

while in the outpatient setting, in individuals that are otherwise healthy, testing, when warranted, is typically focused on a targeted number of respiratory pathogens, such as influenza and SARS-CoV-2 (Fig. 2).

Testing in the Pediatric Population

It is estimated that preschool-age children can have 6 to 10 viral colds a year (137, 138). In addition, one-third of pediatric primary consultations are due to acute respiratory infections in the United Kingdom (138). In the pediatric population, the respiratory pathogens most commonly identified are rhinovirus/enterovirus, RSV, influenza virus, adenovirus, PIVs, and coronaviruses (139). While the clinical utility of viral testing in the pediatric population is questioned in certain contexts, the general concerns raised focus on whether testing results will be properly utilized by the ordering clinician to drive clinical decision-making, specifically in the healthy and immune-competent children in the outpatient setting (32, 140). In children who are hospitalized, or have underlying health conditions, the case for respiratory virus testing is more clearly demonstrated, with multiple studies showing the clinical utility of testing for both treatment decisions and infection control purposes (141–143).

While there was a lower rate of mortality and morbidity due to SARS-CoV-2 observed in children compared to older adults, severe disease has been reported in children. In addition, there have been reports that children play a role in the transmission of COVID-19 (144). During SARS-CoV-2 infection, it was shown that asymptomatic children may have significantly higher viral loads than symptomatic children, pointing out the importance of masking, social distancing, and testing strategies to limit the spread of infection (145).

Testing in the Aging Population and Immunocompromised Hosts

In the aging population and in immunocompromised patients, respiratory viral infections lead

to significant morbidity and mortality underscoring the need for rapid testing to influence patient management. A pre-COVID-19 pandemic study showed a significant increase in acute respiratory infections requiring hospitalization in elderly patients over a 10-year period (146). Influenza, RSV, and recently SARS-CoV-2 are all major causes of morbidity and mortality in the elderly and immunocompromised populations. In addition, other outbreaks, such as hMPV, have also caused severe viral infections in long-term care facilities for the elderly (147). Hospitalization rates and the overall risk of death have increased in those 65 years of age and older for influenza infections (148), with 50% to 70% of influenza-related deaths occurring in this age group (7, 149, 150). Viral pneumonia is 10 times more likely in the elderly population than in younger adults (151) and leads to worse outcomes (152, 153).

A recent literature review estimated 1.5 million episodes of RSV in adults 65 years of age and older in industrialized countries in 2015, with approximately 14.5% of these cases requiring a hospital admission (154). RSV infection is also a substantial cause of morbidity and mortality in immunocompromised populations, with RSV infections in HSCT and SOT ranging from 1% to 12%. An estimated 18% to 55% of these infections progress to LRTIs, and death occurs in 7% to 33% of cases (155, 156). The detection of RSV in the pretransplant period can result in postponement of transplant given the higher risk for increased morbidity and mortality (18). In one study of HSCT recipients, 80% to 90% of patients with upper respiratory RSV infection developed pneumonia with 30% to 40% exhibiting symptoms within 7 days following URTI symptoms (30).

In some studies, for oncology patients diagnosed with influenza, parainfluenza, RSV and adenovirus, antivirals when available and administered early have been shown to improve outcomes (157, 158). Therefore, testing for influenza, RSV, parainfluenza, and other prevalent community-circulating viruses in all symptomatic