LEARNING OBJECTIVES

On completion of the chapter, the reader will be able to:

1. Understand the different methodologies that are performed in the clinical laboratory including rapid diagnostic tests that are used to identify potential pathogens and culturing techniques.

2. Define the minimum inhibitory concentration (MIC) and describe the various methodologies used to determine MICs in the clinical microbiology laboratory.

3. Contrast the methods and results of the disk-diffusion antimicrobial susceptibility test (the Kirby–Bauer test) with those of the MIC test.

4. Identify at least two limitations associated with each of the three types of MIC testing.

5. Explain how patients may fail antimicrobial therapy even when the infecting pathogen appears to be susceptible to the antimicrobial via conventional test methods.

6. Describe two commonly used tests for detecting antimicrobial resistance.

7. Discuss the important information about an antimicrobial that can be obtained from the following tests: minimum bactericidal concentration, timed-kill curve test, postantibiotic effect test, and antimicrobial combination effect test.

8. Compare and contrast the various methods that can be used to determine serum concentrations of antimicrobials.

9. Describe the important considerations for the monitoring of serum concentrations of aminoglycosides and vancomycin.

10. Contrast the pharmacodynamic parameters that correlate with activity for antimicrobials with concentration-dependent killing activity with the pharmacodynamic parameters that correlate with activity for antimicrobials with time-dependent activity.

11. Understand the rationale for antimicrobial optimization based on pharmacokinetic and pharmacodynamic principles such as the ratio of the antimicrobial peak concentration to the MIC or the time that a specific antimicrobial spends above the MIC during the dosing interval or the ratio of the area under the concentration–time curve to the MIC.