

# Health Care–Acquired Viral Respiratory Diseases



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## KEYWORDS

- Influenza • Respiratory syncytial virus • Middle East respiratory syndrome
- Nosocomial infection • Health care–acquired infection

## KEY POINTS

- Health care–acquired viral respiratory infections are common with increased patient morbidity and mortality.
- Multicomponent infection-control measures consisting of education, hand washing, isolation, consistent use of personal protective equipment, cohorting patients, and cohort nursing reduces transmission of respiratory infections.
- Health care worker influenza vaccination is recommended with mandatory vaccination policies becoming more common.

## INTRODUCTION

Health care–associated viral respiratory infections result in increased patient morbidity, mortality and health care costs. Approximately 20% of patients with health care–associated pneumonia have viral respiratory infections, with an incidence that typically reflects the level of virus activity within the community.<sup>1,2</sup> This article focuses on the epidemiology, transmission, and control of health care–associated respiratory viral infections.

## RESPIRATORY SYNCYTIAL VIRUS

### *Epidemiology*

Respiratory syncytial virus (RSV) is the most common cause of pneumonia and bronchiolitis in infants<sup>3</sup> and is a common pathogen in older and high-risk adults.<sup>4</sup> Rates of respiratory hospitalizations secondary to RSV infection are highest among infants,

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although patients 75 years and older have similar rates to children aged 1 to 4 years.<sup>5</sup> Outbreaks of RSV have occurred in a variety of health care settings,<sup>6-9</sup> with the risk for nosocomial RSV infection varying by setting.<sup>10</sup> Secondary attack rates of 19% to 45% have been reported among patients when limited or no infection control measures are implemented.<sup>6,11,12</sup> Similarly, 34% to 56% of health care personnel (HCP) on infant wards may become infected.<sup>6,11,12</sup> Most infected HCP are symptomatic, but asymptomatic shedding of RSV occurs in 15% to 20%.<sup>13</sup> Although some symptomatic HCP may not come to work,<sup>13</sup> symptomatic HCP working while ill (presenteeism) is a concern and is reported to be high (51%–75%) in some populations.<sup>14,15</sup>

### ***Transmission***

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Transmission of RSV occurs via inoculation of the eye and nose<sup>16</sup> and by indirect inoculation of large droplets after touching contaminated fomites.<sup>17</sup> RSV has been recovered on countertops for up to 6 hours, rubber gloves up to 2 hours, and on cloth gowns and hands for 15 to 60 minutes after contamination with infected nasal secretions.<sup>18</sup> The duration of viral shedding among hospitalized infants averages 6.7 days but can be 21 days.<sup>19</sup> Infants with lower respiratory disease and a compromised immune status have more prolonged shedding and shed greater quantities of virus.<sup>19</sup>

### ***Prevention and Control***

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Currently, there is no specific treatment or licensed vaccine readily available for RSV; therefore, effective infection control measures are paramount for minimizing transmission. Studies evaluating the use of gowns and masks to prevent RSV transmission have shown mixed results. In a before-after design, the rate of health care-associated RSV infection among infants during the period that gowns and masks were routinely worn by HCP was not statistically different from the rate during the period when gowns and masks were not used (32% vs 41%).<sup>20</sup> A second prospective, randomized study failed to show that the use of gowns and masks prevented respiratory illness among HCP.<sup>21</sup> One factor in the ineffectiveness of gowns and masks in these studies may have been poor personal protective equipment adherence among HCP. In another study, as compliance with use of gowns and gloves increased from 39% to 95%, the incidence of health care-associated RSV decreased from 6.4 to 3.1 per 1000 patient-days.<sup>22</sup> Some have expressed concerns that the use of gowns and gloves may facilitate transmission by serving as fomites, particularly given the prolonged survival of RSV on rubber gloves compared with skin.<sup>18</sup> One study of seven Canadian pediatric hospitals actually noted an increased risk of transmission with the use of gowns, believed to be caused by decreased adherence of other infection control measures related to the overuse of gowns.<sup>23</sup>

Another explanation for the lack of benefit from gowns and masks in RSV transmission may be from failure to protect the eye as a portal of entry. Two studies suggested that wearing eye protection is beneficial.<sup>24,25</sup> Other studies have evaluated the effectiveness of a variety of measures in combination to prevent health care-associated RSV infection. A combination of cohort nursing and routine use of gowns and gloves significantly reduced RSV transmission compared with either intervention alone.<sup>26</sup> An intervention consisting of education, hand washing, consistent use of gowns and gloves, isolation or cohorting patients, restriction of visitors, and cohort nursing was associated with a 39% reduction in health care-associated RSV.<sup>27</sup> Transmission of RSV in a special care nursery ended after instituting cohort nursing; active surveillance; patient cohorting; a strict policy limiting visitation in the winter; construction of segregate areas; and the use of gown, gloves, and masks with all patient contact.<sup>28</sup> A similar intervention that included isolation or cohorting infected infants, hand

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