During the winter months we see a variety of respiratory viruses causing coughs and colds, as well as lower respiratory tract disease. This year was unusual due to the early increase of respiratory illnesses, especially asthma, due to the novel enterovirus EV-D68. This virus caused so much respiratory disease that we decided to implement visitation restrictions early to prevent the spread of infection.

This edition provides reminders about basic principles as well as information on testing, patient management, visitation practices and prevention of respiratory virus infections. Throughout the season, be sure to monitor “Bug Watch” so you can see what pathogens our lab is detecting from patients throughout the Children’s Hospital Colorado (CHCO) system.

**Important information for this season:**

### Visitation Restrictions: September 3rd, 2014 – April 30, 2015

**Inpatient Visitor Screening and Restrictions**

On September 3rd, 2014 we implemented our respiratory season visitation restrictions to protect inpatients from visitors who may be ill with EV D68 and other viral infections. This early implementation was fortuitous because influenza also arrived early this year. The visitation restriction program includes the following:

1) Visitation hours are 9am – 9pm.
2) All visitors (including siblings) must be at least 13 years of age to visit. Please advise your patient’s family of our visitation restrictions when referring them to Children’s to prevent any confusion when they arrive at our facility. This really helps!
3) Only 4 visitors (this number includes the parents) at a patient bedside at a given time.
4) No ill visitors.
5) ALL parents and visitors will be screened daily before entry into the inpatient units. Each unit has a screening station located at the entry to the unit. All visitors who meet criteria and are not ill will be given an apple sticker to wear indicating they have been screened.
6) Visitors must adhere to any isolation precautions noted on the patient room door sign and are to wash hands before leaving the room. Exception: Parents may refrain from wearing isolation apparel, but need to wash hands each time upon entering and before leaving the room.

7) In the event the primary caretaker (parent/guardian) has a respiratory illness, he/she is requested to wear a mask and wash hands when outside the room and to limit activity (and wear a mask) during the following:
   a. Obtaining food in cafeteria (should return to patient room to eat, if possible).
   b. Avoid crowded areas in hospital (e.g., gift shop).
   c. Avoid high-risk patient visitation (if possible); if unavoidable (primary caregiver only), must wear a mask, gown and gloves. Discourage “close” patient contact.

8) Some of our higher risk units (ICUs, BMT) have more stringent visitor restrictions that may affect the number of people allowed to visit based on a pre-approved visitor list for each patient.

9) Decreasing the number of people visiting a single patient will decrease exposure risks and also provide an opportunity to educate a select group of visitors on the important steps to prevent transmitting infectious illnesses to our patients.

**Outpatient Clinic /Therapy & Surgery/Procedure Visits:**

Due to an increase in respiratory illnesses in the community during these months, we discourage bringing siblings or friends who are under 13 years of age, especially when ill, to your child’s scheduled visits to these areas.

**Respiratory Infection Tips & Tools**

**Mode of Transmission of Most Respiratory Agents**

Transmitted in large droplets by:

- Direct or close contact with secretions (e.g., close face to face contact), or
- Touching contaminated objects in the environment and inoculating self or others (e.g. hand-to-eye, hand-to-mouth)

**Remember…**

**RSV Persists:**

- Up to 30 minutes for secretions in facial tissues.
- 30 minutes or more on hands.
- Up to 6 hours on surfaces (some viruses can be even longer).

**Incubation Period** is 2 - 8 days (4 - 6 days most common).
### Epidemiology

<table>
<thead>
<tr>
<th>Organism</th>
<th>Illnesses</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenovirus</td>
<td>Pharyngitis, Tonsilitis, Croup, Bronchiolitis, Pneumonia, Keratoconjunctivitis, Common cold</td>
<td>Year-round, peak late winter-spring</td>
</tr>
<tr>
<td><strong>Bordetella pertussis, B. parapertussis</strong></td>
<td>Whooping cough, “Pertussis”, Milder form caused by <em>B. parapertussis</em></td>
<td>No clear seasonality</td>
</tr>
<tr>
<td>Coronavirus</td>
<td>Common cold, Croup, Pneumonia</td>
<td>Fall-winter</td>
</tr>
<tr>
<td>Enterovirus EV-D68</td>
<td>Asthma, Pneumonia, Acute flaccid myelitis</td>
<td>Spring-Fall</td>
</tr>
<tr>
<td>Human meta-pneumovirus (HMPV)</td>
<td>Bronchiolitis, Croup, Pneumonia</td>
<td>Year round; mostly late winter-spring</td>
</tr>
<tr>
<td>Influenza (seasonal)</td>
<td>Flu, Bronchitis, Croup, Pneumonia, Secondary bacterial infections</td>
<td>Usually Dec-Feb. Can persist into spring if other virus types or strains appear.</td>
</tr>
<tr>
<td>Parainfluenza</td>
<td>Croup, Bronchiolitis, Bronchitis, Pneumonia, Common cold</td>
<td>Type 1,2 - fall Type 3 – spring Type 4 – year round; peak in fall</td>
</tr>
<tr>
<td>RSV</td>
<td>Bronchiolitis, Pneumonia, Croup</td>
<td>December - April</td>
</tr>
<tr>
<td>Rhinovirus</td>
<td>Common cold</td>
<td>Year-round with peaks in fall and spring</td>
</tr>
</tbody>
</table>

### Isolation: Basic Infection Control

For patients with symptoms of a “suspected” or a “proven respiratory” illness.

#### Droplet Precautions

1. **PLEASE do not tell patients in isolation that they can walk in halls or go to playroom, cafeteria, etc.** Patients in isolation are **not** allowed to leave their room unless they are going to another department for a procedure that cannot be performed in their room. Isolation precautions are to be used during transport and the receiving department should be notified in advance of the need for isolation precautions for the patient.

2. Gown, glove and mask or face shield are needed by staff whenever coming into contact with the patient or anything in the environment. **ALSO, REMEMBER TO USE EYE PROTECTION WHEN SUCTIONING OR IF IN CLOSE CONTACT WITH A COUGHING PATIENT.** If no such contact occurs, and you are not within a few feet of the patient, you are exempt as long as you are healthy and do not touch any items in the room!

3. **N95 masks should be used by staff performing cough inducing and aerosol generating procedures such as nasal suctioning, collecting nasopharyngeal washes or swabs etc.**

4. Hospital staff with respiratory illness should consult policy Employee Infectious Illness Exposure (OHS-003) to assess if they should be working with patients or are too ill to be at work. **If you have any questions regarding this policy you can reach Occupational Health at 7-6577.**

5. Use good handwashing / hand hygiene after removing gloves (prior to leaving the patient room).

6. Don’t forget to disinfect your stethoscope and any other equipment that is used between patients.

### DISCONTINUING ISOLATION

**FOR PATIENTS WITH VIRAL RESPIRATORY ILLNESS**

(This does not apply to patients with Pertussis.)

May discontinue isolation if **ALL** of the following conditions are met:

- Patient is currently asymptomatic.
- It has been at least 7 days from first positive specimen.
- Patient will be hospitalized at least 2 more weeks.
- No underlying immunodeficiency or chronic respiratory condition.
- If repeat PCR for the virus involved is negative.
1. If immunocompromised or with a chronic respiratory condition, then the individualized decision requires Epidemiology evaluation and consensus recommendation (at least 2 members of the Infection Control Executive Committee). Epidemiology will document recommendation in the patient record (progress notes).

For BMT patients refer to “BMT Respiratory and Enteric Disease Isolation Guidelines” P&P (QNC-001-A) in the IC manual on Planet TCH

*Sick Staff*

Many respiratory illnesses present in adults as a slight cold or persistent cough, however, large numbers of organisms can be shed by sneezing/coughing, etc, and when transmitted can cause severe disease in our patients. If you have mild URI symptoms (minus fever), you may work if you wear a mask (changed frequently throughout the day), wear gloves with patient contact, and wash hands frequently or use alcohol based hand rub.

Exceptions:

1. You should not care for high-risk patients (e.g. BMT, organ transplant, and immunocompromised).
2. No ill staff allowed in the BMT unit.
3. WASH YOUR HANDS after removing gloves.

Avoid contact with high-risk patients if you are ill.

*Diagnosis*

**Specimens:** Nasopharyngeal (NP) aspirates or washes are the preferred upper airway specimen for hospitalized or immunocompromised patients.

Flocked swabs can also be used to collect NP specimens. But they should only be used with immune-normal outpatients, NOT hospitalized or immunocompromised patients. This is because some studies suggest that NP flocked swabs detect slightly fewer positive specimens than aspirates or washes. This problem can be worsened by swabbing the anterior nares (i.e. “nose swab”) rather than swabbing the NP so as not to make the patient cry. But the highest concentration of respiratory viruses is in the NP, so if a respiratory virus test is needed from the upper airway the NP should be sampled. See our CHCO Clinical Policy “Nasopharyngeal Flocked Swabs” for the best collection method. Alternatively, contact Respiratory Care (720-777-6227) for a demonstration.

Tracheal aspirates or bronchoalveolar lavage may be needed to diagnose lower respiratory tract disease in immunocompromised patients or adults who often have a lower concentration of pathogens in their upper than in their lower airways.

**Testing:** Two respiratory virus polymerase chain reaction (PCR) assays are available this winter, the influenza virus PCR and the comprehensive panel respiratory virus PCR (RVP). See our latest “Influenza” edition of Contagious Comments and the respiratory pathogen algorithm below for when to order these tests.

The comprehensive respiratory virus PCR is performed by Film Array®, which provides results in 3 hours on average 24/7 after specimens arrive at the Anschutz Campus laboratory. The test detects the 17 viruses and types depicted in the table below. Mycoplasma pneumoniae and Chlamydia pneumoniae are also detected and are now reported without need for confirmatory testing. Bordetella pertussis is also identified, but RVP is less sensitive than Pertussis PCR and misidentifies high concentrations of B. parapertussis as B. pertussis, so confirmatory testing of positives must be done which delays results. Order B. pertussis/parapertussis PCR for accurate and rapid detection of these bacteria in patients with suspected whooping cough.

The Middle-Eastern Respiratory Syndrome coronavirus (MERS) and SARS coronavirus cannot be detected by RVP. Testing for MERS and SARS is available through our State Health Department. If an unusual coronaviruses or novel influenza virus is suspected, contact Epidemiology and Infectious Diseases for guidance immediately.

Cytomegalovirus (CMV) and herpes simplex virus (HSV) are not detected by RVP or influenza PCR. CMV or HSV can cause lower respiratory tract disease, especially in immunocompromised patients. Consider ordering CMV or HSV culture for seriously ill immunocompromised patients with respiratory symptoms, or if symptoms worsen even if other respiratory viruses have been detected. Positive results are available in as little as 2-3 days.

<table>
<thead>
<tr>
<th>Virus Detected</th>
<th>Test &amp; Relative Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resp. Viral PCR (RVP)</td>
</tr>
<tr>
<td><strong>Influenza A, B</strong></td>
<td>+++++</td>
</tr>
<tr>
<td><strong>Influenza A Subtype</strong></td>
<td>Detects H3N2 and H1N1 and separately report them</td>
</tr>
<tr>
<td><strong>RSV</strong></td>
<td>+++++</td>
</tr>
<tr>
<td><strong>Parainfluenza Virus</strong></td>
<td>+++++</td>
</tr>
<tr>
<td><strong>HMPV</strong></td>
<td>+++++</td>
</tr>
<tr>
<td><strong>Adenovirus</strong></td>
<td>+++++</td>
</tr>
<tr>
<td><strong>Rhinovirus</strong></td>
<td>+++++</td>
</tr>
<tr>
<td><strong>Coronavirus</strong></td>
<td>+++</td>
</tr>
<tr>
<td><strong>Acceptable Specimens</strong></td>
<td>Nasal wash, tracheal aspirate, BAL, lung tissue. NP swab for immune normal outpatients only</td>
</tr>
<tr>
<td><strong>Turnaround Time</strong></td>
<td>3 hours on average</td>
</tr>
<tr>
<td><strong>Relative Cost</strong></td>
<td>$$$$$</td>
</tr>
</tbody>
</table>
Who to test?
The algorithm below summarizes our recommendations for ordering of respiratory pathogen tests, organisms detected, and specimen requirements.

RESPIRATORY PATHOGEN TEST ALGORITHM

Child with respiratory or flu-like illness

Will results change clinical care of the patient or clinical practice for other patients?

NO
Do not test

YES
E.g. start or stop antimicrobials, assess need for prophylaxis, limit ancillary testing, decrease hospitalization

If only influenza virus is relevant

INFLUENZA VIRUS PCR
Detects Influenza A/B only
Mean turnaround time - 3 hrs
Cost $$$
Nasal wash or NP swab

If any common pathogen (including influenza) is relevant

RESPIRATORY PANEL (FILM ARRAY)
Detects influenza A/B, RSV, parainfluenza 1-4, HMPV, adenovirus, rhinovirus, 4 coronaviruses, M. pneumoniae, C. pneumoniae, B. pertussis
Average time turnaround time - 3 hrs
Cost $$$$
Nasal wash, NP swab, tracheal aspirates, BAL
**Figure 2**

**Bronchiolitis Care Algorithm**

*NB. Please see CHCO clinical care guidelines for further details.*

All patients should receive upper airway suctioning prior to classification of disease severity.

Supportive care is the mainstay of bronchiolitis treatment for all severity of illness.

**Mild Disease**
- Observation for changes in clinical status
- Suctioning as needed
- Teach supportive techniques to parents
- Supplemental oxygen if room air saturation is consistently below 88% or for significantly increased work of breathing.
- Discharge when criteria met (including home oxygen if patient is stable on 0.5 l/m of oxygen or less).

**Moderate Disease**
**Severe Disease**

Consider the following additional measures:
- IV or nasogastric hydration for dehydrated patients unable to drink adequately
- Heated high flow oxygen per CHCO respiratory guidelines
- Trial of albuterol by nebulizer *only* if wheeze is present, or in presence of atopic history in patient.
  - wheeze should be differentiated from more typical rhonchi
  - clinical assessment using objective measures of respiratory distress should be used to judge benefit of bronchodilator trial

**Severe Disease**

For severe bronchiolitis consider:
- Need for ICU care
- IV fluids
- Alternate diagnoses (pneumonia, congenital heart disease, sepsis)

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**Bronchiolitis Severity Classification**

<table>
<thead>
<tr>
<th>Mild Disease</th>
<th>Moderate Disease</th>
<th>Severe Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert, active, feeding well</td>
<td>Alert, consoles, feeding decreased</td>
<td>Difficult to console, lethargic, poor feeding</td>
</tr>
<tr>
<td>None to minimal retractions</td>
<td>Minimal to moderate retractions</td>
<td>Moderate to severe retractions</td>
</tr>
<tr>
<td>RR normal to mildly elevated (&lt;50)</td>
<td>RR is mildly to moderately elevated</td>
<td>RR is moderately to severely elevated</td>
</tr>
</tbody>
</table>

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**Treatments not recommended by current AAP guidelines:**
- Bronchodilators (albuterol or epinephrine)
- Hypertonic saline in non-hospitalized children
- Corticosteroids
- Continuous pulse oximetry
- Chest physiotherapy
- Antibiotic therapy
**Therapies**

**Supportive Therapy:** Adequate hydration, upper airway suctioning, and oxygenation are the mainstays of treatment for most infants with viral pneumonia and bronchiolitis. Current AAP guidelines suggest that clinicians may consider a trial of nebulized hypertonic saline to infants and children who are hospitalized with bronchiolitis. Though commonly utilized, routine chest physiotherapy is also not supported in the current guidelines.

**Bronchodilators:** New guidelines from the AAP clearly state that children with bronchiolitis should not routinely receive bronchodilators (including racemic epinephrine and albuterol). Many practitioners will consider a careful trial of a bronchodilator in the presence of a typical wheeze, or a strong atopic history. Any such trial should be evaluated using objective clinical severity criteria. (See Clinical Care Guidelines)

**Evaluating Clinical Status and Response to Treatment:**

1. On initial assessment, determine Severity Classification
2. Decide on intervention (based on Care Algorithm (Figure. 3)
3. Repeat severity classification to determine if intervention was helpful

**Respiratory Severity Classification:**

<table>
<thead>
<tr>
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<tr>
<td>Alert, active, feeding well</td>
<td>Alert, consoles, feeding decreased</td>
<td>Fussy, difficult to console, poor feeding</td>
</tr>
<tr>
<td>None to minimal retractions</td>
<td>Minimal to moderate retractions</td>
<td>Moderate to severe retractions,</td>
</tr>
<tr>
<td>RR normal to mildly elevated (less than 50)</td>
<td>RR is mildly to moderately elevated (50-70)</td>
<td>RR is moderately to severely elevated (greater than 70)</td>
</tr>
</tbody>
</table>

**Supportive Care - Routinely Indicated:**

Oxygen is probably the most effective therapy in infants and children with bronchiolitis and/or viral pneumonia.

- Oxygen to achieve SaO2 at or above 90%
- P.O. / I.V. fluids as needed
- Suction upper airway (use saline PRN):
  - Prior to feeding
  - Prior to clinical assessment
  - PRN evidence of upper airway obstruction

**RSV Prophylaxis**

The 2014 AAP guidelines for bronchiolitis include revised recommendations for the use of palivizumab (Synagis®). Children who are otherwise healthy and with a gestational age of 29 weeks and 0 days should not receive palivizumab. Those for whom 5 doses of palivizumab are recommended include infants during the first year of life with hemodynamically significant heart disease or chronic lung disease of prematurity defined as preterm infants <32 weeks 0 days’ gestation who require >21% oxygen for at least the first 28 days of life.

**Some Final Thoughts**

Finally, remember to adhere to infection prevention practices and isolation procedures. Avoid inappropriate use of antibiotics for viral illness, continue vaccination for influenza and now that you are knowledgeable about the management of patients with viral bronchiolitis etc., you can help to dispel the many widely prevalent myths regarding ineffective therapies and patient management.

**Bug Watch**

Up-to-date information on currently circulating respiratory and enteric viruses detected by the Children’s Microbiology/Virology Laboratory can be provided to you weekly during the wintertime or twice a month spring-fall. It is also posted on Children’s Colorado Internet at: http://www.childrenscolorado.org/news/publications/bugwatch.aspx or you may receive it by email. Contact Carolyn Brock by email carolyn.brock@childrenscolorado.org or phone (720-777-6412) to begin receiving your personal copy.
We are modifying our distribution process for Contagious Comments. If you wish to receive this publication please provide us with your E-mail address below.

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E-mail Address: __________________________________________ (Print clearly please)

Both the Contagious Comments and Bug Watch publications are always posted on Children’s Hospital Colorado website at: http://www.childrenscolorado.org/news/publications/index.aspx

Please return your E-mail address to: Carolyn Brock Children’s Hospital Colorado, Epidemiology – Box B276, 13123 E. 16th Avenue, Aurora, CO 80045 or E-mail address: carolyn.brock@childrenscolorado.org.

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CONTAGIOUS COMMENTS
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