Emerging Respiratory Viruses, Especially Rhinoviruses, are Common in Children Evaluated for Respiratory Illness

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Abstract

BACKGROUND

Viral respiratory infections are a common reason children seek medical care. At Primary Children’s Medical Center (PCMC) in Salt Lake City, UT a direct fluorescent assay (DFA) test for 8 viruses is frequently ordered for rapid diagnosis. Nearly half the children have negative DFA tests. There is limited data regarding the frequency of other respiratory viral infections in children with negative DFA testing.

OBJECTIVES

- Determine the frequency of 16 respiratory viruses by polymerase chain reaction (PCR) in DFA negative nasopharyngeal specimens obtained from symptomatic children

METHODS

Respiratory nasopharyngeal specimens were tested by DFA and viral culture for 8 viruses including adenovirus, human metapneumovirus (hMPV), influenza A and B, parainfluenza virus 1, 2, and 3, and respiratory syncytial virus (RSV). Specimens with residual sample from DFA negative patients were tested by PCR for the 8 viruses assayed by DFA and for 8 additional viruses including: bocavirus, coronaviruses 229E, HKU1, NL63, OC43, parainfluenza virus 4, pneumonia viruses, and rhinovirus. Residual DFA samples were also tested by PCR for Bordetella pertussis, Chlamydia pneumoniae, and Mycoplasma pneumoniae. We evaluated PCR results from two time periods, December - March 2005-2008 (winter) and September-November 2006-2007 (fall).

RESULTS

From the winter period, we submitted 195 DFA samples for PCR testing and from the fall period 184 samples, for a total of 379 samples with 204 (54%) DFA negative. During the winter, DFA negative samples were positive by PCR for rhinovirus than in the fall period (September – November) and 195 samples were from the winter period (December - March).

In the fall, DFA negative samples were positive by PCR for rhinovirus (53%), parainfluenza virus 3 (7%), adenovirus (5%), bocavirus, coronaviruses HKU1 and OC43 and parainfluenza virus 4 (3% each).

In the winter, DFA negative samples were positive by PCR for rhinovirus (38%), bocavirus (13%), hMPV (12%), and adenovirus (10%).

Children in the fall were more likely to have rhinovirus than children in the winter. (OR 3.1, 95% C.I. 1.9-5.3, p<0.0001).

RESPIRATORY PATHOGENS BY PCR IN DFA TESTED SPECIMENS (n=204)

** indicates viruses included in DFA testing

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CONCLUSIONS

- The majority of DFA negative specimens from children with respiratory symptoms are positive for emerging viruses by PCR.

- The most common virus detected is human rhinovirus.

- Rhinovirus was more common in the fall than in the winter.

- Prospective studies evaluating the clinical significance and duration of PCR positive test results from nasal secretions for rhinoviruses are warranted.