The management of viral URTI

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Section headings:

01  The Epidemiology of URTI
02  The pathogenesis of URTI
03  The diagnosis of viral URTI
04  The management of viral URTI
YUCK!! Cough hygiene please!
Why be concerned about Viral URTI?

Some interesting details:

- Viral RTI is the most common cause of symptomatic human disease in both adults and children
  - 1-3 attacks per adult per year
  - 2-7 attacks per child per year
- The incidence of URTI complicating into pneumonia has increased over the past decade
  - Better diagnostic assays
  - Greater number of immunocompromised people globally
  - In adults, the commonest cause of CAP after S. pneumoniae is viral!
- RTI kill 4.5 million children each year, and 40% of these are due to viral causes
  - Worth remembering that many bacterial pneumonias are preceded by viral URTI
The costs (example used is the USA):

Financial:
- Non-influenza infections: approx 40 billion USD annually
- Influenza related costs: approx 12 million USD annually in a normal (non-pandemic) season

Health seeking behaviour:
- Coryza syndrome is the commonest cause of physician visits
- Annual influenza pandemics USA:
  - 2/3rd of people infected become ill
  - 25 million seek health care each year
  - 100-200 thousand need hospitalization
  - About 60,000 deaths each year

Mortality and morbidity
02 Pathogenesis of URTI

USE THE HANDKERCHIEF AND DO YOUR BIT TO PROTECT THE PUBLIC!

Colds, influenza, pneumonia, and tuberculosis are spread this way.

TREASURY DEPARTMENT
UNITED STATES
PUBLIC HEALTH SERVICE
### Types of Infection:

<table>
<thead>
<tr>
<th>Localized Infections</th>
<th>Generalized Infections</th>
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<tbody>
<tr>
<td>Rhinovirus</td>
<td>Measles</td>
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<tr>
<td>Coronavirus</td>
<td>Rubella</td>
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<tr>
<td>Adenovirus</td>
<td>Mumps</td>
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<tr>
<td>RSV</td>
<td>VZV</td>
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<tr>
<td>PIV 1,2,3,4</td>
<td>EBV</td>
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<tr>
<td>Human metapneumovirus</td>
<td>Enterovirus</td>
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<tr>
<td>Influenza A and B</td>
<td>Prodrome of these infections mimics URTI</td>
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<tr>
<td>Bocavirus</td>
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<tr>
<td>Enteroviruses</td>
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Localized infections:

- These are the infections that commonly cause URTI.
- They cause disease at the portal of entry and very seldom spread beyond this anatomical site.
- Short incubation period of usually 1-5 days.
- Symptoms may be caused by either the immune response to the viral infection, or by the effects of viral replication directly on the host cells.
How do viruses cause disease?

**Cytopathic effect:**
- Viral replication damages the cells and causes symptoms
  - Virus hijacks the cell machinery and deviates your protein synthesis to its own ends
  - Cellular genomic degradation
  - Glycoprotein insertion in the cell membrane
  - Syncitium formation
  - Disrupted cytoskeleton
  - Permeability changes and rupture of the cell
  - Inclusion bodies and accumulation of toxic virion components

**Immunopathogenic effect:**
- Immune response kills infected cells and causes the symptoms
- Cytokine and IFN response gives flu-like symptoms
- Inflammation
- Post infection cytolysis
Transmission

- Respiratory droplet
- Aerosol
- Hand contact with infected secretions and transfer to mucous membranes (fomite)
03 Diagnosis:

Don't Blame us
How do you diagnose viral URTI?

- Usually clinical diagnosis, although this cannot differentiate between the many different causes of URTI.
- If laboratory confirmation is required:

  - **Molecular**: Quick, accurate, highly sensitive and specific, but expensive.
  - **IF assays**: Quick, limited accuracy and sensitivity, reasonably priced, need good cellularity.
  - **Rapid tests**: Limited sensitivity, specificity, PPV and NPV. Best used when there is a confirmed outbreak as this improves PPV.
  - **Culture**: Very slow and of very limited use for clinical diagnosis. Mainly of research and epidemiological importance.
  - **Serology**: Mostly useless diagnostically. Useful epidemiologically. Antibodies appear after the patient is already better, and one needs to check for a rising titre.
04 Treatment and prevention of viral URTI
Non-specific treatment of viral URTI

Mostly symptomatic management

- Hydration
  - To thin respiratory secretions (watch out for hyponatraemia)
- Anti-pyretics
- Antitussives and expectorants (controversial)
- Mucolytics / decongestants
  - Beware rebound congestion
- Anti-inflammatory (NSAIDS)
  - Steroids have a very limited role to play if used systemically. May be useful as nasal sprays in people who suffer from chronic sinusitis
- Analgesic
Non-specific treatment of viral URTI (continued)

Mostly symptomatic management

- **Vit C**
  - Possible that doses between 2 and 4 g/day reduce duration of illness by half a day. More than 4g causes diarrhoea

- **Zinc**
  - Reduced duration of illness by a day in the studies in which efficacy was shown

- **Echinacea**
  - Heterogenous presentations of this substance make it difficult to study, but anaphylaxis has occurred so be careful in using this agent for trivial illnesses. This agent is an inhibitor of Cytochrome P450 so drug interactions can occur. Should not be used if underlying liver disease.

- **Bedrest**
  - No evidence to support that this shortens the duration of illness
  - Voice rest important if laryngitis
Can OTC medications be used to manage VRTI?

• The reality is that they are extensively used, BUT there are warning signs to rather consider further medical intervention and avoid OTC medications.
  • Fast breathing in children particularly, or difficulty with breathing
  • Inability to drink fluids, particularly in children
  • Persistant vomiting
  • Poor level of consciousness – unable to rouse the patient
  • Extreme irritability, particularly in children
  • Worsening or return of symptoms (may indicate secondary bacterial infection that needs further medical management).
Can OTC medications be used – continued:

- In general, children under the age of 4 years should first be assessed by a medical practitioner before OTC products are used.
- Elderly people on other medications should be assessed by a medical practitioner to assess drug interactions and co-morbidity.
- Pregnant women should avoid OTC medications.
- Care should be taken by athletes in the use of OTC medications.
- Salicylates should be avoided in children <16 years of age.
The number - one port of call for people with URTI:

- While there is little evidence that these preparations shorten the duration of illness or prevent illness and infection when compared with placebo, they often help to alleviate symptoms.
- Most people will buy OTC medications without first consulting a doctor and the pharmacist often becomes the primary clinical care giver in these circumstances.
- Remember: Primum non nocere.
- Record keeping – for epidemiological purposes and to track possible abuse.
- OTC (all) medications can be harmful, but the pharmacist can help patients select the correct medications to alleviate symptoms and minimize the risk of harm.
Specific treatments

- **Influenza**
  - Neuraminidase inhibitors
  - Adamantanes

- **RSV**
  - Ribavirin
  - IG

- **PIV**
  - “Fludase”

- **Rhinovirus**
  - Pleconaril
A word on antibacterials

- Not indicated for viral URTI
- May be required later for complicated secondary bacterial infection, but there is no evidence to show efficacy if used prophylactically
- Can complicate viral illness (EBV and ampicillin)
- Adverse events: Antibiotics are NOT innocuous medications!
- Antibiotic resistance is driven by unnecessary use of antibiotics
- Symptoms that have a poor PPV for antibiotic need:
  - Yellow sputum/secretions
  - Sore throat
  - Fever
A word on antibacterials (continued)

In the USA around 75% of adults with URTI are given antibiotic prescriptions (which amounts to 41 million antibiotic prescriptions per year which is more than 20% of all antibiotic prescriptions)

- 68% of these are non-recommended, broad spectrum, more expensive agents
- Unnecessary cost of approx 700 million USD each year!
Prevention:

- Frequent hand washing
- Cough and sneeze hygiene
- Vit C has not been shown to be useful prophylactically
- Multivits have no benefit in otherwise healthy people on a normal diet, but may be of benefit to elderly institutionalized adults
- Influenza vaccine