including consultants in communicable disease control). Whilst distinct from clinical microbiology and infection teams, genito-urinary (GU) physicians also contribute to infection services. Doctors within each of these specialties may work in teaching hospitals, academic and research institutions, district general hospitals and in the community. Each currently has a different training and career pathway.

Over recent years, however, there has been increasing overlap and common interest between these separate clinical services. This has been reflected in a drive to bring training curricula together, whilst continuing to recognise the wide range of knowledge, skills and career diversity necessary to deliver the full scope of a modern infection service. The bringing together of Royal College training curricula and possibly a common ‘infection CCT’ (Certificate of Completion of Training) does not diminish the requirement for subsequent specialist diversification and acquisition of specialist knowledge and skills, but it does bring greater commonality of purpose, understanding and potential flexibility amongst infection specialists of the future.

1.2 We need to focus on the core components of infection services and the knowledge and skill sets required of doctors, nurses, scientists, antibiotic pharmacists, epidemiologists and others to deliver them. We need to consider how they can best be provided in the future, taking into account proposed reconfigurations of diagnostic (pathology) and clinical services, and taking advantage of new technological diagnostic developments and possibilities. Increased centralisation of pathology services will mean that not all hospitals will have on-site microbiology diagnostic services, although infection specialists (including medical microbiologists) will still be needed to provide a clinical service, liaising with remote facilities whilst maintaining clinical and strategic oversight over diagnostic processes.

1.3 Infection is a key issue in all clinical services and it must be seen as a core component to medical, dental and nursing undergraduate and postgraduate education at all levels. Antimicrobial agents are unique in that their use has public-health implications far beyond the treatment of individual patients. Modern medicine, dentistry and surgery are dependent on the ongoing availability of effective antibiotics, which can only be safeguarded through responsible antibiotic stewardship practised by all prescribers. The importance of ensuring proficiency in antibiotic prescribing is recognised and a series of competencies for prescribers is currently being developed.

1.4 Infection prevention and control is of paramount importance throughout the healthcare economy. All healthcare workers need to work to recognised standards of infection prevention and control practice, and the topic needs to be fully integrated into the training curricula of all staff. Knowledge and competencies need to be continually re-emphasised through mandatory training, ongoing practice needs to be monitored and outcomes kept under surveillance. The key role of microbiologists in detecting the emergence of antibiotic resistance within healthcare settings, and the detection and management of outbreaks within a multi-disciplinary team, also need to be recognised.

**2 Service specifications for infection services**

2.1 Service specifications for infection services must be patient focussed and take into account local population requirements. They can be usefully divided into six main areas:

 health promotion (proactive disease prevention)

 the clinical assessment, investigation and management of patients suspected of having infection

 the pre-analytical, analytical and post-analytical phases of diagnostic work

 infection control

 public health

 education and research.

It is important to emphasise that these areas are mutually dependent on each another; for example, strategic and professional stewardship of laboratory services must be directed by clinical need. Education, training and research are also key elements within all these areas, as is responsible antimicrobial stewardship and ensuring best use of budgetary and trained personnel resources.

The specification set out below is a collation of the many activities undertaken by infection specialists and a team of suitable qualified collaborating individuals will be required to deliver such a service. It is likely that future training of infection specialists will bring about greater commonality of purpose and greater career flexibility, but there will still be a need for sub-specialisation to fully meet the wide range of skills and services required. The Royal College of Pathologists supports the continued medical leadership of clinical, laboratory and infection control teams, bringing medical expertise to laboratory diagnostic stewardship and strategic planning.

**2.2.1 Health promotion and disease prevention**

 Healthcare planning (emerging diseases, threat of bioterrorism, outbreak preparedness), informed by epidemiological knowledge.

 Vaccination programmes (based on accurate surveillance data, demographic knowledge, etc.).

 Occupational health services.

 Education of the public – schools, media, etc. Avoidance of risk, self-protection (e.g. sexually transmitted disease, travel-related diseases, food and water-borne illness), recognition of serious disease (e.g. meningitis).

 Support for public health and environmental health departments (clinical and laboratory surveillance, food and water testing, etc.).

 Design and planning of healthcare premises, overseeing infection control implications of new equipment, safe systems for medical device decontamination and legionella control.

 Appropriate professional input into political decision making.

 Expertise in assessing effectiveness of environmental decontamination technologies, new disinfectants.

**2.2.2 Clinical assessment, investigation and management of patients suspected of having infection**

 Clinical assessment and management of infection – inpatient and outpatient referrals.

 Development and ongoing support for outpatient/home antimicrobial therapy (OPAT).

 Active participation in multi-disciplinary team (MDT) meetings to promote optimal management of patients with infection. Specialist teams may include respiratory (including tuberculosis), orthopaedics, blood-borne viruses, diabetes, urology, cardiology (for endocarditis), etc.

 Active promotion of disease recognition and prompt diagnosis (e.g. opportunistic testing of HIV and prompt referral of patients identified from screening programmes) to prevent onward transmission of disease.

 Encouragement of shared databases to investigate optimal management of patients (e.g. recently launched endocarditis database).

 Provision of specialist infectious disease clinical service as required by local population (may include paediatric specialist service or specific clinics – e.g. hepatitis, HIV).

 Provision of tertiary infectious disease referral centres as required by commissioners.

 Provision of GU medicine services as required by commissioners.

 Training of other healthcare professionals to recognise infection, diagnose and manage appropriately. This includes medical, dental and nursing undergraduate and postgraduate education, in both hospital and general medical and dental practice settings.

 Clinical microbiology support to hospital (including dental hospitals) and general medical and dental practice services (including ward, clinic and MDT work), intensive care and other specialist unit ward rounds, assessing outcomes of infection management, and to deal with complications as they arise. Includes out-of-hours and emergency support.

 Production of local evidence-based guidance to recognise, investigate and manage infection in all relevant healthcare settings.

 Antibiotic, antifungal and antiviral stewardship – specialist expertise in their safe and effective use, audit, training and gatekeeping for responsible antimicrobial prescribing.

 Clinical supervision and training of infection specialist trainees and clinical scientists, to ensure appropriately qualified staff for the future.

**2.2.3 Diagnostic services**

**a) Pre-analytical phase**

 Education of patients – for what conditions do they need to consult, or be tested?

 Knowledge of antibiotics – when appropriate, side effects, limitations. Informed patient choices about who and where to consult. Test options, concepts of quality assurance.

 Education of all healthcare staff – medical, dental and nursing undergraduates, midwives, therapists. Infection and its prevention and management. Who to investigate, what specimens to take. Who to treat and with what.

 Education of healthcare service commissioners, to ensure that appropriate services are contracted and resourced.

 Advice on, and supervision of, appropriate point-of-care testing where relevant.

 Clinical assessment of patients – directly through ward and outpatient activities, or through consultation with clinical colleagues.

 Provision of information – epidemiological information, laboratory handbooks, investigation algorithms, patient pathways integrated into other healthcare services.

 Antimicrobial policies for prophylaxis and therapy, based on published data together with local surveillance data on antibiotic resistance.

 Gatekeeper role to ensure that the most cost-effective and timely tests are performed, managing demand within constrained budgets.

 Working collaboratively with users to provide high-quality, relevant, point-of-care testing where appropriate.

**b) Analytical phase**

 Provision of accredited (CPA or equivalent) microbiology laboratory services, clinically relevant and responsive to evolving clinical practice. Professional and strategic direction of same. Employment of appropriate technology, use of evidence-based standard operating procedures, use of appropriate skill mix, ensured continued professional development.

 Equitable availability of optimal service to all users – patients, clinicians. This includes equitable access to modern molecular technology, and specialist diagnostic and clinical services.

 Effective, strategically led interface between the laboratory and its users. Gatekeeping to ensure best use of resources; rationalisation and prioritisation of laboratory tests.

 Consistency in laboratory interpretation and reporting.

 Evaluation of new technologies and their introduction into routine practice as clinically and economically appropriate.

 Support and oversight of clinically appropriate near-patient testing.

 Provision of specialist (including molecular) typing services as appropriate for infection control purposes.

 Surveillance and audit to ensure maintenance of good practice, and provision of further evidence to support service development.

**c) Post-analytical phase**

 Ensuring that appropriate action taken following appropriate investigation.

 Ensuring access to specialist expert opinion for all users.

 Feedback to users of service, to ensure full benefit to healthcare services and wider public.

 Regular strategic review of services to ensure continued best use of resources, and ensuring integration of infection services into the wider business of healthcare.

 Multi-disciplinary clinical audit.

 Hospital and community epidemiology, to inform public health activity, local policies, infection prevention and control programmes, and educational activities.

**2.2.4 Infection control**

 Strategic leadership at Trust board level, integrating infection control with corporate governance.

 Implementation of national infection prevention and control standards and codes of practice.

 Operational leadership of infection control team.

 Contribution to patient safety by leading on the development of systems which reduce infection risk to patients, staff and visitors.

 Recognition of emergence of antibiotic-resistant strains within the community and acute healthcare settings.

 Detection and management of outbreaks. This includes appropriate access to, and use of, specialist (including molecular) typing services.

 Policy making, audit of clinical practice.

 Education and ongoing training for all healthcare staff.

 Provision of patient information.

 Surveillance of healthcare-associated infection, with feedback to ensure good practice incorporated into clinical services.

**2.2.5 Public health**

 Local, regional, national and international information gathering to inform health policy.

 Management of cases and incidents with potential communicable disease implications.

 Effective communication with the public and healthcare professionals about matters of communicable disease significance.

 Facilitation of multi-professional collaboration in the management of infection, including hospital, primary care and social care teams.

 Surveillance of vaccine-preventable diseases.

 Local and national surveillance of reportable conditions and isolates.

 Ensuring that laboratory refers appropriate significant isolates for further typing.

 Outbreak identification and management.

 Recognition of emerging pathogens of potential importance.

**2.2.6 Education and research**

Education and research underpin all of the above activities, but in particular there must be medical microbiology and infectious disease physician involvement in the following:

 public education material

 medical, dental and nursing undergraduate education

 ongoing medical, dental and nursing postgraduate education

 clinical and bio-medical scientist education

 specific infection (laboratory and clinical) training for public health physicians, antibiotic pharmacists and others requiring competency in antibiotic stewardship and/or the appropriate use of microbiology diagnostic laboratories

 research into best delivery and treatment options for infectious disease

 understanding the social, psychological and behavioural aspects of infectious disease, to better inform clinical interventions and educational initiatives.

**3 Workload and service delivery**

3.1 The wide ranging scope of infection services requires a team of specialists with defined skills within each locality. Each team will differ according to local clinical need and commissioned specialist services, but will require clinical, scientific, epidemiological and nursing expertise and cover the main areas of infection practice:

 clinical microbiology (including clinical oral microbiology)

 infectious disease medicine

 diagnostic expertise and laboratory direction

 specialist virology

 infection control

 GU medicine

 public health and epidemiology

 access to specialist clinical and reference diagnostic services (including tropical medicine, mycology, parasitology and molecular typing).

Other hospital and general practice healthcare staff need to know who to contact for specialist advice in any area of infection, and infection specialists need to be fully integrated into local healthcare teams, clinical pathways, MDTs, education and guideline/protocol setting. Additional expertise should be included as appropriate and may include: hospital and community epidemiologists, investment in electronic surveillance systems, other information technology and informatics expertise. The skills of a health economist should be accessible to determine most cost-effective and clinically optimal configurations of services within available resources.

3.2 Although output specifications for an infection service can be identified, resources within laboratories and clinical workforce are often limited. It is important to define those elements of the service which the professions regard as core activity, essential to clinical care. Where prioritisation is inevitable, decisions must be patient-focussed and risk-assessed. Clinical workload must focus on those elements most essential to patient care and public health, and interventions should be as evidence-based and outcome-driven as possible. Activities of poorly defined value should cease, but investment which can be shown to be associated with quality interventions to improve patient care and clinical outcomes must continue.

3.3 Configurations of clinical and diagnostic services are likely to differ across the country, but all patients should be assured equity of access to appropriate investigation and safe clinical care. Diagnostic services must be appropriate and responsive to clinical services and future developments. Tests of clinical and infection control urgency must be appropriately available to support clinical decision making. The same quality standards, training expectations, audit and surveillance requirements should apply to any provider of pathology and clinical infection services, irrespective whether NHS or private provider.

3.4 Configurations of clinical and diagnostic services must also be able to support the ongoing training of infection specialists of the future. There must also be support for the clinical development of existing staff as service needs alter. Consideration must be given to the recruitment and retention of suitable qualified individuals providing clinical services in sites without on-site diagnostic facilities. Such individuals need to retain their interest and strategic influence within the off-site laboratory, and continue to be able to develop the service, including near-patient testing as clinically appropriate.

**Suggested teams/services for various settings**

**Core services in all acute hospitals and surrounding community**

Clinical advice to colleagues, investigations, treatment, follow-up

 Telephone

 In person, consultations, ward rounds

 MDTs

 *Improved quality of service/financial savings*

Validation of results/reacting proactively to results issued by the laboratory

 *Quality of service*

Infection Control Doctor

HCAI prevention and reporting

Water Safety

Decontamination

 Occ Health advice

*Improved quality of service/financial savings*

Antimicrobial Stewardship

 Policies/Guidelines

 Monitoring/reporting

 *Improved quality of service/financial savings*

Education and training

 Medical staff

 Nursing staff

 Other staff

 *Quality of service*

Governance etc

**? How to quantify; x WTE/?what, beds, total consultants, specialities on site**

|  |  |  |
| --- | --- | --- |
| **College guidance** | **Colchester implications** | **Hours recommended/week** |
| **1 hr per day per 30,000 specimens, doubled for supervision of trainees** | 150,000 specimens/year | 50 hours |
| **1-2 hrs per day for a 500 bed DGH** | 650 beds | 10 hours |
| **An additional 1 hr per week per specialist unit** | ITU, SCBU, Oncology, Haematology, GUM/HIV, Resp medicine, especially CF | 7 hours |
| **Infection Control , minimum 10.5 hrs** | 650 beds, specialist units as above | 16 hours |
| **1-2 hours per 50,000 population** | 330,000 | 6 hours |
| **Management/supporting activities, minimum 10.5 hrs** | Large lab/DGH | 11 hours |
| **Total** |  | 100 hours/week |
|  |  |  |

**District General Hospital (core plus)**

 **Hub laboratory**

Leadership of laboratory

 Management of laboratory

 *Improved quality of service/financial savings*

 **Satellite hospital**

Relationship with hub to enable and facilitate service

 *Improved quality of service/financial savings*

 **Teaching centre**

Specific teaching responsibilities

 *Contractual requirement/quality of service*

 **Research centre**

Specific research responsibilities

 *Contractual requirement/quality of service*

**Tertiary Hospital (core plus)**

 **Hub laboratory**

As above to include laboratory service to tertiary services; may include regional laboratory function/service like virology

Specialist tertiary service infection advice and involvement as above

*Improved quality of service/financial savings*

 **Satellite hospital**

Specialist tertiary service infection advice and involvement as above

*Improved quality of service/financial savings*

 **Teaching centre**

Specific teaching responsibilities

 *Contractual requirement/quality of service*

 **Research centre**

Specific research responsibilities

 *Contractual requirement/quality of service*

**Specialist Centre (single speciality) (core plus)**

As above specifically to provide advice for speciality

 *Improved quality of service/financial savings*

**Potential additional Services**

**OPAT** *Improved quality of service/financial savings*

**Inpatient beds (Isolation Unit**

**Outpatient clinics**