

individuals to avoid contracting HIV infection and for infected individuals to avoid spreading infection. Abstinence from sexual relations is the only absolute way to prevent sexual transmission of HIV infection. However, for many individuals this may not be feasible, and there are a number of relatively safe practices that can markedly decrease the chances of transmission of HIV infection. Partners engaged in monogamous sexual relationships who wish to be assured of safety should both be tested for HIV antibody. If both are negative, it must be understood that any divergence from monogamy puts both partners at risk; open discussion of the importance of honesty in such relationships should be encouraged. When the HIV status of either partner is not known, or when one partner is positive, there are a number of options. Use of condoms can markedly decrease the chance of HIV transmission. It should be remembered that condoms are not 100% effective in preventing transmission of HIV infection, and there is a ~10% failure rate of condoms used for contraceptive purposes. Most condom failures result from breakage or improper usage, such as not wearing the condom for the entire period of intercourse. Latex condoms are preferable, since virus has been shown to leak through natural skin condoms. Petroleum-based gels should never be used for lubrication of the condom, since they increase the likelihood of condom rupture. Some men who have sex with men practice fellatio as a “minimal risk” activity compared with anal intercourse. It should be emphasized that receptive fellatio is definitely not safe sex, and although the incidence of transmission via fellatio is considerably less than that of rectal or vaginal intercourse, there has been documentation of transmission of HIV where receptive fellatio was the only sexual act performed (see “Transmission,” above). Topical microbicides composed of gels containing antiretroviral drugs have been shown to be efficacious in preventing acquisition of HIV infection in women engaging in vaginal intercourse. However, there has been a considerable degree of variability in efficacy related to the variable adherence of participants to the use of the intervention. In general, it is felt that microbicides can

be quite efficacious; however, adherence is a major stumbling block to their broad effectiveness. Pre-exposure prophylaxis (PreP) using oral antiretroviral drugs on a daily basis in uninfected men who have sex with men and transgender women has been shown to be efficacious in preventing acquisition of HIV infection. The degree of efficacy can be very high (>90%) if subjects adhere strictly to the regimen. However, adherence has proven to be a problem in maximizing the overall effectiveness of this approach.

Adult male circumcision has been shown to result in a 50% to 65% reduction in HIV acquisition in the circumcised subject. Clearly, this approach has considerable potential as a preventive strategy for HIV infection and is currently being pursued, particularly in developing nations, as a component of HIV prevention. The most effective way to prevent transmission of HIV infection among IDUs is to stop the use of injectable drugs. Unfortunately, that is extremely difficult to accomplish unless the individual enters a treatment program. For those who will not or cannot participate in a drug treatment program and who will continue to inject drugs, the avoidance of sharing of needles and other paraphernalia (“works”) is the next best way to avoid transmission of infection. However, the cultural and social factors that contribute to the sharing of paraphernalia are complex and difficult to overcome. In addition, needles and syringes may be in short supply. Under these circumstances, paraphernalia should be cleaned after each usage with a virucidal solution, such as undiluted sodium hypochlorite (household bleach). Programs that provide sterile needles to addicts in exchange for used needles have resulted in a marked decrease in HIV transmission without increasing the use of injection drugs. It is important for IDUs to be tested for HIV infection and counseled to avoid transmission to their sexual partners. Oral PreP also is effective in preventing acquisition of HIV infections among IDUs. Prevention of transmission through blood or blood products and prevention of mother-to-child transmission are discussed in “Transmission,” above.

SECTION 15 INFECTIONS DUE TO RNA VIRUSES

227 Viral Gastroenteritis

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Acute infectious gastroenteritis is a common illness that affects persons of all ages worldwide. It is a leading cause of mortality among children in developing countries, accounting for an estimated 0.7 million deaths each year, and is responsible for up to 10–12% of all hospitalizations among children in industrialized countries, including the United States. Elderly persons, especially those with debilitating health conditions, also are at risk of severe complications and death from acute gastroenteritis. Among healthy young adults, acute gastroenteritis is rarely fatal but incurs substantial medical and social costs, including those of time lost from work.

Several enteric viruses have been recognized as important etiologic agents of acute infectious gastroenteritis (Table 227-1, Fig. 227-1). Although most viral gastroenteritis is caused by RNA viruses, the DNA viruses that are occasionally involved (e.g., adenovirus types 40 and 41) are included in this chapter. Illness caused by these viruses is characterized by the acute onset of vomiting and/or diarrhea, which may be accompanied by fever, nausea, abdominal cramps, anorexia, and malaise. As shown in Table 227-2, several features can help distinguish gastroenteritis caused by viruses from that caused by bacterial agents. However, the distinction based on clinical and epidemiologic parameters alone is often difficult, and laboratory tests are required to confirm the diagnosis.

HUMAN CALICIVIRUSES

Etiologic Agent The Norwalk virus is the prototype strain of a group of small (27–40 nm), nonenveloped, round, icosahedral viruses with relatively amorphous surface features on visualization by electron microscopy. These viruses have been difficult to classify because they have not been adapted to growth in cell culture and no animal models are available. Molecular cloning and characterization have demonstrated that the viruses have a single, positive-strand RNA genome ~7.5 kb in length and possess a single virion-associated protein—similar to that of typical caliciviruses—with a molecular mass of 60 kDa. On the basis of these molecular characteristics, these viruses are presently classified in two genera belonging to the family Calciviridae: the *noroviruses* and the *sapoviruses* (previously called Norwalk-like viruses and Sapporo-like viruses, respectively).



Epidemiology Infections with the Norwalk and related human caliciviruses are common worldwide, and most adults have antibodies to these viruses. Antibody is acquired at an earlier age in developing countries—a pattern consistent with the presumed fecal-oral mode of transmission. Infections occur year-round, although, in temperate climates, a distinct increase has been noted in cold-weather months. Noroviruses may be the most common infectious agents of mild gastroenteritis in the community and affect all age groups, whereas sapoviruses primarily cause gastroenteritis in children. Noroviruses also cause traveler’s diarrhea, and outbreaks have occurred among military personnel deployed to various parts of the world. The limited data available indicate that norovirus may be the second most common viral agent (after rotavirus) among young