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Page 260, www.aapredbook.org/content/1/SEC131/SEC152.body: In Burkholderia Infections, Treatment section, the following changes should be made:

- In the first paragraph, a portion of the 2nd sentence should be changed from Most experts recommend to Some experts recommend.
- In the second paragraph, a portion of the 1st sentence should be changed from ceftazidime and meropenem or imipenem to ceftazidime or meropenem or imipenem.
- In the second paragraph, a portion of the 2nd sentence should be changed from trimethoprim-sulfamethoxazole and doxycycline to trimethoprim-sulfamethoxazole or doxycycline. (See page 4 for revised text.)

Page 349, www.aapredbook.org/content/1/SEC131/SEC186.body: In Haemophilus influenzae Infections, in Table 3.10, add new 2nd row with the following information across the four columns: PRP-T; ActHIB; PRP conjugated to tetanus toxoid; Sanofi Pasteur. (See page 5 for revised text.)

Page 350, www.aapredbook.org/content/1/SEC131/SEC186.body: In Haemophilus influenzae Infections, in Table 3.11, add new 2nd row with the following information across the four columns: PRP-T (Sanofi Pasteur); 2, 4, 6 mo; 12 through 15 mo; 16 mo through 4 y. (See page 6 for revised text.)

Page 436, www.aapredbook.org/content/1/SEC131/SEC202.body: In Human Immunodeficiency Virus Infection, Control Measures/Interruption of Mother-to-Child Transmission of HIV section, in the discussion of nevirapine, the parenthetical phrase of “(at birth and at 48 hours and 96 hours of life)” should be changed to “(at birth, 48 hours after the first dose, and 96 hours after the second dose)” —so that the full sentence reads, “A 2-drug regimen of zidovudine for 6 weeks with 3 doses of nevirapine during the first week of life (at birth, 48 hours after the first dose, and 96 hours after the second dose) is as
effective but less toxic than a 3-drug regimen of zidovudine, lamivudine, and nelfinavir.” (See page 7 for revised text.)

Page 544, www.aapredbook.org/content/1/SEC131/SEC233.body: In Pediculosis Capitis, Treatment section, the last sentence of the Permethrin (1%) paragraph should be changed from Permethrin is not approved by the FDA for use on children younger than 2 years of age. to Permethrin 1% is approved by the FDA for use on children 2 months of age or older. (See page 8 for revised text.)

Page 646, www.aapredbook.org/content/1/SEC131/SEC259.body: In Shigella Infections, Treatment section, a portion of the first sentence of the 3rd bullet point should be changed from parenteral azithromycin for 3 days, ceftriaxone for 5 days to azithromycin for 3 days, parenteral ceftriaxone for 5 days. (See page 9 for revised text.)

Page 668, www.aapredbook.org/content/1/SEC131/SEC264.body: In Group A Streptococcal Infections, Clinical Manifestations section, first paragraph, last sentence, the words “suppurative and” should be added before nonsuppurative and the words “and acute glomerulonephritis” should be deleted from the parenthetical passage, so that the full sentence reads, “The goals of antimicrobial therapy for GAS upper respiratory tract disease are to reduce acute morbidity, suppurative and nonsuppurative sequelae (acute rheumatic fever), and transmission to close contacts.” (See page 10 for revised text.)

Page 674, www.aapredbook.org/content/1/SEC131/SEC264.body: In Group A Streptococcal Infections, Treatment section for Pharyngitis, 2nd-to-last bullet, the dosage for azithromycin should be changed from “(12 mg/kg/day [maximum, 500 mg] on day 1, then 6 mg/kg/day [maximum, 250 mg/day]), which is given on days 2 through 5” to “(12 mg/kg/day for 5 days [maximum 500 mg/day]).” (See page 11 for revised text.)

Page 782, www.aapredbook.org/content/1/SEC131/SEC289.body: In Varicella-Zoster Infections, Care of Exposed People section, in the Chemoprophylaxis paragraph, at the beginning of the first sentence, the words “or more than 96 hours have passed since exposure” should be deleted so the beginning of the sentence reads simply, “If Varicella-Zoster Immune Globulin is not available, some experts recommend...” (See page 12 for revised text.)

Page 814, www.aapredbook.org/content/1/SEC295/SEC304/T132.expansion.html: In Table 4.2, in the Azithromycin (Zithromax, Zmax) row, under Comments, a portion of the text should be changed from “Pharyngitis: 12 mg/kg/day (maximum 500 mg) on day 1, then 6 mg/kg/day (maximum 250 mg) on days 2–5” to “Pharyngitis: 12 mg/kg/day for 5 days (maximum 500 mg/day).” (See page 13 for revised text.)
Page 841, www.aapredbook.org/content/1/SEC295/SEC314.body: In Table 4.8, under Acyclovir (Zovirax), the following changes should be made:

- In the row for Varicella in immunocompetent host, Oral route, under “Usually Recommended Dosage,” a qualifier should be added so the entry 80 mg/kg applies to ≤40 kg children, and an entry should be added reading >40 kg: 3200 mg in 4 divided doses for 5 days.
- In the row for Varicella in immunocompetent host requiring hospitalization, IV route, under “Usually Recommended Dosage,” the dosage for all patients should be changed to 30 mg/kg per day for 7–10 days or 1500 mg/m² per day in 3 doses for 7–10 days. (See page 14 for revised text.)

Page 880, www.aapredbook.org/content/1/SEC317/SEC328.body: In Prevention of Bacterial Endocarditis, in Table 5.3, in the final row, in the Regimen, Adults column, the dosage for clindamycin should be changed from 6700 mg, IM or IV to 600 mg, IM or IV. (See page 15 for revised text.)
been reported to cause pulmonary infection in people with cystic fibrosis and people traveling to areas with endemic infection as well as septicemia in children with chronic granulomatous disease.

The **incubation period** is 1 to 21 days, with a median of 9 days, but can be prolonged (years) for melioidosis.

**DIAGNOSTIC TESTS:** Culture is the appropriate method to diagnose *B cepacia* complex infection. In cystic fibrosis lung infection, culture of sputum on selective agar is recommended to decrease the potential for overgrowth by mucoid *Pseudomonas aeruginosa*. *B cepacia* and *B gladioli* can be identified by polymerase chain reaction assay, but this assay is not available routinely. Definitive diagnosis of melioidosis is made by isolation of *B pseudomallei* from blood or other infected sites. The likelihood of successfully isolating the organism is increased by culture of sputum, throat, rectum, and ulcer or skin lesion specimens. A positive result by the indirect hemagglutination assay for a traveler who has returned from an area with endemic infection may support the diagnosis of melioidosis, but definitive diagnosis still requires isolation of *B pseudomallei* from an infected site. Other rapid assays are being developed for diagnosis of melioidosis, but none are available commercially.

**TREATMENT:** Meropenem is the agent most active against the majority of *B cepacia* complex isolates, although other drugs that may be effective include imipenem, trimethoprim-sulfamethoxazole, ceftazidime, doxycycline, and chloramphenicol. **Some experts recommend** combinations of antimicrobial agents that provide synergistic activity against *B cepacia* complex. The majority of *B cepacia* complex isolates are resistant intrinsically to aminoglycosides and polymyxin B.

The drugs of choice for initial treatment of melioidosis include **ceftazidime or meropenem or imipenem** for a minimum of 10 to 14 days. After acute therapy is completed, eradication therapy with **trimethoprim-sulfamethoxazole or doxycycline** for 12 to 24 weeks is recommended to reduce recurrence. Further studies to determine the optimal duration and regimen are ongoing.

**ISOLATION OF THE HOSPITALIZED PATIENT:** Contact and droplet precautions are recommended for patients infected with multidrug-resistant strains of *B cepacia* complex. Standard precautions are recommended for people with *B pseudomallei* infection.

**CONTROL MEASURES:** Because some strains of *B cepacia* complex are highly transmissible and virulence is not well understood, many centers limit contact between *B cepacia* complex-infected and -uninfected patients with cystic fibrosis. This includes inpatient, outpatient, and social settings. For example, patients with cystic fibrosis who are infected with *B cepacia* complex are cared for in single rooms and have unique clinic hours. Education of patients and families about hand hygiene and appropriate personal hygiene is recommended.

Prevention of infection with *B pseudomallei* in areas with endemic disease can be difficult, because contact with contaminated water and soil is common. People with diabetes mellitus, renal insufficiency, or skin lesions should avoid contact with soil and standing water in these areas. Wearing boots and gloves during agricultural work in areas with endemic disease is recommended.
**Immunization.** Two single-antigen (monovalent) Hib conjugate vaccine products and 2 combination vaccine products that contain Hib conjugate are available in the United States (see Table 3.10). The Hib conjugate vaccines consist of the Hib capsular polysaccharide (polyribosylribotol phosphate [PRP]) covalently linked to a carrier protein. Protective antibodies are directed against PRP. Conjugate vaccines vary in composition and immunogenicity, and as a result, recommendations for their use differ.

Depending on the vaccine, the recommended primary series consists of 3 doses given at 2, 4, and 6 months of age or 2 doses given at 2 and 4 months of age (see Recommendations for Immunization, p 350, and Table 3.11, p 350). The recommended doses can be given as a Hib-hepatitis B (HepB) combination or as a diphtheria and tetanus toxoids and acellular pertussis (DTaP)-inactivated poliovirus (IPV)/Hib combination vaccine. The regimens in Table 3.11 (p 350) likely are to be equivalent in protection after completion of the recommended primary series. For American Indian/Alaska Native children, optimal immune protection is achieved by administration of PRP-OMP (outer membrane protein complex) Hib vaccine (see American Indian/Alaska Native Children, *Haemophilus influenzae* type b, p 94).

**Combination Vaccines.** Two combination vaccines that contain Hib are licensed in the United States: HepB-Hib combination and DTaP-IPV/Hib combination (see Table 3.10) vaccines. The HepB-Hib combination vaccine is licensed for use at 2, 4, and 12 through 15 months of age and should not be given to infants younger than 6 weeks of age. The DTaP-IPV/Hib combination vaccine is licensed for children 6 weeks through 4 years of age, given as a 4-dose series at 2, 4, 6, and 15 through 18 months of age.

**Vaccine Interchangeability.** The monovalent Hib conjugate vaccines available in the United States are considered interchangeable for primary and booster immunization.

### Table 3.10. *Haemophilus influenzae* Type b (Hib) Conjugate Vaccines Licensed for Use in Infants and Children in the United States

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Trade Name</th>
<th>Components</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP-T&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Hiberix&lt;sup&gt;b&lt;/sup&gt;</td>
<td>PRP conjugated to tetanus toxoid</td>
<td>GlaxoSmithKline Biologicals</td>
</tr>
<tr>
<td>PRP-T</td>
<td>ActHIB</td>
<td>PRP conjugated to tetanus toxoid</td>
<td>Sanofi Pasteur</td>
</tr>
<tr>
<td>PRP-OMP</td>
<td>PedvaxHIB</td>
<td>PRP conjugated to OMP</td>
<td>Merck &amp; Co, Inc</td>
</tr>
<tr>
<td>PRP-OMP-HepB&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Comvax</td>
<td>PRP-OMP + hepatitis B vaccine</td>
<td>Merck &amp; Co, Inc</td>
</tr>
<tr>
<td>DTaP-IPV/PRP-T&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Pentacel</td>
<td>DTaP-IPV + PRP-T</td>
<td>Sanofi Pasteur</td>
</tr>
</tbody>
</table>

PRP-T indicates polyribosylribotol phosphate-tetanus toxoid; DTaP, diphtheria and tetanus toxoids and acellular pertussis; OMP, outer membrane protein complex from *Neisseria meningitidis*; HepB, hepatitis B vaccine.

<sup>a</sup>Hib conjugate vaccines may be given in combination products or as reconstituted products, provided the combination or reconstituted vaccine is licensed by the US Food and Drug Administration (FDA) for the child’s age and administration of the other vaccine component(s) also is justified.

<sup>b</sup>PRP-T (Hiberix), manufactured by GlaxoSmithKline Biologicals, is licensed only for the final (booster) dose of the Hib vaccine series and should not be used for primary immunization in infants at 2, 4, or 6 months of age (Centers for Disease Control and Prevention. Licensure of a *Haemophilus influenzae* type b [Hib] vaccine [Hiberix] and updated recommendations for use of Hib vaccines. *MMWR Morb Mortal Wkly Rep*. 2009;58[36]:1008–1009).

<sup>c</sup>The combination *H influenzae* type b (PRP-OMP) and HepB (Recombivax, 5 µg) vaccine (Comvax) is licensed for use at 2, 4, and 12 through 15 months of age.

<sup>d</sup>The DTaP-IPV liquid component is used to reconstitute a lyophilized ActHIB vaccine component to form Pentacel.
Table 3.11. Recommended Regimens for Routine Haemophilus influenzae Type b (Hib) Conjugate Immunization for Children Immunized at 2 Months Through 4 Years of Age

<table>
<thead>
<tr>
<th>Vaccine Product</th>
<th>Primary Series</th>
<th>Booster Dose</th>
<th>Catch-up Doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP-T (GlaxoSmithKline)</td>
<td>Not licensed</td>
<td>12 through 15 mo</td>
<td>16 mo through 4 y</td>
</tr>
<tr>
<td>PRP-T (Sanofi Pasteur)</td>
<td>2, 4, 6 mo</td>
<td>12 through 15 mo</td>
<td>16 mo through 4 y</td>
</tr>
<tr>
<td>PRP-OMP (Merck)</td>
<td>2, 4 mo</td>
<td>12 through 15 mo</td>
<td>16 mo through 4 y</td>
</tr>
<tr>
<td>PRP-OMP-HepB</td>
<td>2, 4 mo</td>
<td>12 through 15 mo</td>
<td>Not licensed</td>
</tr>
<tr>
<td>DTaP-IPV/PRP-T</td>
<td>2, 4, 6 mo</td>
<td>12 through 15 mo</td>
<td>16 mo through 4 y</td>
</tr>
</tbody>
</table>

PRP-T indicates polyribosylribitol phosphate-tetanus toxoid; OMP, outer membrane protein complex from Neisseria meningitidis.

a See text and Table 3.10 (p 349) for further information about specific vaccines and Table 1.8 (p 35) for information about combination vaccines.
b See Catch-up Immunization Schedule (Fig 1.3, p 31) for additional information.
c If a PRP-OMP vaccine is not administered as both doses in the primary series, a third dose of Hib conjugate vaccine is needed to complete the primary series.
d Preferred for American Indian/Alaska Native children.

Dosage and Route of Administration. The dose of each Hib conjugate vaccine is 0.5 mL, given intramuscularly.

Children With Immunologic Impairment. Children at increased risk of Hib disease may have impaired anti-PRP antibody responses to conjugate vaccines. Examples include children with HIV infection; children with immunoglobulin deficiency; recipients of hematopoietic stem cell transplants; and children undergoing chemotherapy for a malignant neoplasm. Some children with immunologic impairment may benefit from more doses of conjugate vaccine than usually indicated (see Recommendations for Immunization, below).

Adverse Reactions. Adverse reactions to Hib conjugate vaccines are uncommon. Pain, redness, and swelling at the injection site occur in approximately 25% of recipients, but these symptoms typically are mild and last fewer than 24 hours.

Recommendations for Immunization.

Indications and Schedule

- All children should be immunized with an Hib conjugate vaccine beginning at approximately 2 months of age or as soon as possible thereafter (see Table 3.11). Other general recommendations are as follows:
  - Immunization can be initiated as early as 6 weeks of age.
  - Vaccine can be given during visits for other childhood immunizations (see Simultaneous Administration of Multiple Vaccines, p 33).
Intrapartum management of HIV-infected women and the immediate postnatal care of their newborn infants are multifaceted. The woman’s regular HIV medical subspecialist and the delivering physician should be contacted to discuss the impending delivery and to review the patient’s current and postpartum ARV regimen. For women in labor with undocumented HIV infection status, a rapid HIV test should be performed as soon as possible. The HIV-infected woman in labor should receive intravenous zidovudine immediately (regardless of whether she has been taking ARVs before and/or during pregnancy; see Table 3.28, p 435). Her routine oral ARVs should be continued on schedule (with the exception of stavudine [d4T, Zerit], which should not be coadministered with zidovudine). Any procedures that compromise the integrity of fetal skin during labor and delivery (eg, fetal electrodes) or that increase the occurrence of maternal bleeding (eg, instrumented vaginal delivery, episiotomy, vaginal tears) should be avoided when possible. As noted previously, prolonged rupture of membranes is associated with an increased risk of mother-to-child transmission of HIV, whereas cesarean delivery before labor and before rupture of membranes reduces the risk of mother-to-child transmission and is recommended for women with plasma viral loads greater than 1000 copies/mL and women with unknown plasma viral loads around the time of delivery (http://aidsinfo.nih.gov/Guidelines/). The newborn infant should be bathed and cleaned of maternal secretions (especially bloody secretions) as soon as possible after birth. Newborn infants should begin ARV prophylaxis as soon as possible after birth, preferably within 12 hours. In the United States, neonatal prophylaxis generally consists of zidovudine for 6 weeks. Among infants whose mothers did not receive any ARVs before onset of labor, neonatal postexposure prophylaxis with a 2- or 3-drug ARV regimen results in a lower rate of mother-to-child transmission of HIV than zidovudine alone. A 2-drug regimen of zidovudine for 6 weeks with 3 doses of nevirapine during the first week of life (at birth, 48 hours after the first dose, and 96 hours after the second dose) is as effective but less toxic than a 3-drug regimen of zidovudine, lamivudine, and nelfinavir. Therefore, current recommendations for infants of HIV-infected women who did not receive any ARVs before onset of labor are for administration of this 2-drug neonatal prophylaxis regimen. Detailed guidance is available regarding infant ARV prophylaxis regimens. Both mother and infant should have prescriptions for the HIV drugs when they leave the hospital, and the infant should have an appointment for a postnatal visit at 2 to 4 weeks of age to monitor medication adherence and to screen the infant for anemia from zidovudine.

For a newborn infant whose mother’s HIV infection status is unknown, the newborn infant’s physician should perform rapid HIV antibody testing on the mother or the infant, with appropriate consent as required by state and local law. Test results should be reported to the physician as soon as possible to allow effective ARV prophylaxis to be administered to the infant, ideally within 12 hours. In some states, rapid testing of the neonate is required by law if the mother has refused to be tested.

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Because nits remain affixed to the hair firmly, even if dead or hatched, the mere presence of nits is not a sign of an active infestation.

**TREATMENT:** A number of effective pediculicidal agents are available to treat head lice infestation (see Drugs for Parasitic Infections, p 848). Safety is a major concern with pediculicides, because the infestation itself presents minimal risk to the host. Pediculicides should be used only as directed and with care. Instructions on proper use of any product should be explained carefully. Therapy can be started with over-the-counter 1% permethrin or with a pyrethrin combined with piperonyl butoxide product, both of which have good safety profiles. However, resistance to these compounds has been documented in the United States. For treatment failures not attributable to improper use of an over-the-counter pediculicide, malathion, benzyl alcohol lotion, or spinosad suspension should be used. When lice are resistant to all topical agents, ivermectin may be used, although it is not approved by the Food and Drug Administration (FDA) as a pediculicide. No drug truly is ovicidal, but of the available topical agents, only malathion has ovicidal activity. Drugs that have residual activity may kill nymphs as they emerge from eggs. Pediculicides usually require more than one application. Ideally, retreatment should occur after the eggs that are present at the time of initial treatment have hatched but before any new eggs have been produced.

- **Permethrin (1%).** Permethrin is available without a prescription in a 1% lotion that is applied to the scalp and hair for 10 minutes after shampooing with a nonconditioning shampoo and towel drying the hair. Permethrin has a low potential for toxic effects and a high cure rate. Although activity of permethrin can continue for 2 weeks or more after application, some experts advise a second treatment 9 to 10 days after the first treatment, especially if hair is washed within a week after the first treatment. Product labeling recommends a second treatment 7 or more days after the first application if live lice are seen. **Permethrin 1% is approved by the FDA for use on children 2 months of age or older.**

- **Pyrethrin-based products.** Pyrethrins are natural extracts from the chrysanthemum and are available (usually formulated with the synergist piperonyl butoxide) without a prescription as shampoos or mousse preparations (both to be applied to dry hair). Pyrethrins have no residual activity, and repeated application 7 to 10 days after the first application is necessary to kill newly hatched lice. Resistance to permethrin renders pyrethrin-based products ineffective. Pyrethrins are contraindicated in people who are allergic to chrysanthemums or ragweed.

- **Malathion (0.5%).** This organophosphate pesticide that is both pediculicidal and partially ovicidal is available only by prescription as a lotion and is highly effective as formulated in the United States. The safety and effectiveness of malathion lotion have not been assessed by the FDA in children younger than 6 years of age. Malathion lotion is applied to dry hair; left to dry naturally, and then removed 8 to 12 hours later by washing and rinsing the hair. The product should be reapplied 7 to 9 days later only if live lice still are present at that time. The alcohol base of the lotion is flammable; therefore, the lotion or wet hair during treatment should not be exposed to lighted cigarettes, open flames, or electric heat sources, such as hair dryers or curling irons. The product, if ingested, can cause severe respiratory distress. Malathion is contraindicated in children younger than 2 years of age because of the possibility of increased scalp permeability and absorption.
among children younger than 5 years of age. Travel to resource-limited countries with inadequate sanitation can place travelers at risk of infection. Even without antimicrobial therapy, the carrier state usually ceases within 1 to 4 weeks after onset of illness; long-term carriage is uncommon and does not correlate with underlying intestinal dysfunction.

The **incubation period** varies from 1 to 7 days, typically 1 to 3 days.

**DIAGNOSTIC TESTS:** Isolation of *Shigella* organisms from feces or rectal swab specimens containing feces is diagnostic; sensitivity is improved by testing stool as soon as it is passed. The presence of fecal leukocytes on a methylene-blue stained stool smear is sensitive for the diagnosis of colitis but is not specific for *Shigella* species. Although bacteremia is rare, blood should be cultured in severely ill, immunocompromised, or malnourished children. Other tests for bacterial detection, including a fluorescent antibody test, enzyme-linked DNA probes and microassays, are available in research laboratories. Qualitative and quantitative polymerase chain reaction assays are being implemented in some clinical laboratories.

**TREATMENT:**

- Although severe dehydration is rare with shigellosis, correction of fluid and electrolyte losses, preferably by oral rehydration solutions, is the mainstay of treatment.
- Most clinical infections with *S sonnei* are self-limited (48 to 72 hours), and mild episodes do not require antimicrobial therapy. Available evidence suggests that antimicrobial therapy is somewhat effective in shortening duration of diarrhea and hastening eradication of organisms from feces. Treatment is recommended for patients with severe disease, dysentery, or underlying immunosuppressive conditions; in these patients, empiric therapy should be given while awaiting culture and susceptibility results. Antimicrobial susceptibility testing of clinical isolates is indicated, because resistance to antimicrobial agents is common and susceptibility data can guide appropriate therapy. Plasmid-mediated resistance has been identified in all *Shigella* species. In 2009 in the United States sentinel surveillance system, approximately 46% of *Shigella* species were resistant to ampicillin, 40% were resistant to trimethoprim-sulfamethoxazole, and less than 1% were resistant to ciprofloxacin and to ceftriaxone (www.cdc.gov/narms). Ciprofloxacin and ceftriaxone resistance is increasing around the world.
- For cases in which treatment is required and susceptibility is unknown or an ampicillin- and trimethoprim-sulfamethoxazole–resistant strain is isolated, **azithromycin for 3 days, parenteral ceftriaxone for 5 days**, or a fluoroquinolone (such as ciprofloxacin) for 3 days should be administered. Oral cephalosporins are not useful for treatment. Fluoroquinolones are not approved by the US Food and Drug Administration for use in people younger than 18 years of age with shigellosis, although fluoroquinolones have been shown to be beneficial (see Fluoroquinolones, p 800). For susceptible strains, ampicillin or trimethoprim-sulfamethoxazole is effective; amoxicillin is less effective because of its rapid absorption from the gastrointestinal tract. The oral route of therapy is recommended except for seriously ill patients.
- Antimicrobial therapy typically is administered for 5 days; a 2-day course of ceftriaxone can be used if there is a good clinical response and no extraintestinal infection.
- Antidiarrheal compounds that inhibit intestinal peristalsis are contraindicated, because they can prolong the clinical and bacteriologic course of disease and increase the rate of complications.
have been published by the CDC (Table 3.63, p 660). Ongoing review and restriction of vancomycin use is critical in attempts to control the emergence of VISA and VRSA (see Appropriate and Judicious Use of Antimicrobial Agents, p 802). To date, the use of catheters impregnated with various antimicrobial agents or metals to prevent health care-associated infections has not been evaluated adequately in children.

Nurseries. Outbreaks of *S. aureus* infections in newborn nurseries require unique measures of control. Hand hygiene should be emphasized to all personnel and visitors. Application of triple dye, iodophor ointment, or 1% chlorhexidine powder to the umbilical stump has been used to delay or prevent *S. aureus* colonization. Other measures recommended during outbreaks include reinforcement of hand hygiene, alleviating overcrowding and understaffing, colonization surveillance cultures of newborn infants at admission and periodically thereafter, use of contact precautions for colonized or infected infants, and cohorting of colonized or infected infants and their caregivers. For hand hygiene, soaps containing chlorhexidine or alcohol-based hand rubs are preferred during an outbreak. Colonized health care professionals epidemiologically implicated in transmission should receive decolonization therapy, but eradication of colonization may not occur.

**Group A Streptococcal Infections**

**CLINICAL MANIFESTATIONS:** The most common group A streptococcal (GAS) infection is acute pharyngotonsillitis, which may present with a strawberry tongue, which occurs following peeling of a white coating, leaving a red glistening tongue with prominent papillae. Purulent complications of pharyngotonsillitis, including otitis media, sinusitis, peritonsillar and retropharyngeal abscesses, and suppurative cervical adenitis, develop in some patients, usually those who are untreated. Nonsuppurative sequelae include acute rheumatic fever (ARF) and acute glomerulonephritis. The goals of antimicrobial therapy for GAS upper respiratory tract disease are to reduce acute morbidity, suppurative and nonsuppurative sequelae (acute rheumatic fever), and transmission to close contacts.

Scarlet fever occurs most often in association with pharyngitis and, rarely, with pyoderma or an infected wound. Scarlet fever has a characteristic confluent erythematous sandpaper-like rash that is caused by one or more of several erythrogenic exotoxins produced by group A streptococci. Severe scarlet fever occurs rarely. Other than occurrence of rash, the epidemiologic features, symptoms, signs, sequelae, and treatment of scarlet fever are the same as those of streptococcal pharyngitis.

Toddlers (1 through 3 years of age) with GAS respiratory tract infection initially can have serous rhinitis and then develop a protracted illness with moderate fever, irritability, and anorexia (streptococcal fever or streptococcosis). Acute pharyngotonsillitis is uncommon in children younger than 3 years of age.

The second most common site of GAS infection is skin. Streptococcal skin infections (ie, pyoderma or impetigo) can result in acute glomerulonephritis, which occasionally occurs in epidemics. ARF is not a sequela of GAS skin infection.

Other manifestations of GAS infections include erysipelas, perianal cellulitis, vaginitis, bacteremia, pneumonia, endocarditis, pericarditis, septic arthritis, cellulitis, necrotizing fasciitis, purpura fulminans, osteomyelitis, myositis, puerperal sepsis, surgical wound infection, acute otitis media, sinusitis, retropharyngeal abscess, peritonsillar abscess, mastoiditis,
The dose of orally administered penicillin V is 400,000 U (250 mg), 2 to 3 times per day, for 10 days for children weighing less than 27 kg (60 lb) and 800,000 U (500 mg), 2 to 3 times per day, for heavier children, adolescents, and adults. To prevent ARF, oral treatment with penicillin should be given for the full 10 days, regardless of the promptness of clinical recovery. Although different preparations of oral penicillin vary in absorption, their clinical efficacy is similar. Treatment failures may occur more often with oral penicillin than with intramuscularly administered penicillin G benzathine as a result of inadequate adherence to oral therapy. In addition, short-course treatment (less than 10 days) for GAS pharyngitis, particularly with penicillin V, is associated with inferior bacteriologic eradication rates.

- Orally administered amoxicillin given as a single daily dose (50 mg/kg; maximum, 1000–1200 mg) for 10 days is as effective as orally administered penicillin V or amoxicillin given multiple times per day for 10 days. This approach is an acceptable treatment option if strict adherence to once-daily dosing can be ensured.

- Intramuscular penicillin G benzathine is appropriate therapy. It ensures adequate blood concentrations and avoids the problem of adherence, but administration is painful. For children who weigh less than 27 kg, penicillin G benzathine is given in a single dose of 600,000 U (375 mg); for heavier children and adults, the dose is 1.2 million U (750 mg). Discomfort is less if the preparation of penicillin G benzathine is brought to room temperature before intramuscular injection. Mixtures containing shorter-acting penicillins (eg, penicillin G procaine) in addition to penicillin G benzathine have not been demonstrated to be more effective than penicillin G benzathine alone but are less painful when administered. Although supporting data are limited, the combination of 900,000 U (562.5 mg) of penicillin G benzathine and 300,000 U (187.5 mg) of penicillin G procaine is satisfactory therapy for most children; however, the efficacy of this combination for heavier patients, such as adolescents and adults, has not been demonstrated.

- For some patients who are allergic to penicillin, a 10-day course of a narrow-spectrum (first-generation) oral cephalosporin is indicated. However, as many as 5% to 10% of penicillin-allergic people also are allergic to cephalosporins. Patients with immediate or type I hypersensitivity to penicillin should not be treated with a cephalosporin. Oral clindamycin (20 mg/kg per day in 3 divided doses; maximum, 1.8 g/day) for 10 days is an acceptable alternative to penicillin in people with intermediate or type I hypersensitivity to penicillin.

- An oral macrolide or azalide (eg, erythromycin, clarithromycin, or azithromycin) is acceptable for patients allergic to penicillins. Therapy for 10 days is indicated except for azithromycin (12 mg/kg/day for 5 days [maximum 500 mg/day]). Erythromycin is associated with substantially higher rates of gastrointestinal tract adverse effects than are these other agents. GAS strains resistant to macrolides or azalides have been highly prevalent in some areas of the world and have resulted in treatment failures. In recent years, macrolide resistance rates in most areas of the United States have been 5% to 8%, but resistance rates need continued monitoring.

- Tetracyclines, sulfonamides (including trimethoprim-sulfamethoxazole), and fluoroquinolones should not be used for treating GAS pharyngitis.

Children who have a recurrence of GAS pharyngitis shortly after completing a full course of a recommended oral antimicrobial agent can be retreated with the same antimicrobial agent, an alternative oral drug, or an intramuscular dose of penicillin G.
Globulin for exposed newborn infants within the first 2 weeks of life whose mothers do not have evidence of immunity to VZV.

**Subsequent exposures and follow-up of Varicella-Zoster Immune Globulin recipients.** Because administration of Varicella-Zoster Immune Globulin can cause varicella infection to be asymptomatic, testing of recipients 2 months or later after administration of Varicella-Zoster Immune Globulin to ascertain their immune status may be helpful in the event of subsequent exposure. Most experts, however, would advise Varicella-Zoster Immune Globulin administration after subsequent exposures regardless of serologic results because of the unreliability of serologic test results in immunocompromised people and the uncertainty about whether asymptomatic infection after Varicella-Zoster Immune Globulin administration confers lasting protection.

Any patient to whom Varicella-Zoster Immune Globulin is administered to prevent varicella subsequently should receive age-appropriate varicella vaccine, provided that receipt of live vaccines is not contraindicated. Varicella immunization should be delayed until 5 months after Varicella-Zoster Immune Globulin administration. Varicella vaccine is not needed if the patient develops varicella after administration of Varicella-Zoster Immune Globulin.

**Unavailability of Varicella-Zoster Immune Globulin.** If Varicella-Zoster Immune Globulin is not available, IGIV can be used. The recommendation for use of IGIV is based on “best judgment of experts” and is supported by reports comparing VZV IgG antibody titers measured in both IGIV and Varicella-Zoster Immune Globulin preparations and patients given IGIV and Varicella-Zoster Immune Globulin. Although licensed IGIV preparations contain antivaricella antibodies, the titer of any specific lot of IGIV is uncertain, because IGIV is not tested routinely for antivaricella antibodies. No clinical data demonstrating effectiveness of IGIV for postexposure prophylaxis of varicella are available. The recommended IGIV dose for postexposure prophylaxis of varicella is 400 mg/kg, intravenously administered once.

**Chemoprophylaxis.** If Varicella-Zoster Immune Globulin is not available, some experts recommend prophylaxis with acyclovir (20 mg/kg per dose, administered 4 times per day, with a maximum daily dose of 3200 mg) or valacyclovir (20 mg/kg per dose, administered 3 times per day, with a maximum daily dose of 3000 mg) beginning 7 to 10 days after exposure and continuing for 7 days for immunocompromised patients without evidence of immunity who have been exposed to varicella. A 7-day course of acyclovir or valacyclovir also may be given to adults without evidence of immunity if vaccine is contraindicated. Limited data on acyclovir as postexposure prophylaxis are available for healthy children, and no studies have been performed for adults or immunocompromised people. However, limited clinical experience supports use of acyclovir or valacyclovir as postexposure prophylaxis, and clinicians may choose this option if active or passive immunization is not possible. Most adults born before 1980 with no history or an uncertain history of chickenpox are immune if they were raised in the continental United States or Canada.
Table 4.2. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period,* continued

<table>
<thead>
<tr>
<th>Drug Generic (Trade Name)</th>
<th>Route</th>
<th>Mild to Moderate Infections</th>
<th>Severe Infections</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluoroquinolones</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin (Cipro)</td>
<td>PO</td>
<td>20 mg in 2 doses (daily adult dose, 0.5–1 g)</td>
<td>30–40 mg in 2 doses (daily adult dose, 1–1.5 g)</td>
<td>Also see p 800.</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>Inappropriate</td>
<td>20–30 mg in 2 or 3 doses (daily adult dose, 0.8–1.2 g)</td>
<td></td>
</tr>
<tr>
<td>Levofloxacin (Levaquin)</td>
<td>IV, PO</td>
<td>Inappropriate</td>
<td>20 mg in 2 doses if &lt;5 y; 10 mg once daily if ≥5 y (daily adult dose, 500 mg)</td>
<td>Also see p 800.</td>
</tr>
<tr>
<td><strong>Macrolides</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin (Zithromax, Zmax)</td>
<td>PO</td>
<td>5–12 mg once daily (adult single or total course dose, 1.5–2 g)</td>
<td>Inappropriate</td>
<td></td>
</tr>
<tr>
<td>Clarithromycin (Biaxin)</td>
<td>PO</td>
<td>15 mg in 2 doses (daily adult dose, 0.5–1 g)</td>
<td>Inappropriate</td>
<td>Similar to erythromycin; more activity against <em>Mycobacterium avium</em> and <em>Helicobacter pylori</em>.</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>Inappropriate</td>
<td>10 mg/kg, once daily</td>
<td></td>
</tr>
</tbody>
</table>

*Pharyngitis: 12 mg/kg/day for 5 days (maximum 500 mg/day)

Sinusitis: 10 mg/kg/day × 3 days or 10 mg/kg/day × 1 day, then 5 mg/kg/day × 4 days

CAP: 10 mg/kg × 1 day, then 5 mg/kg/day × 4 days or 60 mg/kg × 1 day of Zmax suspension for infants and children >6 months of age.

Shigellosis: 12 mg/kg × 1 day, 6 mg/kg/d × 4 days.
<table>
<thead>
<tr>
<th>Generic (Trade Name)</th>
<th>Indication</th>
<th>Route</th>
<th>Age</th>
<th>Usually Recommended Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acyclovir&lt;sup&gt;b,c,d&lt;/sup&gt; (Zovirax)</td>
<td>Neonatal herpes simplex virus (HSV) infection</td>
<td>IV</td>
<td>Birth to 3 mo</td>
<td>60 mg/kg per day in 3 divided doses for 14–21 days.</td>
</tr>
<tr>
<td></td>
<td>HSV encephalitis</td>
<td>IV</td>
<td>≥3 mo to 12 y</td>
<td>30–45 mg/kg per day in 3 divided doses for 14–21 days; FDA-approved dose for this indication and age range is 60 mg/kg per day in 3 divided doses, but nephrotoxicity may be increased at this higher dose.&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Varicella in immunocompetent host&lt;sup&gt;f&lt;/sup&gt;</td>
<td>IV</td>
<td>≥12 y</td>
<td>30 mg/kg per day in 3 divided doses for 14–21 days.</td>
</tr>
<tr>
<td></td>
<td>Varicella in immunocompetent host requiring hospitalization</td>
<td>IV</td>
<td>≥2 y</td>
<td>≤40 kg: 80 mg/kg per day in 4 divided doses for 5 days; maximum dose, 3200 mg/day. &gt;40 kg: 3200 mg in 4 divided doses for 5 days.</td>
</tr>
<tr>
<td></td>
<td>Varicella in immunocompromised host</td>
<td>IV</td>
<td>&lt;1 y</td>
<td>30 mg/kg per day in 3 divided doses for 7–10 days.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV</td>
<td>≥1 y</td>
<td>1500 mg/m$^2$ per day in 3 doses for 7–10 days; some experts recommend the 30 mg/kg per day dose.</td>
</tr>
<tr>
<td></td>
<td>Zoster in immunocompetent host</td>
<td>IV (if requiring hospitalization)</td>
<td>All ages</td>
<td>Same as for varicella in immunocompromised host.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral</td>
<td>≥12 y</td>
<td>4000 mg/day in 5 divided doses for 5–7 days.</td>
</tr>
<tr>
<td></td>
<td>Zoster in immunocompromised host</td>
<td>IV</td>
<td>&lt;12 y</td>
<td>30 mg/kg per day in 3 divided doses, for 7–10 days.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV</td>
<td>≥12 y</td>
<td>30 mg/kg per day in 3 divided doses, for 7–10 days.</td>
</tr>
</tbody>
</table>
All dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa. The following procedures and events do not require prophylaxis: routine anesthetic injections through noninfected tissue, taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa.

**Prevention of Neonatal Ophthalmia**

Ophthalmia neonatorum is defined as conjunctivitis occurring within the first 4 weeks of life. Routine prophylaxis is mandated in most jurisdictions in Canada and the United States. The causes of ophthalmia neonatorum are presented in Table 5.4 (p 881). Neonates with ophthalmia neonatorum require clinical evaluation with appropriate laboratory testing and prompt initiation of therapy. Screening of pregnant women for infection with *Chlamydia trachomatis* and *Neisseria gonorrhoeae* followed by appropriate treatment and follow-up of infected women and their partner(s) is the optimal approach to minimize risk of