

Lahey Clinic Medical Center Consultation Service

a) Goals, Objectives, and ACGME Competencies

Goals

- To teach ID residents the physiological basis of infectious diseases, the differential diagnosis and treatment of these diseases, and the broad array of skills required to carry out effective, timely and courteous consultation in infectious diseases.
- To provide Infectious Disease residents a breadth of exposure to both community-acquired and hospital-acquired infections. The Lahey Clinic Medical Center has a large internal medicine practice as well as many surgical subspecialties including orthopedics, neurosurgery, trauma and hepatobiliary surgery that provide a wide range of consultation. The busy liver transplantation service also provides many opportunities for pre-and post-transplantation infectious disease consultations. Emphasis is on the differential diagnosis and management of complicated patients. Follow-ups in the infectious disease clinic allow the resident to participate in the outpatient management of long-term infections such as osteomyelitis. Residents also participate in the Travel and Tropical Medicine Clinic.

Objectives

First Year ID Residents:

- To gain a basic understanding of the major diagnoses, pathophysiology, differential diagnosis, and therapy of general infectious diseases encountered in the inpatient community setting, particularly complicated infectious diseases and infectious complications of surgery.
- To use primary classical and recent literature in the care of patients with infectious diseases and to transfer the experiences learned in specific instances to future experiences.
- Demonstrate ability to teach principles of infectious diseases to other health professionals, including medical students.
- To learn the art of consultation, including the discussion of the consultant's opinions with the primary care team.
- To understand the importance of discharge planning and follow-up of patients in the community with infectious diseases.

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Second Year ID Residents:

- To possess an advanced understanding of pathophysiology, differential diagnosis, and therapy of major, complicated and unusual infectious diseases encountered in the community hospital setting. To be able to competently and efficiently provide sophisticated infectious disease consultation independently.
- To regularly read and critically assess the primary infectious disease literature, become familiar with published practice guidelines and apply this knowledge to patient care.
- Demonstrate ability to impart sophisticated and detailed information regarding infectious diseases to peers and those less experienced.

Rationale/Value

Patients with a severe community-acquired infection usually need different empiric antibiotics than those who acquire their infection in a tertiary care setting. Through the broad mix of consults, ID residents learn to make rational, cost-effective decisions with regards to the appropriate use of diagnostic tests and antibiotics. In addition, ID residents gain experience in teaching as they interact with medical students and medical residents rotating through the service.

Most Important Educational Content

Disease Mix:

Fever in a hospitalized patient; febrile neutropenia; community-acquired pneumonia; nosocomial infections including catheter related blood stream infections, urinary tract infections, pneumonia and *Clostridioides difficile* infection; cellulitis; septic arthritis; osteomyelitis; infections in solid organ transplantation recipients and post-surgical infections including nosocomial meningitis. As a suburban/rural referral center, more patients with tick-borne illness present at Lahey compared with Tufts Medical Center. Patient referral base includes international as well as rural New England, bringing in additional experiences in infectious diseases.

Patient Characteristics:

Patients range from those without significant past medical history to patients with diabetes, peripheral vascular disease and cancer. Lahey Clinic Medical Center has a major emphasis on infections caused by resistant organisms, infectious complications of surgery (neurosurgical, orthopedic, transplant and trauma) and on appropriate infection control measures.

Types of Clinical Encounters:

The encounters in this program are in the form of ID consultations. Emphasis is on the initial consultation and generation of a differential diagnosis, with initial plan for evaluation.

Procedures and Services:

These are similar to those performed during Tufts Medical Center rotations including the performance and interpretation of gram stains and other microbiology tests, advice regarding appropriate diagnostic and/or therapeutic invasive and noninvasive procedures, advice on optimal antimicrobial therapy and adverse effects and providing advice on infection control practices and issues of hospital epidemiology.

ACGME Competencies

Patient Care

First Year ID residents:

- Demonstrate care that is compassionate, appropriate, and effective for the treatment of health problems related to infectious diseases and the promotion of health and prevention of infection.

- Able to perform detailed history and physical exam appropriate to medical, surgical, critically ill and other patient populations in searching for an infectious disease.
- Learn to evaluate complex patients in a tertiary-care setting who often pose unique problems of complexity, and of unusual or refractory infections.

Second year ID residents:

- Demonstrate care that is compassionate, appropriate, and effective for the treatment of health problems related to infectious diseases and the promotion of health and prevention of infection, at a more sophisticated and independent level compared to first year ID residents.
- Able to formulate a focused infectious disease differential diagnosis and diagnostic and therapeutic plan.
- Able to independently and efficiently formulate a focused infectious disease differential diagnosis and diagnostic and therapeutic plan for complex tertiary-care setting patients.

Medical knowledge

First year ID residents:

- Demonstrate knowledge about established and evolving biomedical, clinical and cognate (epidemiology and socio/behavioral) sciences in the field of infectious diseases and the application of knowledge to patient care
- Demonstrate knowledge of the most prominent disease mix encountered in this experience: Fever in the immunocompromised host, fever and neutropenia, differentiation of infectious vs. noninfectious diseases, community acquired pneumonia; nosocomial infections including catheter related blood stream infections, urinary tract infections, pneumonia and *Clostridioides difficile* infection; cellulitis; septic arthritis; osteomyelitis; infections in solid organ transplantation recipients and post-surgical infections including nosocomial meningitis; differential diagnosis and management of fever and infectious etiologies of international patients; differential diagnosis and management of fever and infectious etiologies of rural patients, including agricultural workers.
- Understand the use of empiric and specifically targeted antimicrobial therapy, including optimal timing, dose schedules and dosage adjustment
- Understand drug interactions and toxicities, efficacies of antimicrobials and use of alternative therapies
- Understand appropriate use of preventive therapies, especially antimicrobial prophylaxis and the use of vaccines.
- Recognize and differentiate unusual manifestations of common infections vs. unusual infections vs. non-infectious conditions masquerading as infections
- Demonstrate knowledge of the following:

Expertise including but not limited to the following:

- Host defense mechanisms and defects
- Patients with host defense defects due to neutropenia
- Patients with host defense defects due to leukemia, lymphoma, and

other malignancies

- Epidemiology of community acquired and nosocomial infections
- Anti-infective therapy
- Clinical microbiology

Recognition, natural history, differential diagnosis, specific diagnosis and

management of:

- Fever
 - Upper respiratory tract infections
 - Pleuropulmonary and bronchial infections
 - Urinary tract infections
 - Sepsis syndrome
 - Cardiovascular infections
 - Central nervous system infections
 - Skin and soft tissue infections
 - Gastrointestinal tract infections
 - Intraabdominal infections
 - Hepatitis A, B, C
 - Bone and joint infections
 - Prosthetic Device infections
 - Reproductive organ infections
 - Sexually transmitted diseases
 - Urinary tract infections in normal and immunocompromised hosts
 - Ocular infections
 - Familiarity with etiologic agents of infectious diseases
 - Nosocomial infections
 - Infections of specific hosts
 - Surgical infections
 - Infections related to trauma
 - Infections in travelers
 - Sepsis syndromes
 - Zoonoses
 - Infections in the developing world
 - Infections of solid organ transplant recipients, opportunistic and other
 - Non-infectious medical problems of the solid organ transplant recipient
 - Drug interactions between antimicrobial and immunosuppressive agents
 - HIV disease including
- Epidemiology and prevention
Diagnosis
Immunology
Virology

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Natural history of infection
Infectious and non-infectious complications
HIV/TB coinfection
HIV/hepatitis C coinfection
Antiretroviral therapy – use and complications

- Learn the following procedures related to infectious disease testing:
 - o Performance and interpretation of gram stains
 - o Plating, review and interpretation of cultures of bacteria, mycobacteria, fungi, viruses, rickettsiae, chlamydiae, and parasites, and interpretation of serological tests.
 - o Optimal methods of specimen collection and culture
 - o Diagnostics for CMV infection
 - o Interpretation of drug susceptibility testing for bacteria and selected fungi, knowledge of the sensitivity and specificity of testing,
 - o Use and interpretation of serologic and biomarker testing for fungal pathogens
 - o Use and interpretation of tuberculin testing and interferon-gamma release assays in immunocompromised individuals.
 - o Recommendation and interpretation of diagnostic tests, including risks, benefits, sensitivity and specificity of the tests

Second year ID residents

- Advanced understanding of same

Practice-based learning

First year ID residents:

- Learn the use of primary classical and recent literature in the care of patients with infectious diseases and to transfer the experiences learned in specific instances to future experiences.
- Learn to incorporate hands-on clinical experience with learning derived from participation in conferences, didactic lectures, and investigation of the literature through independent and directed reading.

Second year ID residents

- Advanced understanding of above
- To regularly read and critically assess the primary transplant infectious disease literature, become familiar with published practice guidelines and apply this knowledge to patient care.

Interpersonal and communication skills

First year ID residents:

- Advise physicians on the optimal usage of antimicrobial agents and their monitoring
- Advise proper response to suspected or diagnosed drug reactions including the use of drug desensitization

- Advise on the appropriateness of a given procedure, such as removal of central venous catheters, abscess drainage and bronchoscopy, in the context of the management or diagnosis of an infectious disease.
- Demonstrate ability to teach principles of infectious diseases to other health professionals, including medical students.
- Learn the art of consultation, including the discussion of the consultant's opinions with the primary care team.
- Discuss microbiology testing with microbiology laboratory technologists

Second year ID residents:

- Advanced understanding of above
- Able to impart sophisticated and detailed information regarding infectious diseases to peers and those less experienced.

Professionalism

First year ID residents:

- Provide courteous and timely assistance to all callers both intramural and extramural
- Complete documentation completely and in a timely fashion necessary to promote patient care and safety
- Provide expert and compassionate care to a diverse group of patients. There is an immense diversity of patients seen by the resident. They include adults who live in the immediate urban area who present with acute and chronic infectious diseases. They are of varied ethnic, linguistic, racial and socioeconomic backgrounds and ages vary from the late teens to the very aged.

Second year ID residents:

- Advanced understanding of above

Systems-based practice

First year ID residents:

- Participate in Antimicrobial Stewardship to promote conservation of antimicrobial resources, decrease risk of development of resistance, and unnecessary side effects
- Develop understanding of medical care across the spectrum of care:
- Patients are referred to Lahey Clinic Medical Center from regional, national and international areas and institutions present for care of infectious diseases or develop infectious complications of their primary problem.
- Contribute to discharge planning efforts, including antimicrobial de-escalation, change from parenteral to oral, and facilitation of follow-up particularly for complex patients and patients discharged on parenteral antimicrobial therapy.
- Develop understanding of cost-effective management plans for investigation and treatment.

Second year ID residents:

- Advanced understanding of above

b) Defined Methods of Teaching

Principal Teaching Method

ID residents see new consultations and hospital follow-ups daily. The details of the history, physical exam and available data are reviewed with the attending on call. ID residents are encouraged to formulate a differential diagnosis and plan and to present these to the attending for review. The patient and all data are then examined and reviewed as a team. Infectious disease issues are discussed as they relate to current and classical literature.

Principal Ancillary Educational Materials

Residents are encouraged to do a literature search as specific questions arise. Residents are also responsible for presenting a case and a review of the pertinent literature at the Thursday Infectious Disease Conference. The conference is attended by members of the Infectious Disease Center, microbiology, hematology and infection control personnel as well as other physicians from subspecialty disciplines who had been involved in the patient's care. In addition, ID residents participate in daily microbiology rounds with the attending on call and infection control practitioners. Interesting or unusual smears, plates or cultures are reviewed during rounds. Blood smears for Babesia or malaria and serologies for parasitic diseases are reviewed on an individual patient basis.

c) Methods of Evaluation

Methods to Evaluate Residents

Direct observation by supervising attendings with written monthly reports based on the six ACGME core competencies of patient care, medical knowledge, practice-based learning, interpersonal and communication skills, professionalism and systems-based practice, supplemented with narrative comments. The residents are reviewed in a manner similar to that at Tufts Medical Center. The same forms are used by the local program director, who sends the information to the Tufts Medical Center Program Director, who then oversees the composite evaluation of the resident. As attendings rotate call weekly, each attending is responsible to give verbal feedback to the ID resident at the end of the attending's week of call.

Methods to Evaluate Program Performance

Formal evaluation of program content and impact on professional development of ID residents is carried out by the faculty annually through the Program Evaluation Committee. The ID residents formally review the program by preparing an in-depth collective report of the Lahey rotation at the end of each program year. This is supplemented by informal "feedback" from ID residents during the course of their rotation at Lahey Clinic to the attending physicians and program director. A retrospective gauge of program performance is the success (pass) rate on the infectious disease subspecialty boards.

d) Strengths of Program

Strengths include: the wide range of patients and types of infections seen at the Lahey Clinic; rounding with different attendings which provides exposure to different approaches

to patient care; the close integration of microbiology and infection control with the infectious disease department; a busy and growing liver transplantation service; the availability of an infectious diseases pharmacist and the Travel and Tropical Medicine Clinic. Microbiology including daily plate rounds, is another strength of the rotation.

e) Limitations of Program

The primary limitations of this curricular component are the lack of bone marrow transplants, heart transplants, and limited numbers of HIV patients. These limitations are compensated for by the experiences the resident receives at the other training sites.