

# 16

## INFECTIOUS DISEASE

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### I. CHIEF COMPLAINT

- A. Chief Complaint:** Use the patient's own words when possible. Chronology is often included: Onset (acute, subacute or chronic), duration (minutes, hours, days, weeks, months or years), and frequency of symptom(s).
- B. Identifying Data:** Obtain patient's name, age, race/ethnic background.
- C. Fever:** Fever is the most common symptom that leads patients and physicians to consider a diagnosis of infection. For this reason, the focus of this section is the work-up of the febrile patient.
1. Fever refers to a pyrogen-mediated elevation of body temperature above the expected normal daily variation. In contrast, hyperthermia is an abnormality of thermoregulation that is not driven by pyrogenic cytokines, and therefore, unlike fever, is not ameliorated by antipyretic medications. For most patients, the temperature at which clinical evaluation of fever is indicated is 38.0°C (100.4°F).
  2. Fever as a clinical symptom/sign of infection is neither sensitive nor specific. The absence of fever does not exclude infection, particularly in an immunocompromised, debilitated, or elderly patient.
  3. Conversely, the presence of fever does not equate to infection because fever can be the initial manifestation of noninfectious maladies, including collagen vascular disease and malignancy.
  4. A variety of terms are used to describe fever in terms of its pattern (e.g., intermittent versus remittent), duration (fever of unknown origin), and unique host characteristics (neutropenic fever). The more commonly used terms are summarized in Table 16-1.
  5. Although specific fever patterns are not pathognomonic, a review of the patient's fever curve may provide diagnostic clues about the etiologic agent. Selected fever patterns and putative etiologic agents are summarized in Table 16-2.
- D. Appropriate Febrile Patient Triage:** The goals of triage are to expedite patient care while minimizing the unnecessary exposure of susceptible staff, patients, and family members.
1. Decide if the patient requires an immediate intervention, such as fluid resuscitation or empiric antibiotic therapy. For example,

Table 16-1. DEFINITION OF TERMS REGARDING FEVER.

| TERM   | DEFINITION   |
|--|--|
| <b>Fever</b>   | Fever is an elevation of temperature above the peak normal daily variation. The normal oral temperature range is 36.0-37.8°C (96.8-100.0°F)  |
| <b>Continuous fever</b>                                  | Persistent elevation of temperature with minimal fluctuations  |
| <b>Intermittent fever</b>                                | Daily fever spikes with return to normal body temperature  |
| <b>Remittent fever</b>                                   | Fever spikes without return to normal body temperature between spikes  |
| <b>Relapsing fever</b>                                   | Cyclical pattern of alternating fever and normal temperature   |
| <b>Factitious fever</b>                                  | Fever produced artificially by the patient   |
| <b>Fever of unknown origin (FUO), classic definition</b> | Illness of more than three weeks' duration. Documented fevers above 101°F (38.3°C) on several occasions. Lack of specific diagnosis after 1 week of inpatient investigation  |
| <b>Classic FUO, revised definition</b>                   | As above, but investigation now revised to three hospital days or three outpatient visits  |
| <b>Neutropenic fever</b>                                 | A single oral temperature of >38.3°C (101.0°F) or >38.0°C (100.4°F) over at least 1 hour, in patient with a neutrophil count <500 mm <sup>3</sup> or <1000 mm <sup>3</sup> with predicted decline to less than 500 mm <sup>3</sup> |

a patient with acute bacterial meningitis should have antibiotics started before further diagnostic testing is completed.

- Determine if empiric isolation precautions are warranted. The clinical syndromes for which empiric isolation precautions are advised by the Centers for Disease Control and Prevention (CDC) are summarized in Table 16-3.

## II. HISTORY OF PRESENT ILLNESS

### A. Infectious Diseases

- The study of the relationship between a patient, an infectious agent(s), and the environment.
- Once you have completed your initial triage, you are ready to proceed with an orderly, systematic review of the patient's unique susceptibilities and exposures.

**Table 16-2. DIAGNOSTIC SIGNIFICANCE OF FEVER PATTERNS.**

| FEVER                                 | CAUSES  |
|---------------------------------------|---|
| Single fever spike                    | Manipulation of a colonized or infected mucosal surface, transfusion of blood/ blood products, infusion-related sepsis (contaminated infusate), temperature error, not a systemic infectious disease  |
| Double quotidian fevers (twice daily) | Adult Still's disease, visceral leishmaniasis, miliary tuberculosis, mixed malarial infections, right-sided gonococcal endocarditis   |
| Tertian fevers (every third day)      | Malaria ( <i>Plasmodium vivax</i> )   |
| Quartan fevers (every fourth day)     | Malaria ( <i>Plasmodium malariae</i> )  |
| Intermittent fevers                   | Gram-negative or gram-positive sepsis, abscess (renal, abdominal, pelvic), acute bacterial endocarditis, Kawasaki disease, malaria, miliary tuberculosis, antipyretics, peritonitis, toxic shock syndrome   |
| Remittent fevers                      | Viral upper respiratory infections, <i>Plasmodium falciparum</i> malaria, acute rheumatic fever, Legionella/Mycoplasma infection, tuberculosis, subacute bacterial endocarditis (SBE)   |
| Continuous or sustained fevers        | Central fevers, roseola infantum (HHV6), brucellosis, Kawasaki disease, psittacosis, rocky mountain spotted fever, scarlet fever, subacute bacterial endocarditis, typhoid fever, drug fever  |
| Biphasic (camelback) fever            | Colorado tick fever, dengue fever, leptospirosis, brucellosis, lymphocytic choriomeningitis, yellow fever, polio, smallpox, rat-bite-fever ( <i>Spirillum minus</i> ), Chikungunya fever, African hemorrhagic fevers (Marburg, Ebola, Lassa), Echovirus infection |
| Relapsing fever                       | Relapsing fever ( <i>Borrelia recurrentis</i> ), yellow fever, smallpox, ascending cholangitis, brucellosis, dengue, chronic meningococcemia, malaria, rat-bite-fever   |

Table reproduced with permission from Cunha BA. Clinical approach to fever. In SL Gorbach, JG Bartlett, NR Blacklow (eds), Infectious Diseases, ed 2. Philadelphia: WB Saunders, 1998;86.

Table 16-3. EMPIRIC ISOLATION PRECAUTIONS\*.

| NONSPECIFIC SYMPTOMS  | POTENTIAL PATHOGENS†                               | EMPIRIC PRECAUTIONS  |
|---|--|----------------------|
| <b>Diarrhea</b><br>Acute diarrhea with a likely infectious cause in an incontinent or diapered patient                                | Enteric pathogens*<br><i>Clostridium difficile</i> | Contact<br>Contact   |
| Diarrhea in an adult with a history of recent antibiotic use  | <i>Neisseria meningitidis</i>                      | Droplet              |
| <b>Meningitis</b><br>Petechial/ecchymotic with fever  | <i>Neisseria meningitidis</i>                      | Droplet              |
| <b>Rash or exanthems</b><br>Generalized, etiology unknown   | Varicella  | Airborne and contact |
| Maculopapular with coryza and fever   | Rubeola (measles)                                  | Airborne             |
| Upper lobe pulmonary infiltrate in an HIV-negative patient or a patient at low risk for HIV infection                                 | <i>Mycobacterium tuberculosis</i>                  | Airborne             |
| <b>Cough/Fever</b><br>Pulmonary infiltrate in any lung location in a HIV-infected patient or a patient at high risk for HIV infection | <i>Mycobacterium tuberculosis</i>                  | Airborne             |
| Paroxysmal or severe persistent cough during periods of pertussis activity  | <i>Bordetella pertussis</i>                        | Droplet              |
| Respiratory infections, particularly bronchiolitis and croup, in infants and young children   | Respiratory syncytial or parainfluenza virus       | Contact              |

|   |  |  |         |
|---|--|--|---------|
|   | History of infection or colonization with multidrug-resistant organisms <sup>§</sup>   | Resistant bacteria <sup>§</sup>                      | Contact |
| <b>Risk of multidrug-resistant microorganisms</b> | Skin, wound, or urinary tract infection in a patient with a recent hospital or nursing home stay in a facility where multidrug-resistant organisms are prevalent | Resistant bacteria <sup>§</sup>                      | Contact |
|   | Abscess or draining wound that cannot be covered   | <i>Staphylococcus aureus</i> , group A streptococcus | Contact |
| <b>Skin or Wound Infection</b>                    |  |  |         |

Infection control professionals are encouraged to modify or adapt this table according to local conditions. To ensure that appropriate empiric precautions are implemented always, hospitals must have systems in place to evaluate patients routinely according to these criteria as part of their preadmission and admission care.

\*Patients with the syndromes or conditions listed below may present with atypical signs or symptoms (e.g., pertussis in neonates and adults may not have paroxysmal or severe cough). The clinician's index of suspicion should be guided by the prevalence of specific conditions in the community, as well as clinical judgment.

†The organisms listed under the column "Potential Pathogens" are not intended to represent the complete, or even most likely, diagnoses, but rather possible etiologic agents that require additional precautions beyond Standard Precautions until they can be ruled out.

‡These pathogens include enterohemorrhagic *Escherichia coli* O157:H7, *Shigella*, hepatitis A, and rotavirus.

§Resistant bacteria judged by the infection control program, based on current state, regional, or national recommendations, to be of special clinical or epidemiologic significance.

Reproduced from Garner JS. Hospital Infection Control Practices Advisory Committee. Guideline for isolation precautions in hospitals. Infect Control Hosp Epidemiol 1996;17:53-80, and Am J Infect Control 1996;24:24-52.

**B. Symptoms**

1. May be localized or systemic.
2. It is critical to be thorough in performing the entire history and physical (H&P).

**C. Historical Clues That May “Break the Case”:** These clues generally fall into two categories: (1) those that delineate potential exposures to infectious agents, and (2) those that describe the patient’s susceptibility to infection (Table 16-4).

**D. Important Questions for a Febrile Patient**

1. What is the duration and magnitude of fever? This will allow you to answer the important question, “Is this disease process acute or chronic?”
2. When did the fever begin? Quickly ascertain the onset of the fever because some disease processes dictate immediate treatment (e.g., acute bacterial meningitis).
3. Is there a pattern to the fever? (See Tables 16-1 and 16-2.) For some diseases (e.g., malaria), the periodicity of the fever can be a helpful clue. (Fever patterns also provide interesting material for questions during clinical rounds.)
4. Is there a specific part of your body that is bothering you/painful (e.g., determine localized vs. systemic infection)? When examining the febrile patient, evaluate all localizing symptoms so as not to overlook a potential infectious disease emergency, such as an invasive soft tissue infection.
5. Determine whether the patient is immunocompromised (Table 16-5). What is the specific immune defect? Certain host defects are associated with susceptibility to specific organisms or groups of organisms, some of which require immediate therapy. When caring for immunocompromised patients, it is important to remember that infection with more than one agent may occur simultaneously.
6. Has the patient traveled outside the United States recently? The febrile returning traveler should be evaluated expediently for life-threatening infections, such as malaria. A careful travel history is critical in establishing a differential diagnosis that takes into consideration details of travel itinerary, conditions of travel, prior immunizations, antibiotic prophylaxis, and exposure history.
7. Has the patient been hospitalized recently?
8. Has the patient taken any medications that may alter the fever?
9. Does the patient have occupational exposures or hobbies that make him or her susceptible to infection?
10. Has the patient been exposed to animals, raising the possibility of a zoonotic infection (Table 16-6)?

*Text continued on p. 285.*

**Table 16-4. HOST FACTORS THAT INFLUENCE EXPOSURE, INFECTION, AND DISEASE.**

| FACTORS THAT INFLUENCE EXPOSURE TO INFECTIOUS AGENTS  | FACTORS THAT INFLUENCE INFECTION AND THE OCCURRENCE AND SEVERITY OF DISEASE FOR THE PATIENT |
|---|---|
| Animal exposure, including pets   | Age at the time of infection  |
| Behavioral factors related to age, drug usage, and alcohol consumption  | Alcoholism  |
| Blood or blood product recipient  | Anatomic defect   |
| Child day care attendance   | Antibiotic resistance (agent)   |
| Closed living quarters: military barracks, dormitories, homeless shelters, facilities for the elderly and mentally handicapped, prisons | Antibiotic use (host)   |
| Food and water consumption  | Coexisting noninfectious diseases, especially chronic                                       |
| Familial exposures  | Coexisting infections   |
| Gender  | Dosage: amount and virulence of the organism to which the host is exposed                   |
| Hospitalization or outpatient medical care  | Duration of exposure to the organism  |
| Hygienic practices  | Entry portal of organisms and presence of trauma at the site of implantation                |
| Occupation  | Gender  |
| Recreational activities, including sports and recreational injecting drug use   | Genetic makeup  |
| Sexual activity: heterosexual and homosexual, type and number of persons  | Immune state at the time of infection, including immunization status                        |
| School attendance   | Immunodeficiency (specific or nonspecific): natural, drug induced, or viral (HIV)           |
| Socioeconomic status  | Mechanism of disease  |
| Travel, especially to developing countries  | production: inflammatory, immunopathologic, or toxic  |
| Vector exposure   | Nutritional status  |
|   | Receptors for organism on cells needed for attachment or entry of the organism              |

Table reproduced with permission from Osterholm MT, Hedberg, CW, Moore KA. In Mandell GL, Bennett JE, Dolin R (eds), *Principles and Practice of Infectious Diseases*, ed 5. Philadelphia: Churchill Livingstone, 2000;163.

**Table 16-5. CONDITIONS RESULTING FROM IMMUNE DEFECTS AND ASSOCIATED INFECTING ORGANISMS.**

| DEFECTS                             | CONDITIONS   | ASSOCIATED INFECTING ORGANISMS   |
|-------------------------------------|--|--|
| <b>Neutropenia</b>                  | Leukemia, cytotoxic chemotherapy, AIDS, systemic lupus erythematosus (SLE), Felty syndrome, drugs                                    | <i>Escherichia coli</i><br><i>Klebsiella pneumoniae</i><br><i>Pseudomonas aeruginosa</i><br><i>Staphylococcus aureus</i><br><i>Staphylococcus epidermidis</i><br>Streptococci species<br>Yeasts<br>Aspergillus and other fungi |
| <b>Defective chemotaxis</b>         | Diabetes, alcoholism, renal failure, SLE, Hodgkin's disease, trauma, lazy leukocyte syndrome   | Staphylococci, streptococci, and yeasts  |
| <b>Defective neutrophil killing</b> | Chronic granulomatous disease, Down syndrome myeloperoxidase deficiency  | Catalase-positive bacteria (e.g., <i>S. aureus</i> , <i>E. coli</i> , <i>Candida</i> spp.).  |
| <b>B-lymphocyte defects</b>         | Congenital and acquired agammaglobulinemia, burns, enteropathies, myeloma, lymphocytic leukemia                                      | Encapsulated organisms (e.g., <i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> , <i>Neisseria</i> spp.; also <i>Salmonella</i> and <i>Campylobacter</i> spp.)   |
| <b>T-lymphocyte defects</b>         | Congenital immunodeficiencies, AIDS, lymphoma, sarcoidosis, Epstein-Barr virus (EBV) infection, SLE, cytomegalovirus infection (CMV) | Intracellular infections with bacteria, mycobacteria, viruses, parasites, fungi  |
| <b>Complement components</b>        | Congenital absence   | Miscellaneous bacterial infections   |

Reproduced with permission from Zinner SH. Treatment and prevention of infections in immunocompromised hosts. In Gorbach SL, Bartlett JG, Blacklow NR (eds), *Infectious Diseases*, ed 2. Philadelphia: WB Saunders, 1998;1252.

Table 16-6. ANIMAL ASSOCIATIONS AND ZOONOTIC DISEASE RISK.

| DISEASE/<br>ANIMAL              | AQUATIC<br>MAMMAL |  | BIRD | CAT | CATTLE | DOG | FISH | GOATS |   | HORSE | NONHUMAN<br>PRIMATE | RABBIT |        | RODENT | SNAKES |  | SWINE | WILDLIFE |
|---------------------------------|-------------------|--|------|-----|--------|-----|------|-------|---|-------|---------------------|--------|--------|--------|--------|--|-------|----------|
|                                 |                   |  |      |     |        |     |      | SHEEP |   |       |                     | HARE   | LIZARD |        |        |  |       |          |
| Anthrax                         |                   |  | X    | X   | X      | X   |      | X     | X |       |                     |        |        |        |        |  | X     | X        |
| Bartonellosis                   |                   |  | X    |     |        |     |      |       |   |       |                     |        |        |        |        |  |       |          |
| Brucellosis                     |                   |  | X    | X   | X      | X   |      | X     | X |       |                     | X      |        |        |        |  | X     |          |
| Campylobacteriosis              |                   |  | X    | X   | X      | X   |      | X     |   | X     |                     |        |        |        |        |  | X     |          |
| Capnocytophaga<br>canimorsus    |                   |  |      |     |        | X   |      |       |   |       |                     |        |        |        |        |  |       |          |
| Cryptosporidiosis               |                   |  | X    |     | X      | X   | X    | X     | X |       |                     |        |        |        |        |  | X     |          |
| Cryptosporidium                 | X                 |  |      |     |        |     | X    |       |   |       |                     |        |        |        |        |  | X     |          |
| Giardiasis                      | X                 |  |      |     |        |     |      |       |   | X     |                     |        |        |        |        |  |       |          |
| Hanta virus                     |                   |  |      |     |        |     |      |       |   |       |                     |        |        | X      |        |  |       |          |
| Hepatitis A                     |                   |  |      |     |        |     |      |       |   | X     |                     |        |        |        |        |  |       | X        |
| Herpes B                        |                   |  |      |     |        |     |      |       |   | X     |                     |        |        |        |        |  |       | X        |
| Histoplasmosis                  |                   |  |      |     |        |     |      |       |   |       |                     |        |        |        |        |  |       | X        |
| Lymphocytic<br>choriomeningitis |                   |  |      |     |        |     |      |       |   |       |                     |        |        | X      |        |  |       |          |
| Leptospirosis                   |                   |  | X    |     | X      | X   |      | X     | X |       |                     |        | X      | X      |        |  | X     | X        |
| Listeriosis                     |                   |  | X    |     | X      | X   |      | X     |   |       | X                   |        | X      | X      |        |  | X     | X        |
| Mycobacterium<br>spp.           |                   |  |      |     | X      |     |      |       |   |       | X                   |        |        |        |        |  | X     | X        |

Continued

Table 16-6. ANIMAL ASSOCIATIONS AND ZOONOTIC DISEASE RISK—cont'd

| DISEASE/<br>ANIMAL         | AQUATIC<br>MAMMAL | BIRD | CAT | CATTLE | DOG | FISH | GOATS<br>SHEEP | HORSE | NONHUMAN<br>PRIMATE | RABBIT<br>HARE | RODENT | SNAKES<br>LIZARD | SWINE | WILDLIFE |
|----------------------------|-------------------|------|-----|--------|-----|------|----------------|-------|---------------------|----------------|--------|------------------|-------|----------|
| ORF                        |                   |      |     |        |     | X    |                |       |                     |                |        |                  |       |          |
| Ornithosis                 | X                 |      |     |        |     |      |                |       |                     |                |        |                  |       |          |
| Pasteurellosis             | X                 | X    | X   | X      |     |      |                |       |                     |                |        |                  | X     |          |
| Rat-bite-fever             |                   |      |     |        |     |      |                |       |                     | X              | X      |                  |       | X        |
| Plague                     |                   | X    | X   | X      |     |      |                |       |                     | X              | X      |                  |       |          |
| Q fever                    |                   | X    | X   | X      |     | X    | X              |       |                     | X              |        |                  |       |          |
| Rabies                     |                   | X    | X   | X      | X   | X    | X              | X     |                     | X              | X      |                  | X     | X        |
| Salmonellosis              |                   | X    | X   | X      | X   | X    | X              | X     | X                   | X              | X      | X                | X     | X        |
| Streptococcus<br>iniae     |                   |      |     |        | X   |      |                |       |                     |                |        |                  |       |          |
| Shigellosis                |                   |      |     |        |     |      | X              |       |                     |                |        |                  |       |          |
| Toxoplasmosis              |                   | X    | X   | X      | X   |      |                |       |                     | X              | X      |                  | X     | X        |
| Tularemia                  |                   | X    | X   | X      | X   |      |                |       |                     | X              | X      |                  | X     |          |
| Vibriosis                  |                   |      |     |        | X   | X    |                |       |                     |                |        |                  |       |          |
| Viral hemorrhagic<br>fever |                   |      |     |        |     |      |                |       |                     | X              | X      |                  |       | X        |
| Yersiniosis                |                   |      | X   | X      | X   | X    | X              | X     | X                   |                |        |                  | X     |          |

Table reproduced with permission from Weinberg AN. Zoonoses. In Mandell GL, Bennett JE, Dolin R (eds), Principles and Practice of Infectious Diseases, ed 5. Philadelphia: Churchill Livingstone, 2000:3242.

### III. PAST MEDICAL AND SURGICAL HISTORY

#### A. Past Medical History

1. What diseases have you had? How were they treated? Certain disease processes and treatments may alter immune function.
2. Do you have any deficiencies? Determine whether they are natural, induced (chemotherapy), or viral (human immunodeficiency virus [HIV]).
3. Have you had a chronic disease process or paralysis?
4. Have you recently been hospitalized or received inpatient medical care? Consider recent outbreaks of hospital-acquired (nosocomial) infections.
  - a. Have you had an infection? Involving the urinary tract, lungs, surgical wound, blood? The most common sites of nosocomial infections are the urinary tract, lung (pneumonia), surgical wound, and bloodstream (sepsis).
  - b. Eliciting a history of recent hospitalization is helpful for both planning the diagnostic evaluation and for selecting empiric therapy.
  - c. Hospital-acquired pathogens are often more drug resistant than community-acquired pathogens (e.g., vancomycin-resistant enterococcus, methicillin-resistant *Staphylococcus* species), and may require a modification of the usual empiric therapy for a given infection.

#### B. Past Surgical History

1. Have you had any surgical procedures that involved implanting foreign bodies (e.g., mesh, joints, screws/hardware, tooth implants, heart valves, pacemaker, breast implants)?
2. Did you undergo surgery to repair an anatomic defect (natural or acquired)?
3. Have you had a splenectomy?

#### C. Emergency and Trauma History

1. Have you ever been treated for trauma? Any damage to skin or mucous membranes?
2. Have you had a blood transfusion? The risk of a transfusion-transmitted infection has decreased considerably but has not been eliminated.

#### D. Childhood History

1. Development.
2. Illnesses (e.g., otitis media, respiratory infections, urinary tract infections [UTIs], seizures, and hospitalizations).
3. Child day care attendance.

#### E. Occupational History

1. What, if any, organisms or toxins are you exposed to at work?
2. Do you work in close proximity to co-workers (e.g., assess risk of exposure to co-workers)?

#### F. Travel History

1. Have you traveled within the United States? To foreign countries? Include geographic locations and dates.

2. Did you have a fever during or after your trip? Fever in the returning traveler requires an expedient evaluation to promptly recognize and treat potentially fatal diseases, such as malaria.
3. When taking a travel history, it is important to ask:
  - a. Where did you go? For what duration? When did you return?
  - b. What were the travel conditions (e.g., city versus remote)?
  - c. Did you drink the local water?
  - d. What exposures did you have to insects and animals?
  - e. What types of food and drink did you consume?
  - f. Did you have any sexual contacts? Was protection used?
  - g. Obtain immunization and medication history, including those taken as prophylaxis.
4. Identify diseases that are capable of being transmitted to others, and for which isolation precautions are advised.

**G. Animal and Insects Exposure History** (See Table 16-6 for detailed list.)

1. What animals and insects have you recently been exposed to (including pets)? Have you been exposed to cats (toxoplasmosis, cat scratch disease) or pigeons (*Chlamydia psittacosis*)?
2. Have you had any reactions to bites or stings (envenomations)?

**IV. MEDICATIONS**

1. Are you taking any medications? Which ones? Note medications that may alter fever (e.g., nonsteroidal anti-inflammatory drugs [NSAIDs], medications containing NSAIDs, acetaminophen).
2. Have you recently used antibiotics? For what reason? Antibiotics may alter disease manifestation and ability to culture etiologic agent.
3. Have you had any allergic or adverse reactions? Some patients may experience anaphylactic reactions to certain medications (penicillin and derivatives). Note specific agent and type of reaction. For some infections, desensitization may be required.

**V. HEALTH MAINTENANCE**

**A. Prevention**

1. What immunizations have you had?
  - a. Childhood immunizations by type and/or age: Diphtheria, pertussis, tetanus, polio, measles, mumps, rubella, varicella, influenza, Hemophilus influenza type b, hepatitis B, meningococcus.
  - b. Adult immunizations by type and/or age: Varicella, influenza, pneumococcus, tetanus-diphtheria toxoid, hepatitis A, hepatitis B, rabies, meningococcus, anthrax, yellow fever, cholera.
2. Hygiene practice: How often do you bathe? Do you brush your teeth daily? How often? How often and when do you wash your hands? How do you control menses (e.g., pads vs. tampons)? If you use tampons, how often do you change them? If a child, inquire about toilet training.

3. Prophylaxis: Do you take antibiotics on a daily basis or for specific procedures (e.g., before dental care in patients)? Ask about prophylactic antibiotic use if patient is immunocompromised (e.g., asplenic patients, HIV-infected patients) or has had surgery involving foreign body placement (e.g., cardiac valve replacement, hip replacement).
  4. Do you use an insect repellent or take other precautions (e.g., covering head/face, tent)?
- B. Diet:** What food and water have you been exposed to recently? What is your usual diet? Evaluate nutritional status.
- C. Exercise/Recreational Activities:** In particular, note environmental exposures and zoonotic risks.
- D. Sleep Patterns**
1. Have there been any changes in your sleep pattern?
  2. Have changes been caused by night sweats?
- E. Social Habits**
1. Do you use alcohol? How much and how often?
  2. Do you use tobacco? What type? How much and for how long?
  3. Do you use illicit or recreational drugs?

## VI. FAMILY HISTORY

- A. First-Degree Relatives' Medical History and Three-Generation Genogram:** Look for a history of disease process(es) altering immune function (e.g., severe combined immune deficiency syndrome [SCIDS]).
- B. Familial Exposure:** Inquire about recent, potentially communicable, illnesses in family members.

## VII. PSYCHOSOCIAL HISTORY

### A. Personal and Social History

1. Where were you born (country and city)?
2. What is your religious affiliation?
3. What is your ethnic background?
4. Socioeconomic status: Describe your current residence. Whom do you live with? What is the physical layout? Note especially close-quarters facilities, such as military barracks, dormitories, homeless shelters, facilities for the elderly and mentally handicapped, and prisons.
5. Are you currently attending school?
6. Are you involved in a social club?

### B. Current Illness Effects on Patient

1. Does the patient understand the illness?
2. Is counseling necessary (e.g., risk of transmission to others, any special precautions)?
3. Will the patient be able to continue current occupation?

### C. Interpersonal and Sexual History

1. Are you sexually active? More than one partner? Do you use protection? Possible exposure to sexually transmitted disease (STD).

2. Do you now have, or have you had, an STD? Consider the need to report to appropriate authority(ies). Contact partners.

#### D. Family Support

1. Are family members available to provide any necessary assistance?
2. Consider whether it is necessary to counsel family members.
3. Does the patient require any special needs or arrangements (e.g., wheelchair, supplies for wound care, home health care)?

#### E. Occupation Aspects of the Illness

1. How will the rehabilitation requirements affect your employment (i.e., tertiary prevention)?
2. Will you be able to take necessary precautions (to protect self and co-workers)?

### VIII. REVIEW OF SYSTEMS (Tables 16-7, 16-8, and 16-9)

**Table 16-7. GENERAL INFECTIOUS DISEASE SYMPTOMS BY SYSTEM.**

| SYSTEM                          | SYMPTOMS  |
|---------------------------------|---|
| <b>General</b>                  | Weight loss, fatigue/weakness, chills (frequency, how long do they last?), night sweats, fever, and anorexia/loss of appetite   |
| <b>HEENT</b>                    | Sinus pain, headache, conjunctivitis, icterus, eyes/ears/nose pain, bleeding or discharge, photophobia, sore throat, difficulty swallowing, drainage in back of throat, dentition |
| <b>Neck</b>                     | Any masses, pain on movement, stiffness   |
| <b>Cardiac</b>                  | Angina, dyspnea, murmur   |
| <b>Respiratory</b>              | Cough (productive or nonproductive), hemoptysis, pleurisy, chest pain with or without radiation, shortness of breath  |
| <b>Gastrointestinal</b>         | Abdominal pain (location, quality, radiation), change in bowel habits/diarrhea, jaundice  |
| <b>Genitourinary</b>            | Flank pain, pain or burning on urination, discharge, hematuria  |
| <b>Obstetrics / gynecologic</b> | Pelvic pain, dyspareunia vaginal discharge, last menstrual period (LMP), contraceptives   |
| <b>Hematopoietic</b>            | Anemia, easy bruising, bleeding   |
| <b>Skin</b>                     | Color change (jaundice), easy bruising, rash  |
| <b>Neurologic</b>               | Loss of consciousness, change in mentation  |
| <b>Lymphatic</b>                | Neck, axillary, groin masses, drainage  |
| <b>Musculoskeletal</b>          | Trauma, pain, stiffness, swelling, backache, tumors/lesions   |

**Table 16-8. NONSPECIFIC SYMPTOMS AND THEIR INFECTIOUS DISEASE CORRELATES.**

| SYMPTOM                           | DISEASE  |
|-----------------------------------|--|
| <b>Abdominal pain (localized)</b> | Appendicitis, abscess (peritoneal, subphrenic, of solid organs)            |
| <b>Abdominal pain (diffuse)</b>   | Peritonitis, gastroenteritis   |
| <b>Change in mentation</b>        | Meningitis (bacterial, fungal, viral, parasitic), anoxia (many etiologies) |
| <b>Cough</b>                      | Sinusitis, pharyngitis, bronchitis, pneumonia                              |
| <b>Icterus</b>                    | Many etiologies including hemolysis, liver/ biliary disease, malaria       |
| <b>Joint pain</b>                 | Septic arthritis   |
| <b>Neck stiffness</b>             | Meningitis, osteomyelitis, soft tissue abscess                             |
| <b>Pelvic pain</b>                | STD, PID   |
| <b>Photophobia</b>                | Meningitis   |
| <b>Pleurisy</b>                   | Pleural effusion, irritation of diaphragm (abscess), pneumonia             |

**Table 16-9. COMMON INFECTIOUS DISEASE SYNDROMES AND THEIR SYMPTOMS.**

| SYNDROME               | SYMPTOMS   |
|------------------------|--|
| <b>Sinusitis</b>       | Nasal discharge, cough, sinus pain, fever  |
| <b>Meningitis</b>      | Headache, photophobia, neck pain/stiffness, lethargy, fever, nausea, vomiting  |
| <b>Pneumonia</b>       | Fever, chills, rigors, headache, malaise, cough (may or may not be productive), hemoptysis, pleuritic chest pain, possible diarrhea, chest/back pain |
| <b>Gastroenteritis</b> | Fever, nausea, vomiting, variable abdominal pain (localized, diffuse, intermittent, colicky)   |

### IX. PHYSICAL EXAMINATION (Table 16-10)

The physical examination of a patient with a febrile illness is no different from that of any other patient, with one exception: the need for empiric isolation precautions (Table 16-9). Because some infections are contagious, precautions may be needed to protect those who must interact with the patient.

A question that needs to be answered early in the triage of the febrile or infected patient is: “Does this patient have a disease that is

*Text continued on p. 294.*

Table 16-10. FINDINGS OF EXAMINATION AND POSSIBLE DIAGNOSES.

| SYSTEM                  | PHYSICAL EXAMINATION FINDING  | POSSIBLE DIAGNOSES  |
|-------------------------|---|---|
| <b>General</b>          | Chills  | Septic shock (Gram-negative bacteria), localized infection, parasitemia                                 |
|                         | Weight loss/emaciation  | Undiagnosed abscess (e.g., subphrenic, perirenal, other deep seated), chronic infection (HIV, parasite) |
| <b>Vital signs</b>      |   |   |
| <b>Pulse</b>            | Tachycardia   | May be early sign of impending sepsis   |
| <b>Blood pressure</b>   | Hypotension   | Septic shock  |
| <b>Respiratory rate</b> | Tachypnea   | Pneumonia   |
| <b>HEENT</b>            |   |   |
| <b>Eyes</b>             | Photophobia   | Meningitis (e.g., viral, bacterial, fungal), syphilis   |
|                         | Icterus   | Many etiologies, including liver/biliary disease, hemolysis (malaria)                                   |
|                         | Periorbital edema/redness   | Periorbital cellulitis  |
|                         | Injected conjunctivae   | Conjunctivitis  |
|                         | Failure to accommodate/react to light, weak extraocular muscles, ptosis | Botulism  |
|                         | Corneal ulceration/lesions  | Bacterial, viral, parasite (e.g., acanthamoeba)   |
|                         | Subretinal hemorrhage   | Trichinosis   |

|              |  |   |
|--------------|--|---|
| <b>Ears</b>  | Injected, immobile tympanic membranes              | Otitis media  |
|              | Inflamed canal                                     | Otitis externa  |
|              | Discharge  | Bacterial, fungal, viral infection                    |
|              | Periphararyngeal/peritonsillar mass                | Retropharyngeal/peritonsillar abscess                 |
| <b>Nose</b>  | Tonsillar exudate                                  | Pharyngitis (e.g., strep throat)                      |
|              | Whitish coloration                                 | Thrush  |
|              | Induration/edema floor of mouth                    | Infection of sublingual/submandibular space           |
|              | Petechiae, erythema soft palate                    | Scarlet fever   |
| <b>Mouth</b> | Koplik's spots                                     | Measles   |
|              | Beefy red tongue                                   | Scarlet fever   |
|              | Membrane   | Diphtheria  |
|              | Gingival edema/bleeding                            | Gingivitis (e.g., bacterial)                          |
|              | Sit forward with protrusion of mandible            | Epiglottitis  |
|              | Fluid in sinus (transillumination)                 | Sinusitis   |
| <b>Face</b>  | Unilateral pain/swelling with overlying redness    | Suppurative parotitis                                 |
|              | Bilateral swelling/pain                            | Viral (e.g., mumps)                                   |
|              | Pain/stiffness in jaw (risus sardonicus)           | Tetanus   |
|              | Disfigurement                                      | Hansen's disease, Leishmaniasis                       |
|              | Stiffness (e.g., Kernig's sign, Brudzinski's sign) | Meningitis, submastoid (Bezold's) abscess             |
|              | Pain tenderness/mass                               | Deep infection, osteomyelitis                         |
| <b>Lungs</b> | Thrombophlebitis jugular vein                      | Associated with Bezold's abscess                      |
|              | Rales/rhonchi                                      | Pulmonary edema (septic shock), bronchitis, pneumonia |
|              | Dullness to percussion                             | Effusion, consolidation (e.g., pneumonia)             |
|              | Respiratory obstruction                            | Mediastinal abscess                                   |

Continued

Table 16-10. FINDINGS OF EXAMINATION AND POSSIBLE DIAGNOSES—cont'd

| SYSTEM                | PHYSICAL EXAMINATION FINDING                   | POSSIBLE DIAGNOSES   |
|-----------------------|--|--|
|                       | Bronchophony, pectoriloquy, tracheal deviation | Pneumonia  |
|                       | Left pleural effusion                          | Splenic/pancreatic/subphrenic abscess, pneumonia, empyema                            |
|                       | Right pleural effusion                         | Liver/subphrenic abscess, pneumonia, empyema, amebiasis                              |
|                       | Pain   | Pneumonia, empyema, bronchitis   |
| <b>Chest</b>          | Friction rub                                   | Pericarditis   |
| <b>Cardiovascular</b> | New onset murmur                               | Endocarditis   |
|                       | Decreased heart sounds                         | Tamponade (pericarditis)   |
| <b>Abdomen</b>        | Fluid wave                                     | Peritonitis (e.g., spontaneous bacterial peritonitis [SBP])                          |
|                       | Pain, right lower quadrant (McBurney's point)  | Appendicitis, abscess, PID   |
|                       | Dullness to percussion                         | Ascites/peritonitis  |
|                       | Mass, right upper quadrant                     | Liver abscess (e.g., amoebic, bacterial), echinococcal cyst, PID                     |
|                       | Rigidity                                       | Peritonitis  |
|                       | Hepatomegaly                                   | Abscess  |
|                       | Vague, variable, nonlocalized discomfort       | Bacterial infection, "food poisoning" (e.g., enterotoxin), protozoal (e.g., Giardia) |
|                       | Splenomegaly                                   | Abscess, parasitemia (e.g., malaria, schistosomiasis)                                |
|                       | Lower abdominal pain                           | Appendicitis, PID  |

|                      |   |  |
|----------------------|---|--|
|                      | Distension  | Organomegaly (e.g., abscess) some pneumonias, peritoneal effusion  |
|                      | Rebound   |  |
| <b>Flank</b>         | Pain  | Peritonitis, appendicitis, gastroenteritis   |
| <b>Genitourinary</b> | Perineal pain, tender prostate  | Retroperitoneal abscess, pyelonephritis, gastroenteritis   |
| <b>Male</b>          | Urethral pain, meatal erythema  | Prostatitis  |
|                      | Testicular pain   | STD  |
|                      | Ulceration(s)   | Epididymitis, STD  |
|                      | Scrotal edema   | STD  |
|                      | Vaginal "fullness"/tenderness   | Parasitemia (e.g., filariasis)   |
| <b>Female</b>        | Pelvic pain during examination/cervical movement                      | Retrofascial abscess   |
|                      | Adnexal mass/fullness   | PID  |
|                      | Vulvar/vaginal/introitus erythema with or without white discoloration | Tuboovarian abscess (TOA)  |
|                      | Vaginal discharge   | Fungal (e.g., Candida)   |
|                      | Ulceration(s)   | Bacterial/fungal disease, STD, PID   |
|                      | Cyanosis  | STD, fungal, viral   |
| <b>Skin</b>          | Jaundice  | Septic shock, pneumonia  |
|                      | Redness, tenderness, swelling, heat                                   | Hemolysis (e.g., septic shock), biliary disease (cholangitis), liver disease (e.g., abscess, cyst: amoebic, echinococcal, viral) |
|                      | Reddish streaks with lymphadenopathy                                  | Dermal/subcutaneous infection  |
|                      | Warts, papules  | Lymphangitis   |
|                      |   | Viral (e.g., HPV)  |

Continued

Table 16-10. FINDINGS OF EXAMINATION AND POSSIBLE DIAGNOSES—cont'd

| SYSTEM             | PHYSICAL EXAMINATION FINDING               | POSSIBLE DIAGNOSES   |
|--------------------|--|--|
|                    | Erythematous lesions                       | Impetigo, pyoderma, cellulitis                               |
|                    | Ulceration                                 | Viral (e.g., HSV), bacterial (e.g., septic thrombi)          |
|                    | Petechiae                                  | Endocarditis   |
|                    | Red rash                                   | Scarlet fever  |
|                    | Red rash, exfoliative dermatitis           | Scalded skin syndrome, toxic shock syndrome                  |
|                    | Erythematous papule—eschar                 | Anthrax  |
|                    | Marbling/bronzing of skin                  | Clostridium  |
|                    | Petechiae, hemorrhages                     | Waterhouse-Friderichsen syndrome, DIC associated with sepsis |
|                    | Annular lesions                            | Lyme disease   |
|                    | Targetoid rash on palms/soles              | Syphilis (secondary)   |
|                    | Maculopapular rash                         | Viral exanthems, trichinosis                                 |
|                    | Vesicles (diffuse, dermatome distribution) | HSV, VZV   |
|                    | Large skin folds                           | Onchocerciasis   |
|                    | Lymphadenopathy                            | Infection of draining area, lymphangitis, parasitemia        |
| <b>Lymphatics</b>  | Suppurative lymphadenitis in groin         | Lymphogranuloma venereum (LGV)                               |
|                    | Mass                                       | Abscess  |
| <b>Extremities</b> | Joint pain, swelling, redness              | Septic arthritis   |
|                    | Crepitus                                   | Infection with gas-producing organism (emergency)            |

|   |  |
|---|--|
| Paronychia  | Infection around nail  |
| Bone pain   | Osteomyelitis  |
| Exquisite tenderness in distribution of tendon sheath/compartments with flexion | Suppurative tenosynovitis  |
| Hip/thigh pain, paresthesias  | Retropsoas abscess   |
| Inguinal/iliac crest pain, pain with movement of hip                            | Retrofascial abscess   |
| Hyperreflexia   | Tetanus  |
| Progressive weakness—paralysis  | Botulism, viral (e.g., polio)  |
| Reduced reflexes  | Botulism   |
| Massive edema   | Parasitemia (e.g., filariasis)   |
| Severe pain, edema (compartment syndrome)                                       | Gas gangrene (e.g., Clostridia)  |
| Splinter hemorrhages (nail)   | Endocarditis, trichinosis  |
| Mental status changes   | Meningitis, septic shock, parasitemia (e.g., Chagas' disease, trypanosomiasis), ruptured abscess |
| <b>Neurologic</b>   | Lyme disease   |
| Radiculopathy, cranial neuritis   | Lyme disease   |
| Chorea  | Perirectal abscess   |
| Perirectal mass/pain, fistula(s)  | Retrofascial abscess   |
| Fullness/tenderness   | Suprlevator (ischioanal) abscess   |
| Vague to severe pelvic pain, relieved with defecation, anal/coccygeal pain      | Proctitis (e.g., STD; bacterial, viral)  |
| Erythema, exudates, ulceration, mucosal bleeding                                |  |

potentially transmissible, and thus should isolation precautions be initiated?"

**X. LABORATORY STUDIES AND DIAGNOSTIC EVALUATIONS**

**A. Diagnostic Studies:** Microbiologic cultures, in particular, are an integral part of the work-up of a patient with a suspected infection.

1. It is important to be familiar with the unique capabilities of your hospital laboratory and to communicate directly with laboratory personnel about your differential diagnosis.
  - a. Some infections require unique methods of detection, and you must convey your suspicions to the laboratory personnel. For example, if you suspect a skin infection is caused by *Mycobacterium marinum*, the specimen should be cultured at 30°C to optimize growth.
  - b. You should also alert lab personnel if you suspect the patient's infection is caused by an etiologic agent that may pose a danger to lab personnel if cultured (e.g., coccidioidomycosis).
2. The diagnosis of an infection is typically made by the following method:
  - a. Direct examination of a clinical specimen.
  - b. Isolation of the microorganism(s).
  - c. Measurement of the host's immune response to the organism.
3. The proper collection, transport, and handling of specimens are critical to obtaining useful information (Table 16-11). The goal of proper specimen collection and handling is to minimize extrinsic contamination while facilitating growth of the pathogen.

**B. Radiologic Studies:** These may be critical for arriving at a correct diagnosis (chest x-ray for pneumonia, abdominal CT for abscess).

**C. Routine Tests:** In hospitalized patients with community-acquired pneumonia.

1. Chest radiograph.
2. Arterial blood gas (ABG) analysis.
3. Complete blood count (CBC).
4. Chemistry profile, including kidney and liver function tests (LFTs) and electrolyte levels.
5. HIV serology (age 15 to 54 years).
6. Blood culture.
7. Sputum Gram stain and culture +/- acid-fast stain and culture, Legionella test (culture, direct fluorescent antibody stain, or urinary antigen assay), Mycoplasma immunoglobulin M.
8. Pleural fluid analysis (if present): White blood cell (WBC) count and differential, lactate dehydrogenase (LDH), pH, protein, glucose, Gram stain, acid-fast stain; and culture for bacteria (aerobes and anaerobes), fungi, and mycobacteria.

*Text continued on p. 299.*

Table 16-11. SPECIMEN COLLECTION AND TRANSPORT FOR BACTERIOLOGY.

| SPECIMEN                                     | COLLECTION AND TRANSPORT  | COMMENT  |
|--|---|--|
|  | <i>BLOOD</i>  |  |
|  | Adults  |  |
|  | 1. 10 mL into each of two 100-mL vacuum bottles <i>or</i>   |  |
|  | 2. 5 mL into each of two 50-mL vacuum bottles and 10 mL into isolator, <i>or</i>  |  |
|  | 3. 10 mL into one 100-mL vacuum bottle and 10 mL into isolator  |  |
|  | 4. 10 mL into each of two BACTEC high-volume resin resin bottles  |  |
|  | Infants   |  |
|  | 1. 1-3 mL into each of two 50- or 100-mL vacuum bottles, <i>or</i>  | A minimum of two and a maximum of four cultures per septic episode are recommended |
|  | 2. 0.5-1.0 mL into pediatric isolator and any remaining blood into 50- or 100-mL vacuum bottle  |  |
| <b>Intravascular catheter</b>                | Remove catheter aseptically, clip one (from 2- to 3-inch catheter) or two (from 8- to 24-inch catheter) 2-inch segments, and transfer into swab transport device (Culturette) | Catheter segments should be cultured semi-quantitatively                           |
| <b>Exudate (transudate, drainage, ulcer)</b> | Swab or sterile, screw-capped tube  | Such specimens are rarely suitable for anaerobic culture                           |
| <b>Feces</b>                                 | Freshly passed specimen in sealed container or rectal swab  | Transport medium is recommended if delay is anticipated                            |

Continued

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Table 16-11. SPECIMEN COLLECTION AND TRANSPORT FOR BACTERIOLOGY—cont'd

| SPECIMEN                                | COLLECTION AND TRANSPORT   | COMMENT   |
|---|--|---|
| <i>FLUIDS</i>                           |  |   |
| <b>Cerebrospinal fluid (CSF)</b>        | Sterile, screw-capped tube to be delivered to the laboratory immediately   | Refrigeration may be harmful to <i>Neisseria</i> or <i>Haemophilus</i>  |
| <b>Peritoneal (including dialysate)</b> | Inoculate 10 mL into blood culture bottles   | Direct inoculation of blood culture systems has increased yield of bacteria from patients with spontaneous peritonitis and continuous ambulatory peritoneal dialysis-associated peritonitis   |
| <b>Pleural</b>                          | Inoculate a portion of the specimen into an anaerobic transport system   | Pleural or empyema fluid is a major source of anaerobic bacteria causing pleuropulmonary infection  |
| <b>GENITOURINARY SYSTEM</b>             |  |   |
| <b>For <i>Neisseria gonorrhoeae</i></b> | Send swab moistened with Stuart or Amies transport medium directly to laboratory (4-hour maximum transport time) or directly inoculate modified Thayer Martin medium into Transgrow or JEMBEC device | <p><b>Women</b><br/> <b>Cervix:</b> Moisten speculum with water before inserting into vagina; insert swab into cervical canal<br/> <b>Anal swab:</b> Insert swab approximately 2 cm and move from side to side to sample crypts</p> <p><b>Men</b><br/> <b>Urethra:</b> Swab may be used when a discharge is present; otherwise, a sterile bacteriologic loop is inserted to obtain scrapings for smear and culture<br/> <b>Anal swab:</b> Same procedure as for women</p> |

|                                    |  |  |
|------------------------------------|--|--|
| Cervix, vagina, for other bacteria | Swab   | Specimens from these sites are not suitable for anaerobic culture  |
| <i>URINE</i>                       |  |  |
| Midstream catheter                 | Collect in sterile, screw-capped container, which must be transported to the laboratory within 2 hours unless refrigerated   | This is the only type of urine specimen that is acceptable for anaerobic culture   |
| Suprapubic aspirate                | Inject portion of aspirate into an anaerobic transport tube or vial  | A swab provides too little material for Gram-stained smear or aerobic and anaerobic cultures. If the amount of pus is limited, one may inject the area with 0.5 to 1.0 mL bacteriostat-free lactated Ringer's, and aspirate material |
| <i>RESPIRATORY TRACT</i>           |  |  |
| For <i>Bordetella pertussis</i>    | Use flexible-wire, calcium-tipped swab or soft rubber catheter to obtain nasopharyngeal specimen   | Cough plate is not recommended   |
| Throat                             | Swab posterior pharynx, tonsils, any areas of purulence or ulceration; dry swab acceptable if cultured within 2 hours; otherwise, moisten swab with Stuart or Amies transport medium | Avoid contamination with oral secretions. Ordinarily, testing for group A streptococci is sufficient. The laboratory must be notified in case of suspected diphtheria, pertussis, or gonococcal infection                            |

Continued

Table 16-11. SPECIMEN COLLECTION AND TRANSPORT FOR BACTERIOLOGY—cont'd

| SPECIMEN                            | COLLECTION AND TRANSPORT  | COMMENT   |
|-------------------------------------|---|---|
| <i>RESPIRATORY TRACT</i>            |   |   |
| <b>Sputum</b>                       | Obtain specimen by expectorating a deep cough into a sterile, screw-capped jar  | Specimens should be screened cytologically and another specimen requested when >25 squamous epithelial cells are observed per low-power field                               |
| <b>Transtracheal aspirate</b>       | Collect aspirate in a Lukens trap or inject into an anaerobic transport vial  | Such specimens are suitable for anaerobic culture   |
| <b>Protected brush</b>              | The brush is severed from the inner cannula and transported to the laboratory in 1 mL of bacteriostatic free lactated Ringer's solution | Quantitative culture of the vortexed lactated Ringer's solution helps differentiate upper from lower respiratory tract bacterial origin                                     |
| <b>Bronchoalveolar lavage (BAL)</b> | Obtain at least 40 mL for complete microbiologic examination  | Cyocentrifuge smears should be made for Gram and other appropriate stains. Quantitative culture will help differentiate upper from lower respiratory tract bacterial origin |
| <b>Tissue</b>                       | Sterile, screw-capped container   | A sufficient amount of tissue must be obtained for both histopathologic and microbiologic examinations  |

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## XI. EPONYMS, ACRONYMS, AND ABBREVIATIONS (Tables 16-12 and 16-13)

Table 16-12. SELECTED INFECTIOUS DISEASE-FOCUSED EPONYMS.

| EPONYM                            | DESCRIPTION  | ASSOCIATION(S)   |
|-----------------------------------|--|--|
| Bezold's abscess                  | Abscess associated with mastoid disease  | Mastoiditis  |
| Biederman's sign                  | Dark red coloration of the anterior pillars of the throat                              | Seen in some patients with syphilis                    |
| Borsieri's sign (line)            | When fingernail drawn along skin, a white line is left, which quickly turns red.       | Associated with early stages of scarlet fever          |
| Brudzinski's sign                 | Flexion of the neck results in flexion of the hip and knee                             | Associated with meningitis                             |
| Brunati's sign                    | Opacities in the cornea  | Appearance in the course of pneumonia or typhoid fever |
| Clavicular sign                   | Tumefaction of the inner third of the right clavicle                                   | Associated with congenital syphilis                    |
| Filopovitch's (palmoplantar) sign | Yellow discoloration of the prominent parts of the palms/soles                         | Seen with typhoid fever                                |
| Guillard's sign                   | Brisk flexion of the hip when contralateral quadriceps are pinched                     | Associated with meningeal irritation                   |
| Hatchcock's sign                  | Tenderness on running finger toward angle of the jaw                                   | Associated with mumps                                  |
| Jackson's sign                    | Prolongation of expiratory sound over affected area                                    | Pulmonary tuberculosis                                 |
| Horn's sign                       | Pain produced on traction of right spermatic cord                                      | Associated with appendicitis                           |
| Kernig's sign                     | When lying with knee on abdomen or when sitting, the leg cannot be completely extended | Associated with meningitis                             |
| Koplik's spots                    | Bright red spots on buccal/lingual mucosa  | Measles  |
| Lenhoff's sign                    | Furrow appearing on deep inspiration below the lowest rib and above cyst in liver      | Echinococcal cyst of liver                             |

Continued

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Table 16-12. SELECTED INFECTIOUS DISEASE-FOCUSED EPONYMS—cont'd

| EPONYM                  | DESCRIPTION   | ASSOCIATION(S)  |
|-------------------------|---|---|
| McBurney's sign         | Tenderness at a point two thirds of the distance from the umbilicus to the anterior superior spine of the ilium                   | Associated with appendicitis  |
| Murat's sign            | Vibration of the affected side of the chest with a feeling of discomfort when speaking  | Associated with tuberculosis  |
| Obturator sign          | Hypogastric/adductor pain by passive internal rotation of the flexed thigh  | Associated with appendicitis  |
| Osler's sign            | Painful, small erythematous swellings in the skin of the hands and feet   | Associated with endocarditis  |
| Parrot's sign           | Dilation of the pupils when skin on the back of the neck is pinched   | Seen with meningitis  |
| Romberg's sign          | Swaying of the body or falling when standing with feet close together and eyes closed   | Seen with tabes dorsalis  |
| Skoda's sign            | Tympanic sound heard on percussing chest above large pleural effusion or lung consolidation                                       | Pneumonia   |
| Squire's sign           | Alternate dilation and contraction of the pupil   | Basilar meningitis  |
| Waterhouse-Friderichsen | Meningitis with sudden onset, short course of fever, coma, collapse, cyanosis, petechial hemorrhages of skin and mucous membranes | Meningitis associated with bilateral adrenal hemorrhage (e.g., meningococcal disease) |
| Weill's sign            | Absence of expansion in the subclavicular region of the affected side   | Infantile pneumonia   |

Table 16-13. SELECTED INFECTIOUS DISEASE-FOCUSED ACRONYMS AND ABBREVIATIONS.

| ACRONYM OR ABBREVIATION | TERM                                | ACRONYM OR ABBREVIATION | TERM   |
|-------------------------|-------------------------------------|-------------------------|--|
| AIDS                    | Acquired immunodeficiency syndrome  | HIV                     | Human immunodeficiency virus                       |
| ARDS                    | Adult respiratory distress syndrome | HSV                     | Herpes simplex virus                               |
| BAL                     | Bronchoalveolar lavage              | MAC                     | Mycobacterium avium intracellulare complex         |
| BCG                     | Bacilli Calmette-Guerin vaccine     | MRSA                    | Methicillin-resistant <i>Staphylococcus aureus</i> |
| CGD                     | Chronic granulomatous disease       | PCP                     | <i>Pneumocystis carinii</i>                        |
| CMV                     | Cytomegalovirus                     | PID                     | Pelvic inflammatory disease                        |
| CJD                     | Creutzfeldt-Jakob disease           | PML                     | Progressive multifocal leukoencephalopathy         |
| CVAT                    | Costovertebral angle tenderness     | RPR                     | Rapid plasma reagin (serologic test for syphilis)  |
| EBV                     | Epstein-Barr virus                  | RSV                     | Respiratory syncytial virus                        |
| EHEC                    | Enterohemorrhagic <i>E. coli</i>    | SBP                     | Spontaneous bacterial peritonitis                  |
| EIA                     | Enzyme immunoassay                  | SCIDS                   | Severe combined immune deficiency syndrome         |
| ELISA                   | Enzyme-linked immunosorbent assay   | SIRS                    | Systemic inflammatory response syndrome            |
| FUO                     | Fever of unknown origin             | STD                     | Sexually transmitted disease                       |
| GVHD                    | Graft versus host disease           | TMP-SMX                 | Trimethoprim sulfamethoxazole                      |
| HUS                     | Hemolytic uremic syndrome           | UTI                     | Urinary tract infection                            |
| HAV, HBV, HCV           | Hepatitis A, B, and C virus         | VRE                     | Vancomycin-resistant enterococcus                  |
|                         |                                     | VZV                     | Varicella Zoster virus                             |

## XII. DEFINITIONS (Table 16-14)

**Table 16-14. INFECTIOUS DISEASE-FOCUSED DEFINITIONS.**

| TERM                           | DEFINITION  |
|--------------------------------|---|
| <b>Bacteremia</b>              | Bacteria present in blood, as confirmed by culture; may be transient  |
| <b>Hypotension</b>             | A systolic blood pressure of <90 mmHg or a reduction of >40 mmHg from baseline in the absence of another known cause for hypotension  |
| <b>Infection</b>               | Presence of an organism in a normally sterile site that is usually, but not necessarily, accompanied by an inflammatory host response   |
| <b>Refractory septic shock</b> | Septic shock that lasts for more than 1 hour and does not respond to fluid administration or pharmacologic intervention   |
| <b>Sepsis</b>                  | Describes the inflammatory response to infection. See clinical evidence of infection and evidence of systemic response, manifested by two or more of the following conditions:<br>Temperature >38°C (100.4°F) or <36°C (96.8°F)<br>Heart rate >90 beats per minute<br>Respiratory rate >20 breaths/minute or arterial carbon dioxide tension of <32 mm<br>White blood cell (WBC) count: >12,000 cells/mm <sup>3</sup> , <4000 cells/mm <sup>3</sup> , or >10% immature band forms<br>These changes should represent an acute alteration from baseline in the absence of another known cause for the abnormalities |
| <b>Sepsis syndrome</b>         | Sepsis plus evidence of altered organ perfusion, with at least one of the following: Hypoxemia, elevated lactate, oliguria, altered mentation   |
| <b>Septicemia</b>              | Same as bacteremia, but implies greater severity  |
| <b>Septic shock</b>            | Sepsis with hypotension despite adequate fluid resuscitation, with the presence of perfusion abnormalities that may include, but are not limited to, lactic acidosis, oliguria, or an acute alteration in mental status. Patients who are receiving inotropic or vasopressor agents may not be hypotensive at the time that perfusion abnormalities are measured  |

Table 16-14—cont'd

| TERM   | DEFINITION  |
|--|---|
| <b>Severe sepsis</b>                           | Sepsis associated with organ dysfunction, hypoperfusion, or hypotension. Hypoperfusion and perfusion abnormalities may include, but are not limited to, lactic acidosis, oliguria, or altered mental status |
| <b>Systemic inflammatory response syndrome</b> | Response to a wide variety of clinical insults, which can be infectious, as in sepsis, but can be noninfectious in etiology (e.g., burns, pancreatitis)   |

Table adapted with permission from Young LS. Sepsis syndrome. In Mandell GL, Bennett JE, Dolin R (eds), *Principles and Practice of Infectious Diseases*, ed 5. Philadelphia: Churchill Livingstone, 2000; 690.

### XIII. SAMPLE H&P WRITE-UP

**CC:** “I’ve got the worst headache of my life.”

**HPI:** J.R. is an 18-year-old white male college student who presents with an acute onset of the worst headache of his life. He was in his usual state of excellent health until 12 hours before admission, when he developed fever, headache, and stiff neck.

**PMHx:** The patient denies any chronic medical problems. He states that two other students in his dormitory have similar symptoms and are being evaluated in the emergency room.

**PSHx:** History of an automobile accident at age 16, during which he suffered a ruptured spleen and required a splenectomy. No other hospitalizations or surgeries.

**Emergency and Trauma History:** No history of head trauma. No prior transfusions.

**Childhood History:** Varicella at age 7. He denies any other childhood illnesses.

**Occupational History:** Freshman in college; works at a local fast-food restaurant as a cook.

**Travel History:** No recent or remote history of travel.

**Sexual History:** Reports monogamous relationship with healthy female student.

**MEDICATIONS:** Ibuprofen during the past day for headache and fever. He has not taken any other medications. The patient denies any known allergies.

#### HEALTH MAINTENANCE

**Prevention:** The patient received all of the usual childhood immunizations. He does not recall receiving any additional immunizations following his splenectomy.

**Diet:** Regular diet with no restrictions. Eats meals in college cafeteria and at fast-food restaurant where employed. No ingestion of raw meats.

**Exercise:** The patient is on the college track team.

**Sleep Patterns:** Wakes at most once each night to void. Denies recent changes.

**Social Habits:** The patient denies tobacco use or illicit drug use. Drinks approximately one six-pack of beer per weekend.

#### **FAMILY HISTORY**

**First-Degree Relatives' Medical History:** The patient's father has hypertension and adult-onset diabetes mellitus. The patient's mother has a history of intermittent migraine headaches that respond well to medication. The patient's two siblings have no medical problems.

#### **PSYCHOSOCIAL HISTORY**

**Personal and Social History:** The patient is a white college student who lives in the freshman dormitory.

#### **REVIEW OF SYSTEMS**

**General:** Fever, chills, rigors, and severe headache over past 12 hours.

**HEENT/Neck:** Positive for headache, photophobia. No discharge, difficulty swallowing, or drainage in back of throat.

**Respiratory:** Denies cough or dyspnea.

**Cardiovascular:** No chest pain, dyspnea, or history of murmur.

**Gastrointestinal:** Mild abdominal pain "all over" without radiation. Reports several episodes of emesis after headache began. No diarrhea.

**Genitourinary:** No dysuria, urinary urgency, hematuria, or discharge.

**Hematopoietic/Lymphatic:** No bleeding or adenopathy.

**Neurologic:** No loss of consciousness (LOC) or change in mentation.

**Skin:** New onset of rash on legs and lower abdomen.

**Musculoskeletal:** Recent neck stiffness.

#### **PHYSICAL EXAMINATION**

**Vitals:** T (oral) 102°F P 99 BP 90/60 RR 22 Weight 170 lbs.

**General:** Agitated, well-developed, well-nourished Caucasian male who appears his stated age. Patient is oriented to person, place, time, and circumstances, but appears in moderate distress secondary to headache.

**HEENT:** Head is normocephalic without palpable defects. Mild sinus tenderness on percussion. Lids/sclera normal. Conjunctivae slightly injected. Pupils measure 3mm bilaterally and react symmetrically to light. Photophobia present. Tympanic membranes are clear and mobile. Nares are patent with slight mucosal erythema and clear nasal discharge. Neck stiff with limited range of motion. Positive Kernig's and Brudzinski's signs. Trachea normal position. No JVD.

Tonsils slightly injected but otherwise within normal limits. No adenopathy appreciated.

**Lungs:** Clear to auscultation bilaterally.

**Cardiovascular:** Normal S1 and S2. Regular rate and rhythm. No JVD, murmur.

**Abdomen:** Well-healed surgical scar in the left upper quadrant. Soft with diffuse mild tenderness and no localizing signs. No organomegaly, flank pain (CVAT), or suprapubic tenderness.

**Genitalia:** Normal circumcised male. No penile lesions/discharge, testicular pain, or masses.

**Rectum/Prostate:** Normal external appearance. Guaiac negative. Prostate normal size with no tenderness on palpation.

**Extremities:** Normal range of motion. No weakness or muscle tenderness.

**Skin:** Multiple purpuric lesions noted on both lower extremities and lower abdomen.

**Lymphadenopathy:** “Fullness” noted bilateral neck (anterior cervical), but otherwise no adenopathy.

**Neurologic:** Normal mental status examination and gait.