



Upper Respiratory Infection Essential Learning

- **Essential Teaching Points: Viral URI**

- For well-appearing patients with suspected uncomplicated URI, no specific testing is indicated. Patient education, symptomatic care and reassurance is key.
- Patients with abnormal vital signs or exam findings concerning for pneumonia or heart failure may require additional testing and/or a higher level of care.
- Viral URIs are the leading cause of inappropriate antibiotic prescribing; antibiotics should be given only for confirmed or highly suspected bacterial infections (i.e. pneumonia or strep pharyngitis).
- Acetaminophen and/or ibuprofen are the mainstay of treatment for fever, sore throat, and body aches.
- Common over the counter medications to treat congestion/cough offer limited or no evidence of benefit and may cause harm. Adverse side effects should always be a consideration.
 - Over the counter cough and cold medications should not be prescribed, recommended or given to children 4-years-old and younger
 - Official recommendation from the American Academy of Pediatrics and the American College of Emergency Physicians
 - **Symptomatic care options that may help cough/congestion:** combination antihistamine/pseudoephedrine, naproxen, cromolyn sodium nasal spray (NasalCrom), saline nasal spray (marginal); bronchodilators may be helpful for acute bronchitis
 - **Symptomatic care options that do NOT help/are not recommended:** second generation antihistamines alone, codeine, dextromethorphan (Robitussin), phenylephrine, topical glucocorticoids, mucolytics, herbal products, vitamin C, zinc (marginal benefit, high side effect profile/anosmia), heated humidified air

- **Deep Learning: Indications for Transfer to a Higher Level of Care**

- Markedly abnormal vital signs, signs/symptoms suggestive of emergent dx noted above, immunocompromised patients, URI causing significant exacerbation of chronic illness (hyperglycemia in DM, COPD exacerbation, etc)

- **Deep Learning: Disease Characteristics of Respiratory Tract Infections**

- Upper and lower respiratory tract infections are commonly self-limiting infections that cause irritation and swelling of the airways with associated cough and no evidence of pneumonia. There must also be a lack of a separate condition to account for the patient symptoms and no history of COPD/emphysema/chronic bronchitis.
- Upper respiratory tract infections involve the nose, sinuses, pharynx, and larynx while lower respiratory tract infections involve the bronchi below the level of the larynx.

- Common presenting symptoms can include cough, wheezing, sore throat, runny nose, nasal congestion, headache, low-grade fever, facial pressure, sneezing, malaise, myalgias.
- Expected symptom course:
 - Incubation period for most common viruses is 1-3 days
 - Symptoms usually peak around day 3
 - Resolve or significantly improve by day 7
 - Usually last 1-2 weeks
 - For bronchitis, symptoms are initially similar to upper respiratory infection and then cough or chest symptoms may develop
 - Cough for more than 5 days suggests acute bronchitis
- The most common virus is rhinovirus. Other viruses include the influenza virus, adenovirus, enterovirus, and respiratory syncytial virus.
- Epidemiology
 - Upper respiratory infections are one of the top three diagnoses in the outpatient setting. Estimated annual direct and indirect costs for viral upper respiratory infections, not related to influenza, exceeds \$22 billion.
 - Upper and lower respiratory tract infections account for an estimated 20 million outpatient appointments a year.
 - Upper and lower respiratory tract infections are accountable for greater than 20 million missed days of school and greater than 20 million days of work lost leading to a large economic burden.
- **Deep Learning: Testing Options for URI**
 - Uncomplicated upper and lower respiratory tract infections are a clinical diagnosis that typically do not require any specific testing.
 - According to recommendations from the American College of Physicians and the Centers for Disease Control:
 - Clinicians should not perform testing in patients with bronchitis unless pneumonia is suspected.
 - Clinicians should only test patients with symptoms suggestive of group A streptococcal pharyngitis by rapid antigen detection test and/or culture for group A Streptococcus.
 - Do not routinely test for common viral pathogens
 - The American College of Chest Physicians recommends obtaining a chest plain film only when heart rate is greater than 100, respiratory rate is greater than 24, oral body temperature is greater than 38 degrees C, or there are focal chest examination findings of rales, egophony or fremitus.
 - According to the American College of Radiology Appropriateness Criteria:
 - Chest radiograph test characteristics for detection of pulmonary opacities when pneumonia is being considered has demonstrated a sensitivity of 43.5%, specificity of 93.0%, positive predictive value of 26.9%, and negative predictive value of 96.5%.
 - According to the Infectious Disease Society of America:
 - Consider influenza testing in outpatients who have high risk factors such as:

- Immunocompromised persons who present with influenza-like illness, pneumonia, or nonspecific respiratory illness if the testing result will influence clinical management.
 - Patients who present with acute onset of respiratory symptoms with or without fever, and either exacerbation of chronic medical conditions or known complications of influenza (e.g., pneumonia) if the testing result will influence clinical management.
 - Patients not at high risk for influenza complications who present with influenza-like illness, pneumonia, or nonspecific respiratory illness (e.g., cough without fever) and who are likely to be discharged home if the results might influence antiviral treatment decisions or reduce use of unnecessary antibiotics, further diagnostic testing, and time in the emergency department, or if the results might influence antiviral treatment or chemoprophylaxis decisions for high-risk household contacts.
- If other specific emergent or urgent diagnoses are highly suspected, arrange for disease specific testing according to local protocols and guidelines.
- **Deep Learning: Treatment of URI**
 - The great majority of upper and lower respiratory tract infections are viral and self-limiting but they are a leading cause of inappropriate antibiotic prescriptions.
 - According to recommendations from the American College of Physicians and the Centers for Disease Control:
 - “Clinicians should not prescribe antibiotics for patients with the common cold.”
 - Clinicians should not initiate antibiotic therapy in patients with bronchitis unless pneumonia is suspected.
 - Clinicians should treat patients with antibiotics only if they have confirmed streptococcal pharyngitis.
 - Do not give over the counter cold and cough preparations to patients 4 years of age or younger due to lack of proven benefit and potential for adverse side effects.
 - Antipyretics and analgesics may relieve fever, sore throat and myalgias
 - Antitussive agents:
 - The best available data suggests that there is no good evidence for or against the effectiveness of over the counter medicines in acute cough. Adverse side effects should always be a consideration.
 - Recommendations from the American College of Chest Physicians includes:
 - Patients with acute cough associated with the common cold can be treated with a first-generation antihistamine and decongestant preparation (brompheniramine/Dimetapp and sustained-release pseudoephedrine/Sudafed). Naproxen can also be administered to help decrease cough in this setting.
 - In patients with the common cold, newer generation non-sedating antihistamines are ineffective for reducing cough and should not be used.
 - In patients with a diagnosis of acute bronchitis, antitussive agents are occasionally useful and can be offered for short-term symptomatic relief of coughing.

- In patients with a diagnosis of acute bronchitis, because there is no consistent favorable effect of mucokinetic agents on cough, they are not recommended.
 - Codeine does not appear to be effective in reducing acute cough symptoms
 - Bronchodilators such as beta-2 agonists may help in patients with wheezing symptoms associated with bronchospasms especially in those with a history of asthma, COPD or reactive airway disease
 - Spirometry has demonstrated transient bronchial hyperresponsiveness in 40% of patients with acute bronchitis. Reversibility of FEV1 >15% is reported in 17% of patients.
 - Outside of these populations, there is likely little effect and should not be routinely recommended.
 - Agents for nasal symptoms:
 - First generation antihistamines may offer a modest reduction of rhinorrhea and sneezing during the first 2 days of a cold in adults, but do cause sedation.
 - Decongestants are moderately effective for short term relief of congestion in adolescents and adults, topical nasal preparations may be more effective than oral. Topical decongestants should only be used for 2-3 days (rebound rhinitis).
 - Ipratropium nasal spray may improve rhinorrhea but not nasal congestion.
 - Intranasal steroids have not been shown to reduce common cold symptoms.
 - Nonpharmacological therapy including hot tea, honey, ginger, and throat lozenges may be reasonable as they are unlikely to have adverse side effects; however, no clinical trials have evaluated their effectiveness.
 - Zinc, echinacea, and vitamin C have all been evaluated as common cold therapies, but none has been clearly shown to be beneficial. For those taking zinc for the common cold, 1 in 5 patients had reduced symptoms at 7 days, however 1 in 12 patients had an adverse side effect, largely a bad taste and nausea. Zinc can cause irreversible anosmia.
 - Herbal therapy liquid solutions containing Pelargonium sidoides extract may lead to faster resolution of symptoms associated with the common cold.
- **Deep Learning: Patient Communication Pearls and Questions to Anticipate**
 - Symptom relief is a main reason for patient visits. We know many patients are wondering if they need an antibiotic but patient satisfaction with care for acute bronchitis depends more on clinician-patient communication rather than on antibiotic treatment. Receiving information and reassurance has been associated with patient satisfaction in patients with acute respiratory tract symptoms.
 - Patients spend billions of dollars on prescriptions and over the counter treatments. There is little evidence to no evidence that any treatment actually shortens the duration of a viral upper respiratory infection. Be honest about expected treatment effects, patients may appreciate the cost savings.
 - Set realistic expectations for symptom improvement. Symptoms may last for a couple of weeks and the cough may last for up to several weeks.
 - Don't forget to consider other noninfectious causes of cough. Acute asthma is misdiagnosed as acute bronchitis in approximately one-third of the patients who present with acute cough.
- **Deep Learning: Patient Education Scenarios**

- **“I know this is bronchitis. Why can’t you just prescribe me an antibiotic for this cough? Every time I get these same symptoms in the winter I always get an antibiotic prescription and that always helps.”**
 - Explain to the patient that they have many reassuring features, describe what signs and symptoms would be concerning for pneumonia which may benefit from antibiotics.
 - Stress the potential side effects of antibiotics and lack of benefit by briefly touching on available evidence.
 - In patients who receive antibiotics for symptoms like yours:
 - No patients had clinical improvement in acute bronchitis during follow-up at 2 to 14 days.
 - 1 in 24 developed gastrointestinal symptoms, headache, rash, or vaginitis.
- **“This is definitely the worst sinus infection I’ve ever had, can I get an antibiotic?”**
 - Again, provide reassurance and discuss how we as clinicians make the diagnosis of bacterial sinusitis.
 - According to the American College of Physicians and the Centers for Disease Control: “Clinicians should reserve antibiotic treatment for acute rhinosinusitis for patients with persistent symptoms for more than 10 days, onset of severe symptoms or signs of high fever (>39 °C) and purulent nasal discharge or facial pain lasting for at least 3 consecutive days, or onset of worsening symptoms following a typical viral illness that lasted 5 days that was initially improving (double sickening).”
 - Based on the evidence that we have available, in patients like you that also had similar symptoms:
 - The great majority improve with time and supportive care.
 - 1 in 17 patients that received antibiotics were helped at 7-14 days.
 - 1 in 8 patients experienced significant adverse side effects with the most common being diarrhea and other less common side effects being allergic reactions, C. difficile infection, and the development of antibiotic resistance.
 - Acknowledge and sympathize that they are uncomfortable. Offer to try medications that have shown some greater potential benefit than antibiotics including oral or topical decongestants, first generation antihistamines, NSAIDs, nasal saline rinse.
- **“I had a cold a couple weeks ago but I still have this darn cough. Am I still sick? What can I do about this cough?”**
 - Cough as an isolated symptom may persist for weeks after recovery from other symptoms. 25% of patients may have a cough that lasts for greater than four weeks. A cough is not considered chronic until eight weeks or greater.
 - Assuming the patient clinically looks well and all other symptoms have resolved, explain the basic pathophysiology. “The infection caused inflammation of your respiratory tract which contains the cough receptors. This tract extends from your nose, down your throat, into your neck and down into your chest so there’s a lot of cells that could have been affected. The cells of the respiratory tract are still irritable and recovering from the infection but you have cleared the actual infection at this point.”

- Unfortunately, there is no great cure for this type of cough, no prescription or over the counter medications have ever been proven to have significant impact on the treatment of this type of cough.
- The American Academy of Pediatrics has made the following recommendation:
 - Cough and cold medicines should not be prescribed, recommended or used for respiratory illnesses in young children [under the age of four years old]. Research has shown these products offer little benefit to young children and can have potentially serious side effects [respiratory depression, hallucinations, dry mouth, and tachycardia]. Many cough and cold products for children have more than one ingredient, increasing the chance of accidental overdose if combined with another product.
 - Simple therapies that could be considered in young children include nasal saline, increased humidification, and honey (avoid in infants less than one year old).
- Recommendations from the American College of Chest Physicians regarding post infectious cough:
 - Consider a trial of inhaled ipratropium as it may attenuate the cough.
 - When the cough persists despite use of inhaled ipratropium, consider the use of inhaled corticosteroids.
 - For severe paroxysms of postinfectious cough, consider prescribing 30 to 40 mg of prednisone per day for a short, finite period of time when other common causes of cough (*e.g.*, Upper Airway Cough Syndrome due to rhinosinus diseases, asthma, or gastroesophageal reflux disease) have been ruled out.
 - Central acting antitussive agents such as codeine and dextromethorphan should be considered when other measures fail.
- **I feel like my child has been sick with this cold for months. Do you think there is something wrong with their immune system?**
 - If the child is well appearing with a normal exam, provide reassurance and possible explanation.
 - Young children have an average of several respiratory tract infections per year and up to 15% of young healthy children have up to 12 infections per year. This can lead to infections that are essentially back to back making it seem as though there is a prolonged illness. This is especially likely in the winter months when children are indoors and in close contact with each other. The drier air may make the nasal mucosa drier and more vulnerable to infection.
- **Deep Learning: Disposition and Discharge Instructions**
 - Does this patient require transfer to a higher level of care?
 - What would be concerning symptoms or exam findings?
 - Symptoms
 - Lightheadedness or syncope
 - Atypical headache or stiff neck
 - Chest pain with concerning features
 - Atypical rash

- Worsening sore throat for greater than 5 days
- Symptoms of whooping cough (preceding URI symptoms for 1-2 weeks followed by paroxysms of a staccato cough during which which forceful inspirations cause a “whooping” sound)
- Decreased urination or vomiting suggestive of dehydration
- Exam findings
 - Toxic appearance
 - Respiratory distress signs including posturing and accessory muscle use
 - Upper airway obstructive symptoms including difficulty or painful swallowing, difficulty opening mouth, voice changes, history of foreign body inhalation
 - Abnormal oropharyngeal or neck swelling
 - Altered mental status
 - Respiratory rate greater than 24
 - Systolic blood pressure less than 90
 - Persistent or worsening tachycardia (greater than 100)
 - Oxygen saturation levels less than 92% on room air
 - Multilobar or bilateral involvement on chest plain film
- Good return precautions are always important
 - A small number of individuals may develop complications including secondary bacterial infections (otitis media, epiglottitis, pharyngeal or retropharyngeal abscesses, pneumonia, meningitis), respiratory distress syndrome, sepsis, cavernous sinus thrombosis, or exacerbations of other chronic conditions. Each year, there are isolated cases of death reported stemming from a respiratory tract infection.
- Preventing transmission
 - Promote good hand hygiene and covering the nose and mouth when sneezing and coughing.
 - Most viruses from the respiratory tract can persist on dry inanimate surfaces for up to a few days.
 - Rhinovirus can survive 2 hours to 7 days
 - Coronavirus can survive 3 hours
 - Influenza can survive for 1-2 days
- A good time to promote smoking cessation if applicable and encourage appropriate vaccinations (childhood vaccines, influenza, pneumococcal)
 - Consider using patient handouts
 - Choosing Wisely has well written, evidence based documents for patients
 - <https://www.choosingwisely.org/patient-resources/colds-flu-and-other-respiratory-illnesses-in-adults/?highlight=respiratory%20infection>
 - <https://www.choosingwisely.org/patient-resources/antibiotics-for-respiratory-illness-in-children/?highlight=respiratory%20infection>

- **Learning Objectives**

- List a differential for emergent, urgent and benign causes of this presentation
 - Discuss which history and exam findings are most helpful to establish a diagnosis
 - Discuss which tests, if any, are needed during the work up
 - Discuss treatment options focused on symptom relief
 - Promote thoughtful consideration of antibiotics and determine when they are truly indicated
 - Determine which patients require transfer to a higher level of care
 - Anticipate and practice structured responses for common patient questions
- **Attributions**
 - Author: Nathaniel Shekem, PA-C
 - Editors: Matthew Negaard, MD, Melissa Nelson-Perron, MD, Kristen Grabow Moore, MD, MEd
- **References:**
 - Wenzel RP, Fowler AA. Clinical practice. Acute bronchitis. *N Engl J Med*. 2006 Nov 16;355(20):2125-30.
 - Fendrick AM, Monto AS, Nightengale B, Sarnes M. The economic burden of non-influenza-related viral respiratory tract infection in the United States. *Arch Intern Med*. 2003 Feb 24;163(4):487-94. doi: 10.1001/archinte.163.4.487. PMID: 12588210.
 - Thomas M, Bomar PA. Upper Respiratory Tract Infection. [Updated 2021 Jun 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK532961/>
 - Singh A, Avula A, Zahn E. Acute Bronchitis. [Updated 2021 Jul 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK448067/>
 - Braman SS. Postinfectious cough: ACCP evidence-based clinical practice guidelines. *Chest*. 2006 Jan;129(1 Suppl):138S-146S. doi: 10.1378/chest.129.1_suppl.138S. PMID: 16428703.
 - Irwin RS, Baumann MH, Bolser DC, et al. Diagnosis and management of cough executive summary: ACCP evidence-based clinical practice guidelines. *Chest*. 2006;129(1 Suppl):1S-23S. doi:10.1378/chest.129.1_suppl.1S
 - Truesdale K, Jurdi A. Nebulized lidocaine in the treatment of intractable cough. *Am J Hosp Palliat Care*. 2013 Sep;30(6):587-9. doi: 10.1177/1049909112458577. Epub 2012 Sep 9. PMID: 22964341.
 - Singh M, Das RR. Zinc for the common cold. *Cochrane Database Syst Rev*. 2013 Jun 18;(6):CD001364. Doi: 10.1002/14651858.CD001364.pub4. Update in: *Cochrane Database Syst Rev*. 2015;(4):CD001364. PMID: 23775705.
 - Timmer A, Günther J, Motschall E, Rücker G, Antes G, Kern WV. Pelargonium sidoides extract for treating acute respiratory tract infections. *Cochrane Database Syst Rev*. 2013 Oct 22;(10):CD006323. doi: 10.1002/14651858.CD006323.pub3. PMID: 24146345.
 - Arroll B. Common cold. *BMJ Clin Evid*. 2008 Jun 9;2008:1510. PMID: 19450292; PMCID: PMC2907967.
 - Kim SY, Chang YJ, Cho HM, Hwang YW, Moon YS. Non-steroidal anti-inflammatory drugs for the common cold. *Cochrane Database Syst Rev*. 2015 Sep 21;(9):CD006362. doi: 10.1002/14651858.CD006362.pub4. PMID: 26387658.

- Oduwole O, Meremikwu MM, Oyo-Ita A, Udoh EE. Honey for acute cough in children. *Cochrane Database Syst Rev*. 2014 Dec 23;(12):CD007094. doi: 10.1002/14651858.CD007094.pub4. Update in: *Cochrane Database Syst Rev*. 2018 Apr 10;4:CD007094. PMID: 25536086.
- Hayward G, Thompson MJ, Perera R, Del Mar CB, Glasziou PP, Heneghan CJ. Corticosteroids for the common cold. *Cochrane Database Syst Rev*. 2015 Oct 13;(10):CD008116. doi: 10.1002/14651858.CD008116.pub3. PMID: 26461493.
- Singh M, Singh M, Jaiswal N, Chauhan A. Heated, humidified air for the common cold. *Cochrane Database Syst Rev*. 2017 Aug 29;8(8):CD001728. doi: 10.1002/14651858.CD001728.pub6. PMID: 28849871; PMCID: PMC6483632.
- King D, Mitchell B, Williams CP, Spurling GK. Saline nasal irrigation for acute upper respiratory tract infections. *Cochrane Database Syst Rev*. 2015 Apr 20;(4):CD006821. doi: 10.1002/14651858.CD006821.pub3. PMID: 25892369.
- Kinkade S, Long NA. Acute Bronchitis. *Am Fam Physician*. 2016 Oct 1;94(7):560-565. PMID: 27929206.
- Harris AM, Hicks LA, Qaseem A; High Value Care Task Force of the American College of Physicians and for the Centers for Disease Control and Prevention. Appropriate Antibiotic Use for Acute Respiratory Tract Infection in Adults: Advice for High-Value Care From the American College of Physicians and the Centers for Disease Control and Prevention. *Ann Intern Med*. 2016 Mar 15;164(6):425-34. doi: 10.7326/M15-1840. Epub 2016 Jan 19. PMID: 26785402.
- Timothy M Uyeki, Henry H Bernstein, John S Bradley, Janet A Englund, Thomas M File, Jr, Alicia M Fry, Stefan Gravenstein, Frederick G Hayden, Scott A Harper, Jon Mark Hirshon, Michael G Ison, B Lynn Johnston, Shandra L Knight, Allison McGeer, Laura E Riley, Cameron R Wolfe, Paul E Alexander, Andrew T Pavia, Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza, *Clinical Infectious Diseases*, Volume 68, Issue 6, 15 March 2019, Pages e1–e47, <https://doi.org/10.1093/cid/ciy866>
- Kirsch J, Ramirez J, Mohammed TL, Amorosa JK, Brown K, Dyer DS, Ginsburg ME, Heitkamp DE, Jeudy J, Macmahon H, Ravenel JG, Saleh AG, Shah RD. ACR Appropriateness Criteria® acute respiratory illness in immunocompetent patients. *J Thorac Imaging*. 2011 May;26(2):W42-4. doi: 10.1097/RTI.0b013e31820ffe0f. PMID: 21508726.
- Lemiengre MB, van Driel ML, Merenstein D, Liira H, Mäkelä M, De Sutter AIM. Antibiotics for acute rhinosinusitis in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 9. Art. No.: CD006089. DOI: 10.1002/14651858.CD006089.pub5. Accessed 10 November 2021.
- Smith SM, Fahey T, Smucny J, Becker LA. Antibiotics for acute bronchitis. *Cochrane Database Syst Rev*. 2017 Jun 19;6(6):CD000245. doi: 10.1002/14651858.CD000245.pub4. PMID: 28626858; PMCID: PMC6481481.
- Cough and cold medicines for children under four. American Academy of Pediatrics. Choosing Wisely. Released February 21, 2013; updated June 12, 2018. Available at: <https://www.choosingwisely.org/clinician-lists/american-academy-pediatrics-cough-and-cold-medicines-for-children-under-four/>
- Smith SM, Schroeder K, Fahey T. Over-the-counter (OTC) medications for acute cough in children and adults in community settings. *Cochrane Database of Systematic Reviews* 2014, Issue 11. Art. No.: CD001831. DOI: 10.1002/14651858.CD001831.pub5.

- Kramer A, Schwebke I, Kampf G. How long do nosocomial pathogens persist on inanimate surfaces? A systematic review. BMC Infect Dis. 2006 Aug 16;6:130. doi: 10.1186/1471-2334-6-130. PMID: 16914034; PMCID: PMC1564025.
- Welschen I, Kuyvenhoven M, Hoes A, Verheij T. Antibiotics for acute respiratory tract symptoms: patients' expectations, GPs' management and patient satisfaction. Fam Pract. 2004 Jun;21(3):234-7. doi: 10.1093/fampra/cmh303. PMID: 15128681.

- **Supplemental Resources for Learners**

- FOAMed references

- <https://thesgem.com/2019/07/sgem263-please-stop-prescribing-antibiotics-for-viral-acute-respiratory-infections/>
- <https://www.thennt.com/nnt/antibiotics-acute-bronchitis/>
- <https://www.thennt.com/nnt/antibiotics-acute-sinusitis-adults/>
- <https://www.thennt.com/nnt/zinc-for-common-cold/>