settings in which a high proportion of adults have risk factors for HBV infection (e.g., STD clinics, HIV testing and treatment facilities, drug-abuse treatment and prevention settings, health care settings targeting services to injection drug users or MSM, and correctional facilities). (2) In other primary care and specialty medical settings in which adults at risk for HBV infection receive care, health care providers should inform all patients about the health benefits of vaccination, the risk factors for HBV infection, and the persons for whom vaccination is recommended and should vaccinate adults who report risk factors for HBV infection as well as any adult who requests protection from HBV infection. To promote vaccination in all settings, health care providers should implement standing orders to identify adults recommended for hepatitis B vaccination, should administer hepatitis B vaccine as part of routine clinical services, should not require acknowledgment of an HBV infection risk factor for adult vaccination, and should use available reimbursement mechanisms to remove financial barriers to hepatitis B vaccination.

In 2007, the ACIP recommended routine immunization of 9- to 26-year-old girls and women with the quadrivalent HPV vaccine (against HPV types 6, 11, 16, and 18) approved by the U.S. Food and Drug Administration; the optimal age for recommended vaccination is 11–12 years because of the very high risk of HPV infection after sexual debut. In 2009, the ACIP added bivalent HPV vaccine (against types 6 and 11) as an option and expanded the groups in which immunization (with either quadrivalent or bivalent vaccine) is safe and effective to include boys and men 9–26 years old. HPV vaccines offering broader protection against additional oncogenic HPV types are anticipated. Since 2011, the ACIP has recommended routine administration of quadrivalent HPV vaccine to boys at 11 or 12 years of age and to males 13–21 years of age who have not yet been vaccinated or who have not completed the three-dose vaccine series; men 22–26 years of age may also be vaccinated.

*Partner notification* is the process of identifying and informing partners of infected patients about possible exposure to an STI and of examining, testing, and treating partners as appropriate. In a series of 22 reports concerning partner notification during the 1990s, index patients with gonorrhea or chlamydial infection named a mean of 0.75–1.6 partners, of whom one-fourth to one-third were infected; those with syphilis named 1.8–6.3 partners, with one-third to one-half infected; and those with HIV infection named 0.76–5.31 partners, with up to one-fourth infected. Persons who transmit infection or who have recently been infected and are still in the incubation period usually have no symptoms or only mild symptoms and seek medical attention only when notified of their exposure. Therefore, the clinician must encourage patients to participate in partner notification, must ensure that exposed persons are notified and treated, and must guarantee confidentiality to all involved. In the United States, local health departments often offer assistance in partner notification, treatment, and/or counseling. It seems both feasible and most useful to notify those partners exposed within the patient's likely period of infectiousness, which is often considered the preceding 1 month for gonorrhea, 1–2 months for chlamydial infection, and up to 3 months for early syphilis.

Persons with a new-onset STI always have a *source* contact who gave them the infection; in addition, they may have a *secondary* (*spread* or *exposed*) contact with whom they had sex after becoming infected. The identification and treatment of these two types of contacts have different objectives. Treatment of the source contact (often a casual contact) benefits the community by preventing further transmission and benefits the source contact; treatment of the recently exposed secondary contact (typically a spouse or another steady sexual partner) prevents the development of serious complications (such as PID) in the partner, reinfection of the index patient, and further spread of infection. A survey of a random sample of U.S. physicians found that most instructed patients to abstain from sex during treatment, to use condoms, and to inform their sex partners after being diagnosed with gonorrhea, chlamydial infection, or syphilis; physicians sometimes gave the patients drugs for their partners. However, follow-up of the partners by physicians was infrequent. A randomized trial compared patients' delivery of therapy to partners exposed to gonorrhea or chlamydial infection with conventional notification and advice to partners to seek evaluation for STD; patients' delivery of partners' therapy, also known as *expedited partner therapy* (EPT), significantly reduced combined rates of reinfection of the index patient with *N. gonorrhoeae* or *C. trachomatis*. State-by-state variations in regulations governing this approach have not been well defined, but the 2010 CDC STD treatment guidelines and the EPT final report of 2006 (*http://www.cdc.gov/std/treatment/EPTFinalReport2006.pdf*) describe its potential use. Currently, EPT is commonly used by many practicing physicians. Its legal status varies by state, but EPT is now permissible in 38 states and potentially allowable in another 9. (Updated information on the legal status of EPT is available at *http://www.cdc.gov/std/ept*.)

In summary, clinicians and public health agencies share responsibility for the prevention and control of STIs. In the current health care environment, the role of primary care clinicians has become increasingly important in STI prevention as well as in diagnosis and treatment, and the resurgence of bacterial STIs like syphilis and LGV among MSM—particularly those co-infected with HIV—emphasizes the need for risk assessment and routine screening.

# 164 Meningitis, Encephalitis, Brain Abscess, and Empyema

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Acute infections of the nervous system are among the most important problems in medicine because early recognition, efficient decision making, and rapid institution of therapy can be lifesaving. These distinct clinical syndromes include acute bacterial meningitis, viral meningitis, encephalitis, focal infections such as brain abscess and subdural empyema, and infectious thrombophlebitis. Each may present with a nonspecific prodrome of fever and headache, which in a previously healthy individual may initially be thought to be benign, until (with the exception of viral meningitis) altered consciousness, focal neurologic signs, or seizures appear. Key goals of early management are to emergently distinguish between these conditions, identify the responsible pathogen, and initiate appropriate antimicrobial therapy.

## APPROACH TO THE PATIENT: Meningitis, Encephalitis, Brain Abscess, and Empyema

(Figure 164-1) The first task is to identify whether an infection predominantly involves the subarachnoid space (*meningitis*) or whether there is evidence of either generalized or focal involvement of brain tissue in the cerebral hemispheres, cerebellum, or brainstem. When brain tissue is directly injured by a bacterial or viral infection, the disease is referred to as *encephalitis*, whereas focal infections involving brain tissue are classified as either *cerebritis* or *abscess*, depending on the presence or absence of a capsule.

Nuchal rigidity ("stiff neck") is the pathognomonic sign of meningeal irritation and is present when the neck resists passive flexion. Kernig's and Brudzinski's signs are also classic signs of meningeal irritation. *Kernig's sign* is elicited with the patient in the supine position. The thigh is flexed on the abdomen, with the knee flexed; attempts to passively extend the knee elicit pain when meningeal irritation is present. *Brudzinski's sign* is elicited with the patient in the supine position and is positive when passive flexion of the neck results in spontaneous flexion of the hips and knees. Although commonly tested on physical examinations, the sensitivity and specificity of Kernig's and Brudzinski's signs are uncertain. Both may be absent or reduced in very young or elderly patients, immunocompromised individuals, or patients with a severely depressed