

# 223 Common Viral Respiratory Infections

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## GENERAL CONSIDERATIONS

Acute viral respiratory illnesses are among the most common of human diseases, accounting for one-half or more of all acute illnesses. The incidence of acute respiratory disease in the United States is 3–5.6 cases per person per year. The rates are highest among children <1 year old (6.1–8.3 cases per year) and remain high until age 6, when a progressive decrease begins. Adults have 3–4 cases per person per year. Morbidity from acute respiratory illnesses accounts for 30–50% of time lost from work by adults and for 60–80% of time lost from school by children. The use of antibacterial agents to treat viral respiratory infections represents a major source of abuse of that category of drugs.

It has been estimated that two-thirds to three-fourths of cases of acute respiratory illness are caused by viruses. More than 200 antigenically distinct viruses from 10 genera have been reported to cause acute respiratory illness, and it is likely that additional agents will be described in the future. The vast majority of these viral infections involve the upper respiratory tract, but lower respiratory tract disease can also develop, particularly in younger age groups, in the elderly, and in certain epidemiologic settings.

The illnesses caused by respiratory viruses traditionally have been divided into multiple distinct syndromes, such as the “common cold,” pharyngitis, croup (laryngotracheobronchitis), tracheitis, bronchiolitis, bronchitis, and pneumonia. Each of these general categories of illness has a certain epidemiologic and clinical profile; for example, croup occurs exclusively in very young children and has a characteristic clinical course. Some types of respiratory illness are more likely to be associated with certain viruses (e.g., the common cold with rhinoviruses), whereas others occupy characteristic epidemiologic niches (e.g., adenovirus

infections in military recruits). The syndromes most commonly associated with infections with the major respiratory virus groups are summarized in [Table 223-1](#). Most respiratory viruses clearly have the potential to cause more than one type of respiratory illness, and features of several types of illness may be found in the same patient. Moreover, the clinical illnesses induced by these viruses are rarely sufficiently distinctive to permit an etiologic diagnosis on clinical grounds alone, although the epidemiologic setting increases the likelihood that one group of viruses rather than another is involved. In general, laboratory methods must be relied on to establish a specific viral diagnosis.

This chapter reviews viral infections caused by six of the major groups of respiratory viruses: rhinoviruses, coronaviruses, respiratory syncytial viruses, metapneumoviruses, parainfluenza viruses, and adenoviruses. The extraordinary outbreaks of lower respiratory tract disease associated with coronaviruses (severe acute respiratory syndrome [SARS] in 2002–2003 and Middle East respiratory syndrome [MERS] in 2012–2013) are also discussed. Influenza viruses, which are a major cause of death as well as morbidity, are reviewed in [Chap. 224](#). Herpesviruses, which occasionally cause pharyngitis and which also cause lower respiratory tract disease in immunosuppressed patients, are reviewed in [Chap. 216](#). Enteroviruses, which account for occasional respiratory illnesses during the summer months, are reviewed in [Chap. 228](#).

## RHINOVIRUS INFECTIONS

### ETIOLOGIC AGENT

Rhinoviruses are members of the Picornaviridae family—small (15- to 30-nm) nonenveloped viruses that contain a single-stranded RNA genome. Human rhinoviruses were first classified by immunologic serotype and are now divided into three genetic species: HRV-A, HRV-B, and HRV-C. The 102 serotypes described initially are encompassed by HRV-A and HRV-B species, whereas HRV-C encompasses more than 60 previously unrecognized serotypes. In contrast to other members of the picornavirus family, such as enteroviruses, rhinoviruses are acid-labile and are almost completely inactivated at pH ≤3. HRV-A and HRV-B species grow preferentially at 33°–34°C (the temperature of the human nasal passages) rather

**TABLE 223-1** ILLNESSES ASSOCIATED WITH RESPIRATORY VIRUSES

Virus	Frequency of Respiratory Syndromes		
	Most Frequent	Occasional	Infrequent
Rhinoviruses	Common cold	Exacerbation of chronic bronchitis and asthma	Pneumonia in children
Coronaviruses <sup>a,b</sup>	Common cold	Exacerbation of chronic bronchitis and asthma	Pneumonia and bronchiolitis
Human respiratory syncytial virus	Pneumonia and bronchiolitis in young children	Common cold in adults	Pneumonia in elderly and immunosuppressed patients
Parainfluenza viruses	Croup and lower respiratory tract disease in young children	Pharyngitis and common cold	Tracheobronchitis in adults; lower respiratory tract disease in immunosuppressed patients
Adenoviruses	Common cold and pharyngitis in children	Outbreaks of acute respiratory disease in military recruits <sup>c</sup>	Pneumonia in children; lower respiratory tract and disseminated disease in immunosuppressed patients
Influenza A viruses	Influenza <sup>d</sup>	Pneumonia and excess mortality in high-risk patients	Pneumonia in healthy individuals
Influenza B viruses	Influenza <sup>d</sup>	Rhinitis or pharyngitis alone	Pneumonia
Enteroviruses	Acute undifferentiated febrile illnesses <sup>e</sup>	Rhinitis or pharyngitis alone	Pneumonia
Herpes simplex viruses	Gingivostomatitis in children; pharyngotonsillitis in adults	Tracheitis and pneumonia in immunocompromised patients	Disseminated infection in immunocompromised patients
Human metapneumoviruses	Upper and lower respiratory tract disease in children	Upper respiratory tract illness in adults	Pneumonia in elderly and immunosuppressed patients

<sup>a</sup>Severe acute respiratory syndrome–associated coronavirus (SARS-CoV) caused epidemics of pneumonia from November 2002 to July 2003 (see text). <sup>b</sup>Middle East respiratory syndrome coronavirus (MERS-CoV) has caused severe respiratory illnesses from 2012 to the time of this writing (2014); see text. <sup>c</sup>Serotypes 4 and 7 most commonly; also serotypes 14 and 21. <sup>d</sup>Fever, cough, myalgia, malaise. <sup>e</sup>May or may not have a respiratory component.