

Community Respiratory Virus Infection in Hematopoietic Stem Cell Transplantation Recipients and Household Member Characteristics

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Community respiratory virus (CRV) infections are a health threat and are responsible for substantial global disease. CRVs include respiratory syncytial virus (RSV), influenza, adenovirus, and parainfluenza virus (PIV). Patients with impaired immune systems (e.g., hematopoietic stem cell transplantation [HSCT] recipients) particularly are vulnerable in developing CRV infection. The risk of CRV infection occurs throughout all phases of HSCT—pre-engraftment, postengraftment, and in the latent phase (Tomblyn et al., 2009). High mortality rates have been associated with the progression of CRV infection to the lower respiratory tract, particularly with RSV infection (Avetisyan, Mattsson, Sparrelid, & Ljungman, 2009; Chemaly et al., 2012; Nichols, Gooley, & Boeckh, 2001). Patients who acquire CRV infection may have unscheduled hospital readmissions, lengthy treatment of the infection, and increased medical costs. Outpatient HSCT recipients are particularly at risk for acquiring CRV infection because of varied community exposure to viruses, and challenges associated with seeking timely interventions (Tomblyn et al., 2009).

Understanding potential reservoirs and how transmission occurs in the household setting is vital to minimizing the risk of CRV infection in patients undergoing transplantation. A reservoir for infection is an infected host who is capable of shedding a virus that can infect others. Children, particularly those of preschool age and in day care, are reservoirs for transmission of respiratory viruses because of increased exposure to CRV infection and inadequate personal hygiene practices (Goldmann, 2000; Heikkinen & Järvinen, 2003; Monto, 2002). Compared to adults, children can shed respiratory viruses longer (Centers for Disease Control and Prevention [CDC], 2012). CRV infection primarily is spread through droplet transmission, usually contained in a large droplet expelled from a cough or sneeze, or via direct contact with contaminated hands or objects (CDC, 2012; Goldmann, 2000).

Purpose/Objectives: To determine if children or the number of contacts living in an immediate household increases the risk of community respiratory virus (CRV) acquisition in hematopoietic stem cell transplantation (HSCT) recipients.

Design: Retrospective, exploratory study.

Setting: National Cancer Institute–designated comprehensive cancer center located in the Southeast.

Sample: 720 adult outpatients post-autologous or allogeneic HSCT.

Methods: Data were gathered using a retrospective medical record review from July 1, 2006, to December 31, 2009. Summary statistics were used to describe sample characteristics. Binary logistic regression was used to determine whether the number of household member contacts or number of children in each age group was a significant predictor of CRV infection. Multivariate linear regression was used to investigate predictors of the number of CRV infections.

Main Research Variables: The dependent variable was acquisition of CRV infection. Independent variables included the number of children in the household and the number of household members.

Findings: Across all HSCT recipients, children aged 0–4 years ($p = 0.01$) and 5–12 years ($p = 0.001$) predicted CRV infection. The allogeneic group had the greatest incidence of CRV infection and was most sensitive to the presence of young children. The total number of household members was not a predictor of CRV infection.

Conclusions: Households with children aged 12 years and younger more than doubled the risk of an HSCT recipient acquiring CRV infection. Additional studies are needed to test interventions designed to interrupt household transmission of CRV infection from children to vulnerable HSCT recipients.

Implications for Nursing: Household contacts, particularly children, should be included in HSCT teaching. As indicated by the potentially high number of days from transplantation to acquisition of CRV infection, re-education and continuing focus on prevention of CRV infection should be reinforced throughout the lengthy transplantation period.

Key Words: community respiratory virus; hematopoietic stem cell transplantation

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