

B., C., and D. *Control of patient, contacts and the immediate environment; Epidemic measures; and Disaster implications:* See Staphylococcal food poisoning (19B, C and D, above).

E. *International measures:* None.

GASTROENTERITIS, ACUTE VIRAL

ICD-9 078

Viral gastroenteritis presents as a sporadic or epidemic illness in infants, children and adults. Several enteropathogenic viruses (rotaviruses and, less commonly, enteric adenoviruses, caliciviruses and astroviruses) affect mainly infants and young children as a diarrheal illness which may be severe enough to produce dehydration requiring hospitalization. Other non-cultivable enteric viruses (Norwalk agent and Norwalk-like viruses) affect primarily older children and adults and cause self-limited sporadic gastroenteritis or outbreaks in families, institutions and communities. The epidemiology, natural history and clinical expression of enteric viral infections are best understood for group A rotavirus in infants and Norwalk agent in adults.

1. ROTAVIRAL ENTERITIS

ICD-9 008.8

(Sporadic viral gastroenteritis, Severe viral gastroenteritis of infants and children, Non-bacterial gastroenteritis of infancy)

1. *Identification*—A sporadic or seasonal, often severe gastroenteritis of infants and young children characterized by fever and vomiting, followed by a watery diarrhea occasionally associated with severe dehydration and death in the young age group. Secondary symptomatic cases among adult family contacts are infrequent, although subclinical infections occur frequently. Rotavirus infection has occasionally been found in pediatric patients with a variety of clinical manifestations, but the virus is probably coincidental rather than causative in these conditions. Rotavirus is a major cause of nosocomial diarrhea of newborns and infants. In any single patient, illness caused by rotavirus is not distinguishable from that caused by other enteric viruses, although rotavirus diarrhea may be more severe, and is more frequently associated with fever and vomiting than is acute diarrhea due to other agents.

Rotavirus is identified in stool or rectal swab by EM, ELISA, LA and other immunologic techniques for which commercial kits are available. Evidence of rotavirus infection can be demonstrated by serologic tech-

niques but diagnosis is usually based on the demonstration of rotavirus antigen in stools.

2. *Infectious agent*—The 70-nm rotavirus belongs to the Reoviridae family. Group A is common, group B is uncommon in infants but has caused large epidemics in adults in China, while group C is rare in humans; groups B, C and D occur in animals. There are 4 major serotypes of group A human rotavirus, based on antigenic differences in the VP7 surface protein, the major neutralization antigen. Another surface protein, designated VP4, is associated with virulence and also plays a role in virus neutralization.

3. *Occurrence*—In both developed and developing countries, rotavirus is associated with about one-third of the hospitalized cases of diarrheal illness in infants and young children less than 5 years of age. All children are infected in their first 3-4 years of life, and most first infections after the first month of life are associated with diarrhea. Rotavirus is more frequently associated with severe diarrhea than are other enteric pathogens. In developing countries, it is responsible for an estimated 870,000 diarrheal deaths each year.

In temperate climates, it occurs almost exclusively in the cooler months; in tropical climates, throughout the year and with less pronounced peaks. Neonatal infections are frequent in certain settings but are usually asymptomatic. Infection of adults is usually subclinical; outbreaks of clinical disease occur in geriatric units. Rotavirus has caused travelers' diarrhea in adults, diarrhea in immunocompromised (and AIDS) patients, among parents of children with rotavirus diarrhea, in the elderly and among children in day-care settings.

4. *Reservoir*—Probably man. The pathogenicity of animal viruses for man has not been found when searched for, except for group B and group C rotaviruses which may be primarily animal rotaviruses.

5. *Mode of transmission*—Probably fecal-oral and possibly fecal-respiratory. Although rotaviruses do not effectively multiply in the respiratory tract, they may be swallowed with respiratory secretions.

6. *Incubation period*—Approximately 24 to 72 hours.

7. *Period of communicability*—During acute stage of disease, and later while virus shedding continues. Rotavirus is not usually detectable after about the eighth day of illness, although excretion of virus for ≥ 30 days has been reported in immunocompromised patients. Symptoms last for an average of 4-6 days.

8. *Susceptibility and resistance*—Susceptibility is greatest between 6 and 24 months of age. By age 3, most individuals have acquired rotavirus antibody. Immunocompromised infants are at particular risk for prolonged rotavirus diarrhea.

9. Methods of control—

A. *Preventive measures:*

- 1) Undetermined. Hygienic measures applicable to diseases transmitted via fecal-oral route may not be effective in preventing transmission.
- 2) Prevent exposure of infants and young children to individuals with acute gastroenteritis in family and institutional (day-care or hospital) settings.
- 3) Passive immunization by oral administration of IG has been shown to protect low-birth-weight neonates. Breast feeding does not affect infection rates, but may reduce severity of the gastroenteritis. Studies are under way to determine the efficacy of attenuated rotavirus as an orally administered vaccine.

B. *Control of patient, contacts and the immediate environment:*

- 1) Report to local health authority: Obligatory report for epidemics; no individual case report, Class 4 (see Preface).
- 2) Isolation: Enteric precautions, with frequent handwashing by caretakers of infants.
- 3) Concurrent disinfection: Sanitary disposal of diapers.
- 4) Quarantine: None.
- 5) Immunization of contacts: None.
- 6) Investigation of contacts and source of infection: Source of infection should be sought, especially in the home and institutions.
- 7) Specific treatment: None. Oral rehydration therapy with oral glucose-electrolyte solution is adequate in most cases. Parenteral fluids are needed in cases with vascular collapse or uncontrolled vomiting (see Cholera, 9B7).

C. *Epidemic measures:* Search for vehicles of transmission and source on epidemiologic bases.D. *Disaster implications:* A potential problem.E. *International measures:* WHO Collaborating Centres (see Preface).

II. EPIDEMIC VIRAL GASTROENTEROPATHY

ICD-9 078.8, 078.82

(Viral gastroenteritis in adults, Epidemic viral gastroenteritis, Norwalk type disease, Acute infectious nonbacterial gastroenteritis, Viral diarrhea, Epidemic diarrhea and vomiting, Winter vomiting disease, Epidemic nausea and vomiting)

1. Identification—Usually a self-limited, mild to moderate disease

often occurs in outbreaks, with clinical symptoms of nausea, vomiting, diarrhea, abdominal pain, myalgia, headache, malaise, low-grade fever, or a combination of these symptoms. Gastrointestinal symptoms characteristically last 24-48 hours.

The virus may be identified in stools of ill individuals by IEM or, for the Norwalk virus, also by RIA. Serologic evidence of infection may be demonstrated by IEM or, for the Norwalk virus, by RIA. Diagnosis requires collection of a large volume of stool, with aliquots stored at 4°C (39°F) for EM, and at -20°C (-4°F) for antigen assays. Acute and convalescent sera (3-4 week interval) are essential to link particles observed by IEM with disease etiology.

2. *Infectious agents*—The small, 27-32-nm Norwalk virus, an atypical calicivirus, has been implicated as the etiologic agent in about one-third of the nonbacterial gastroenteritis outbreaks. Other agents that are morphologically similar, but antigenically distinct, have been associated with gastroenteritis outbreaks. These include Hawaii, Ditchling or V, Cockle, Paramatta, Snow Mountain agents and the Marin County agent (an astrovirus). Outbreaks have also been associated with adenoviruses (types 40, 41 and probably 31), several types of astroviruses and 20-35-nm caliciviruses, the 33-39-nm Sapporo agent, the similar Orofuke agent, parvoviruses and coronaviruses. With the exception of the enteric adenoviruses, some astroviruses and caliciviruses, the role of these agents as a cause of severe diarrhea of infants and young children is unclear.

3. *Occurrence*—Worldwide and common; most often in outbreaks but also sporadically affecting all age groups. In a study in the USA, antibodies to Norwalk agent were acquired slowly; by the fifth decade of life, >60% of the population had antibodies. In most developing countries studied, antibodies are acquired much earlier. Seroreponse to Norwalk virus was detected in infants and young children in Bangladesh; this agent was associated with 1-2% of diarrhea episodes.

4. *Reservoir*—Man is the only known reservoir.

5. *Mode of transmission*—Unknown; probably by fecal-oral route principally, although airborne transmission from fomites has been suggested to explain the rapid spread in hospital settings. Several recent outbreaks have strongly suggested primary community foodborne and waterborne transmission, with secondary transmission to family members.

6. *Incubation period*—Twenty-four to 48 hours; in volunteer studies with Norwalk agent, the range was 10-50 hours.

7. *Period of communicability*—During acute stage of disease and up to 48 hours after Norwalk diarrhea stops.