Molecular Detection of Human Rhinovirus in Hospitalized Kansas City Children (2009-2012): Demographics, Chest Radiograph Findings and Length of Stay in Relation to Pre-existing Comorbidity

Christopher J Harrison MD,1 Nasreen Quadri MD2, Amy Dahl MD3, and Rangara Selvarangan PhD4
1 Infectious Diseases, Children's Mercy Hospital and Clinics (CMH), Kansas City, MO
2 Departments, Internal Medicine and Pediatrics, University of Minnesota, Minneapolis, Minnesota
3 Radiology, CMH Kansas City, MO.
4 Pathology and Laboratory Medicine, CMH Kansas City, MO.

Abstract

- General: All HRV(*) patients – N=517
  - Most (76%) HRV found in children <3 years old. Fig. 1. Peak HRV detection = Mar-May and lesser in Sept-Nov. Fig. 2. - HRV was the sole detected virus in 85%
  - Co-morbidity pre-existing in 159 (26%)
  - PICU admissions: N = 55 (15 bacterial and 35 nonbacterial)
- Annualized HRV admission rate – Table 1
  - No difference year-to-year for patients with co-morbidity
  - Higher rates for previously healthy HRV patients in 2009 & 2011

**Results 1**

**Table 1. Annualized HRV rate/1000 admissions**

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Rate/1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>600</td>
<td>10.00</td>
</tr>
<tr>
<td>2010</td>
<td>617</td>
<td>10.00</td>
</tr>
<tr>
<td>2011</td>
<td>609</td>
<td>10.00</td>
</tr>
<tr>
<td>2012</td>
<td>590</td>
<td>10.00</td>
</tr>
</tbody>
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**Methods**

- Retrospective chart review focusing on HRV(*)
- Mid turbinate specimens – flocked swab
- Multiplex PCR tests by Luminex XTAG multiplex respiratory panel...40 months, Jan 2009-May 2012.
- N = 2375 patients with any respiratory virus
- 617 patients for whom data analyzed
- N = 524 patients with HRV alone
- N = 517 patients for whom data analyzed
- CXR (N=386) interpreted by blinded pediatric radiologist.
- State – For dichotomous variables
  - Student’s t-test for continuous variables
  - AND/OR for multiple group comparison

Introduction

Human rhinovirus (HRV) is frequently detected in hospitalized children (1) with and without respiratory symptoms in the era of routine molecular multiplex testing. HRV may cause severe disease in hospitalized children (2). HRV seems an important pathogen in hospitalized, even previously healthy, children. Our data may allow less overuse of antibiotics and early discharge.

Background

- Almost 90% of nonbacterial HRV admissions (3)
- Pre-existing morbidity extended LOS (Table 2; Figure 1; Figure 2)
- No effect overall
- 1. No bacterial admission detected
- 2. HRV molecular test results availability: Overall: Mn LOS = 8.1d (range 0-402d, SD 27.3).
- 3. Nonbacterial N=509 (82.6%). Pre-existing morbidity = 23.2% (118/509) nonbacterial HRV admissions
- 4. For the N=439 with HRV results available to clinicians before patient D/C, the D/C rate was 57% and LOS 8.2d (range 0-100d, +13.6). The D/C rates at both 24hr and 48hr after HRV results were available was 46% and Mn length of stay (LOS) was 8.1d (range 0-100d, +27.3).
- 5. The D/C rate by 48hr after HRV results were available was less, p<0.001, for patients with morbidity pre-existing (23.7%) compared to those with no morbidity pre-existing (35.0%) (0.008). The D/C rate at 24h for those with morbidity pre-existing was 54%, compared to those with no morbidity pre-existing 65% (0.03).

Discussion

Known aspects of HRV infection that we confirmed

- HRV was the only virus detected in 85% of patients with HRV
- Modest seasonality (Spring > Fall > Winter > Summer)
- 76% of HRV (+) patients < 3 yo (1)
- No racial/ethnic differences in HRV (+) patients i.e. race/ethnicity paralleled that of our region
- No effect overall on LOS due to availability of HRV results

New aspects of data

1. Possible biannual increase in HRV admits in otherwise healthy children
2. 1/3 of HRV (+) patients had pre-existing co-morbidities
3. If no patient co-morbidity, HRV result availability on D1 of admit associated with D/C more often at both 24 & 48 hrs thereafter
4. Normal CXR or insufficient respiratory symptoms to warrant CXR predicted early D/C in HRV (+) patients
5. HRV (+) patients w no co-morbidity BUT w viral pattern CXR D/C at 48h not different than those w normal or no CXR

Conclusion:

HRV test result availability plus a CXR without consolidation in otherwise healthy HRV (+) infants predicted early D/C. Prospective studies could confirm the utility of this combination in management pathways aimed at safely reducing resource utilization, e.g. hospital costs and antibiotic use.