Upper Respiratory Tract Infections in Long-Term Care Patients

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Pre-Questions

Whose responsibility is it to prevent antimicrobial misuse?

a) Physicians
b) Pharmacists
c) Nurses
d) Patients
e) All of the above

True or false: upper respiratory tract infections are mostly caused by bacteria.

a) True
b) False

What patient age group is most affected by “strep throat”?

a) 3-14 months of age
b) 3-14 years of age
c) 15-45 years of age
d) > 45 years of age

Objectives

Explain antimicrobial stewardship

Discuss antibiotic overuse in the geriatric population

Summarize the burden of upper respiratory tract infections

What is antimicrobial stewardship?

Promotion for the responsible use of antibiotics

Audience Participation Question #1

FALSE

TRUE or FALSE?

Antibiotics are benign drugs that pose no significant threat to humans, animals, or the environment.

Negative Effects of Antibiotics in Humans

Adverse drug reactions

Increased health care burden

Development of antimicrobial resistance

Negative Effects of Antibiotics in Animals and the Environment

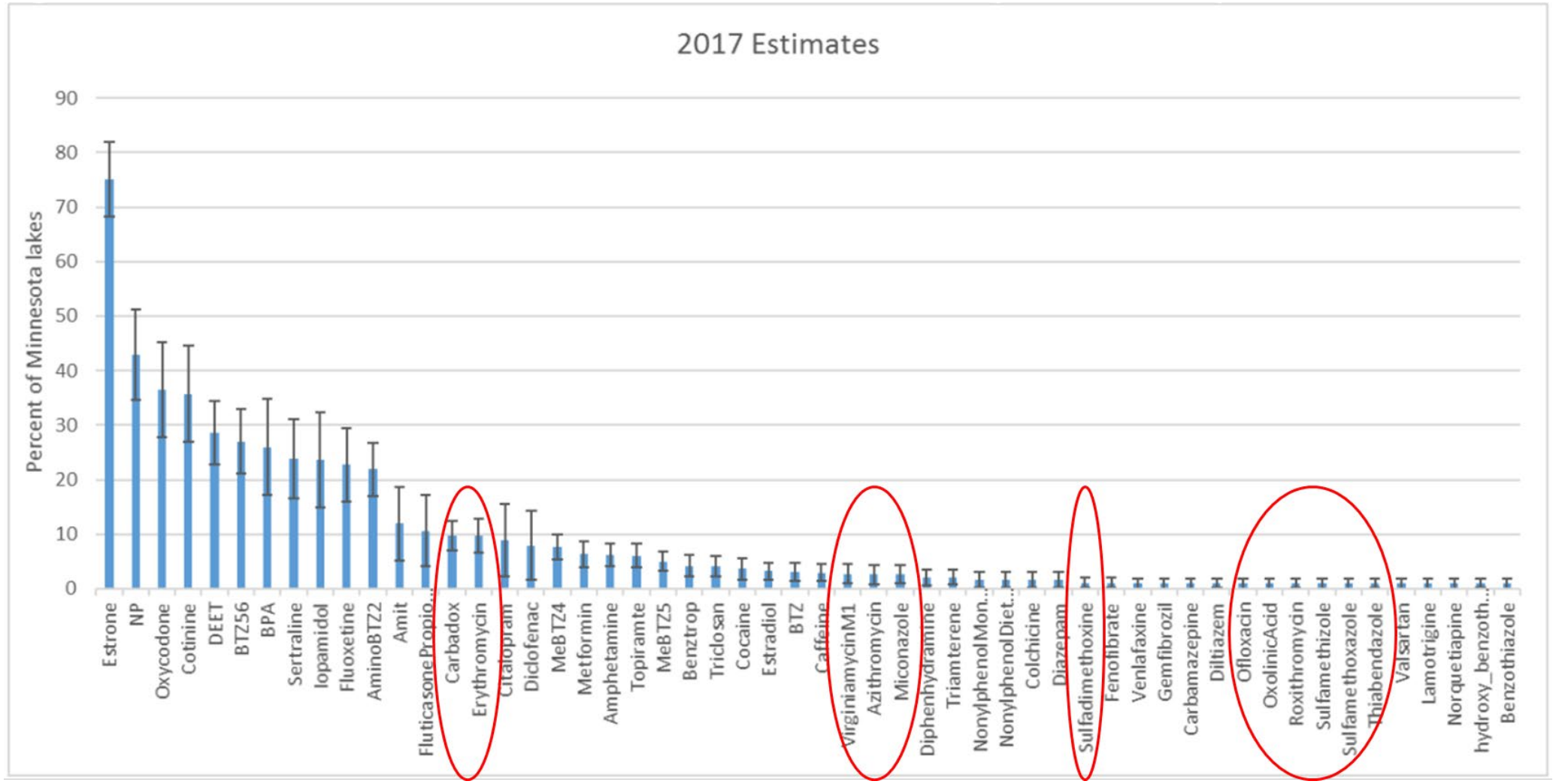
Adverse drug reactions

Agro-ecosystem contamination

Development of antimicrobial resistance

Polianciuc, S. I., Gurzău, A. E., Kiss, B., Ștefan, M. G., & Loghin, F. (2020). Antibiotics in the environment: Causes and consequences. *Medicine and Pharmacy Reports*, 93(3), 231–240. https://doi.org/10.15386/mpr-1742

Figure 5. Estimate of the number of lakes that contained chemicals analyzed in this study in 2017.



Ferrey, M., Streets, S., Andrews, A., & Backe, W. (2021, January). Pharmaceuticals and chemicals of concern in Minnesota lakes. https://www.pca.state.mn.us/sites/default/files/tdr-g1-21.pdf

What can we do?

One Health Antibiotic Stewardship Collaborative

- Recognizes the health of humans, animals, and the environment are interconnected
- Requires a multidisciplinary approach at the local, regional, national, and global levels

Minnesota Department Of Health. (2024, September 11). Minnesota One Health Antibiotic Stewardship Collaborative (MOHASC). Healthy Communities, Environment and Workplaces. https://www.health.state.mn.us/communities/onehealthabx/index.html

Audience Participation Question #2

In what human health care setting are antimicrobials used inappropriately?

a) Hospital setting

b) Outpatient setting

c) Long-term care setting

d) Antimicrobials aren’t used inappropriately in humans

e) a, b, and c are all correct

Long-term Care (LTC)

- Provides a variety of services for patients who cannot perform everyday activities independently
- Patients who are of advanced age, frail, or are with serious illness
- Need for LTC often develops gradually

National Institute on Aging. (2023, October 12). What is Long-Term Care?. Long-Term Care. https://www.nia.nih.gov/health/what-long-term-care

LTC Services

Home-based care – can be provided by family, friends, neighbors, or formal caregivers

Assistance with activities of daily living.

Examples:
Bathing, dressing, eating, taking medications, general supervision.

Assistance with more advanced care.

Examples:
Wound care, medica equipment assistance, physical therapy.

Community and residential care – can be provided in an adult day care center, assisted-living facility, or nursing home

Provides necessities of life.

Examples:
Food, water, shelter.

Some provide special programs.

Examples:
Specialty Alzheimer's disease/dementia services.

National Institute on Aging. (2023, October 12). What is Long-Term Care?. Long-Term Care. https://www.nia.nih.gov/health/what-long-term-care

Nursing Home Numbers in the U.S.

~1.4 million
people reside in more than 15,000 nursing homes (NHs) daily

~3.3 million
Medicare recipients admitted annually for short stays

Antibiotic Use in NHs

One of the most frequently prescribed medications in NHs

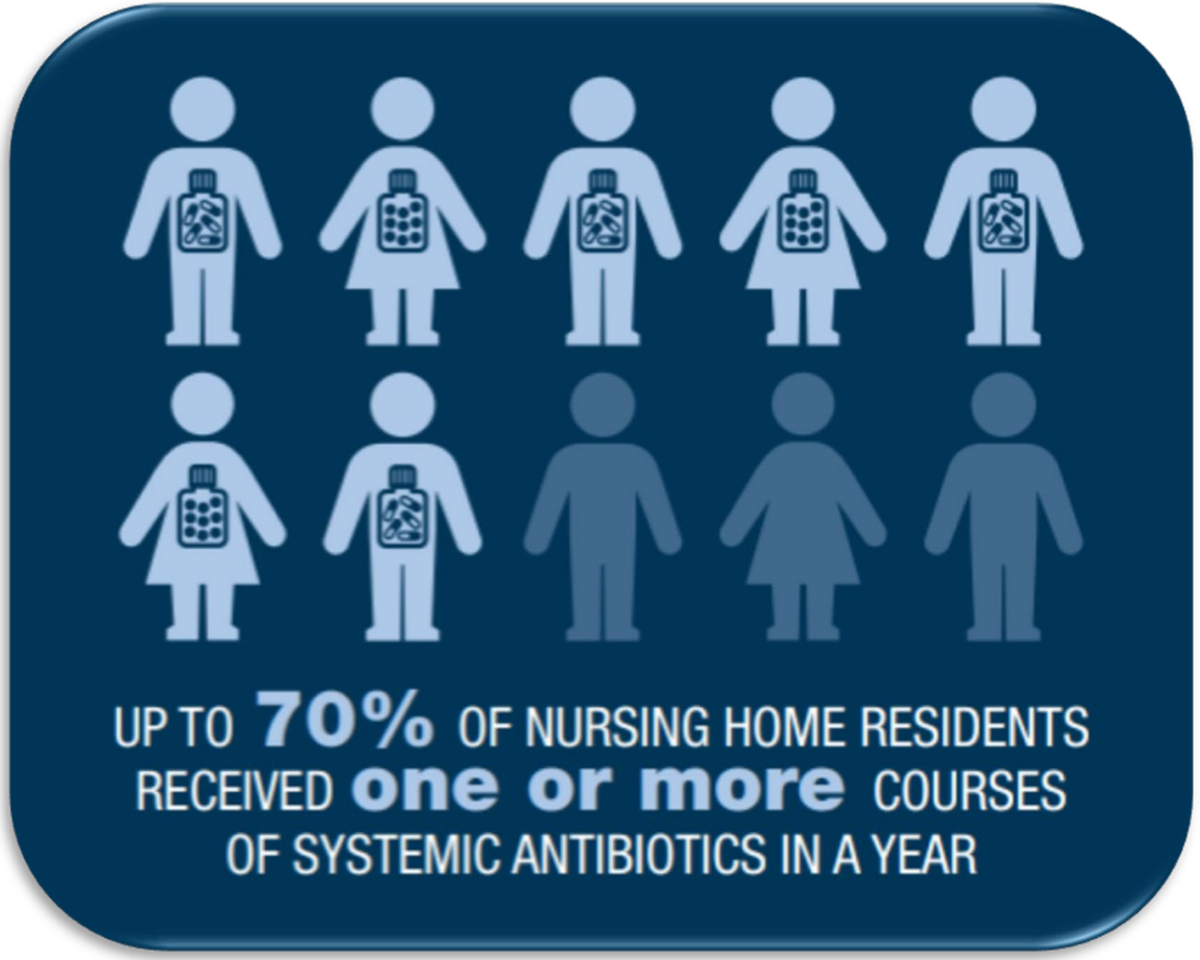
- 6-10% of residents are taking antibiotics at any given time
- More than half of residents are prescribed at least one antibiotic in a year

Most antibiotic use in NHs is inappropriate

- Estimated 25%-75% of antibiotic prescriptions do not meet clinical guidelines for appropriate prescribing
- Most common infection leading to inappropriate prescribing is suspected urinary tract infection

Mody, L., & Crnich, C. (2015). Effects of Excessive Antibiotic Use in Nursing Homes. *JAMA Internal Medicine*, *175*(8), 1339. https://doi.org/10.1001/jamainternmed.2015.2774

Antibiotic Use in NH residents



Mody, L., & Crnich, C. (2015). Effects of Excessive Antibiotic Use in Nursing Homes. *JAMA Internal Medicine*, *175*(8), 1339. https://doi.org/10.1001/jamainternmed.2015.2774

Minimum Criteria for Initiation of Antibiotics in Long-Term Care Residents

Suspected Lower Respiratory Tract Infection

- Fever >38.9°C [102°F]
  and at least one of the following:
  - Respiratory rate >25
  - Productive cough

or

- Fever (>37.9°C [100°F] or a 1.5°C [2.4°F] increase above baseline temperature, but ≤38.9°C [102°F])
  and cough
  and at least one of the following:
  - Pulse >100
  - Rigors
  - Delirium
  - Respiratory rate >25

or

- Afebrile resident with COPD and >65 years
  and new or increased cough with purulent sputum production

or

- Afebrile resident without COPD and new cough with purulent sputum production
  and at least one of the following:
  - Respiratory rate >25
  - Delirium

or

- New infiltrate on chest X-ray thought to represent pneumonia
  and at least one of the following:
  - Fever (>37.9°C [100°F] or a 1.5°C [2.4°F] increase above baseline temperature)
  - Respiratory rate >25
  - Productive cough

Chest X-ray and complete cell count with differential is reasonable for residents with fever, cough, and at least one of the following: pulse >100, worsening mental status, rigors.

Fever with Unknown Focus of Infection

- Fever (>37.9°C [100°F] or a 1.5°C [2.4°F] increase above baseline temperature)
  and at least one of the following:
  - New onset delirium
  - Rigors

Suspected Urinary Tract Infection

NO indwelling catheter:

- Acute dysuria

or

- Fever (>37.9°C [100°F] or a 1.5°C [2.4°F] increase above baseline temperature)
  and at least one of the following:
  New or worsening:
  - Urgency
  - Frequency
  - Suprapubic pain
  - Gross hematuria
  - Costovertebral angle tenderness
  - Urinary incontinence

WITH indwelling catheter (Foley or suprapubic):

- *At least one* of the following:
  - Fever (>37.9°C [100°F] or a 1.5°C [2.4°F] increase above baseline temperature)
  - New costovertebral tenderness
  - Rigors
  - New onset of delirium

Note: Foul smelling or cloudy urine is not a valid indication for initiating antibiotics. Asymptomatic bacteriuria should not be treated with antibiotics.

Suspected Skin and Soft-tissue Infection

- New or increasing purulent drainage at a wound, skin, or soft-tissue site

or

- *At least 2* of the following:
  - Fever (>37.9°C [100°F] or a 1.5°C [2.4°F] increase above baseline temperature)
  - Redness
  - Tenderness
  - Warmth
  - New or increasing swelling

Minimum Criteria for Initiation of Antibiotics in Long-Term Care Residents
(www.health.state.mn.us/diseases/antibioticresistance/hcp/ltcabxcard.html)

What about other types of infection?

Upper Respiratory Tract Infections (URTIs)

Leading cause of acute disease incidence worldwide

Relatively low risk of severe illness and mortality

Substantial economic and health care burden due to:

- Medical expenses
- Lost productivity
- Increased health system strain

Sirota, S. B., Doxey, M. C., Dominguez, R.-M. V., Bender, R. G., Vongpradith, A., Albertson, S. B., Novotney, A., Burkart, K., Carter, A., Abdi, P., Abdoun, M., Abebe, A. M., Abegaz, K. H., Aboagye, R. G., Abolhassani, H., Abreu, L. G., Abualruz, H., Abu-Gharbieh, E., Aburuz, S., … Kyu, H. H. (2025). Global, regional, and national burden of upper respiratory infections and otitis media, 1990–2021: A systematic analysis from the Global Burden of Disease Study 2021. The Lancet Infectious Diseases, 25(1), 36–51. https://doi.org/10.1016/s1473-3099(24)00430-4

Causative Pathogens

Viral

- Rhinoviruses
- Coronaviruses
- Influenza
- SARS-CoV-2

Bacterial

- *Streptococcus pyogenes*
- *Streptococcus pneumoniae*
- *Haemophilus influenzae*
- *Mycoplasma pneumoniae*

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URTI Transmission

Acquired via various respiratory routes

- Onto mucous membranes from contaminated hands
- Inhalation of aerosolized particles from infected persons

Methods are influenced by several factors

- Ambient temperature
- Humidity
- Crowding

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Types

Types of URTIs

- Common cold
- Sinusitis
- Pharyngitis
- Laryngitis
- Other viral infections (i.e., flu, COVID-19)

Types of LRTIs

- Bronchitis
- Bronchiolitis
- Chest infections
- Pneumonia
- Other viral infections (i.e., flu, COVID-19)

National Health Service. (2024, December 23). Respiratory tract infections. https://www.nhs.uk/conditions/respiratory-tract-infection/

Common Cold

- Typically mild, self-limited viral infection
- Caused by over 200 respiratory viruses
- Rhinoviruses are most common
- Human coronaviruses, parainfluenza viruses, adenoviruses, enteroviruses, human metapneumovirus
- Symptoms include mild fever, nasal discharge/congestion, sneezing, sore throat, cough, and muscle ache
- Symptom duration is 7-10 days
- Treatment is symptomatic

Yoon, Y. K., Park, C.-S., Kim, J. W., Hwang, K., Lee, S. Y., Kim, T. H., Park, D.-Y., Kim, H. J., Kim, D.-Y., Lee, H. J., Shin, H.-Y., You, Y. K., Park, D.-A., & Kim, S.-W. (2017a). Guidelines for the Antibiotic Use in Adults With Acute Upper Respiratory Tract Infections. Infection & Chemotherapy, 49(4), 326. https://doi.org/10.3947/ic.2017.49.4.326
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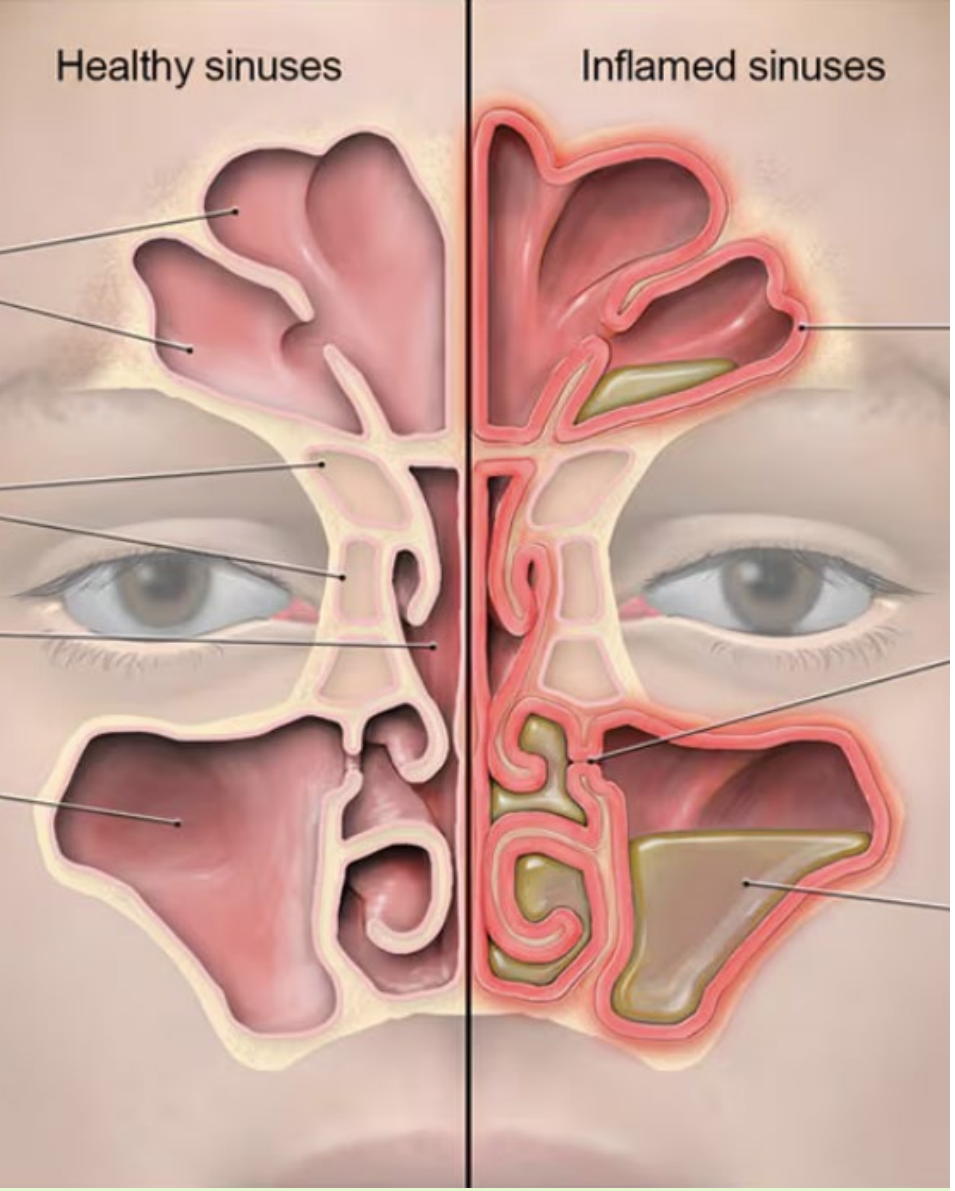
Centers for Disease Control and Prevention. (2024, October 15). About Common Cold. Common Cold. https://www.cdc.gov/common-cold/about/index.html



CDC Sinus Infection Basics (https://www.cdc.gov/sinus-infection/about/)

Sinusitis

- Also known as rhinosinusitis
- Inflammation of the nasal passage and mucosa lining the sinuses resulting from infection, allergy, and/or autoimmunity
- Classified as acute (< 4 weeks), subacute (4 weeks - 3 months), chronic (> 3 months)
- Bacterial infection accounts for 2-10% of cases
- S. pneumoniae, H. influenzae, Moraxella catarrhalis, anaerobic bacteria
- Viral infection accounts for 90-98% of cases
- Rhinovirus, parainfluenza virus, influenza virus
- ~0.5-2% of acute viral sinusitis progress to acute bacterial sinusitis

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Sinusitis Guidelines

- Difficult to differentiate acute viral sinusitis from acute bacterial sinusitis
- Antibiotic treatment is not routinely recommended to treat uncomplicated acute sinusitis
- Amoxicillin/clavulanate (or 3rd-generation cephalosporin in penicillin intolerant)

TABLE 3

IDSA Guidelines for Acute Bacterial Rhinosinusitis

Treat acute bacterial rhinosinusitis in patients with any one of the following symptom complexes:

Onset with severe symptoms or signs, including high fever (≥ 102.2°F [39°C]) and purulent nasal discharge or facial pain lasting for at least three to four consecutive days at the beginning of the illness

Persistent symptoms or signs compatible with acute bacterial rhinosinusitis lasting ≥ 10 days without clinical improvement

Worsening symptoms or signs for three to four days characterized by the onset of fever, headache, or increase in nasal discharge following a typical viral upper respiratory tract infection that lasted five to six days and was initially improving (i.e., double sickening)

IDSA = Infectious Diseases Society of America.

Information from reference 9.

Yoon, Y. K., Park, C.-S., Kim, J. W., Hwang, K., Lee, S. Y., Kim, T. H., Park, D.-Y., Kim, H. J., Kim, D.-Y., Lee, H. J., Shin, H.-Y., You, Y. K., Park, D.-A., & Kim, S.-W. (2017a). Guidelines for the Antibiotic Use in Adults With Acute Upper Respiratory Tract Infections. Infection & Chemotherapy, 49(4), 326. https://doi.org/10.3947/ic.2017.49.4.326
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Pharyngitis and Laryngitis

Inflammation of the pharynx and larynx, respectively

- Causes include vocal overuse, irritation from allergens/environmental irritants, acid reflux, or infection

Majority of infection are caused by viruses

- Similar viruses as the common cold and sinusitis

Symptoms include sore throat, painful swallowing, fever, hoarseness (primarily laryngitis)

Routine use of antibiotics are not recommended

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TABLE 2

Modified Centor Criteria

Clinical finding	Points
Absence of cough	1
Age	
3 to 14 years	1
15 to 45 years	0
Older than 45 years	–1
Fever (≥ 100.4°F [38°C])	1
Tender anterior cervical lymphadenopathy	1
Tonsillar exudates or swelling	1

Note: Patients with a score of ≤ 1 do not require further testing or treatment; however, contact with a person who has documented streptococcal infection should be considered in patients with a score of 1, and testing should be performed in these cases; rapid antigen detection testing should be considered for patients with a score of 2 or 3 and, if results are positive, should receive antibiotics; patients with a score of 4 or 5 should receive antibiotics.

Adapted with permission from Zoorob R, Sidani MA, Fremont RD, et al. Antibiotic use in acute upper respiratory tract infections. Am Fam Physician. *2012;86(9):820.*

Strep Throat

- Group A Beta-Hemolytic Streptococcal Pharyngitis
  - Caused by *S. pyogenes*
- Most common cause of bacterial pharyngitis
- More common in children than adults
  - Accounts for 20-30% of sore throat visits in children
  - Accounts for 5-15% of sore throat visits in adults
- Difficult to differentiate from viral pharyngitis
- Rapid antigen detection test

Yoon, Y. K., Park, C.-S., Kim, J. W., Hwang, K., Lee, S. Y., Kim, T. H., Park, D.-Y., Kim, H. J., Kim, D.-Y., Lee, H. J., Shin, H.-Y., You, Y. K., Park, D.-A., & Kim, S.-W. (2017a). Guidelines for the Antibiotic Use in Adults With Acute Upper Respiratory Tract Infections. Infection & Chemotherapy, 49(4), 326. https://doi.org/10.3947/ic.2017.49.4.326
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If we know that these illnesses are largely caused by viruses, and we know the risks of antibiotic overuse, then why are antibiotics still overprescribed for URTIs?

Antibiotic Pressure

Patient and family dissatisfaction

What can we do?

Patient and Family Education

URTIs are largely caused by viral infections

The dangers of antibiotic misuse

The importance of antimicrobial stewardship


Key Takeaways

Questions?

Sources

1. Polianciuc, S. I., Gurzău, A. E., Kiss, B., Ștefan, M. G., & Loghin, F. (2020). Antibiotics in the environment: Causes and consequences. Medicine and Pharmacy Reports, 93(3), 231–240. https://doi.org/10.15386/mpr-1742

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Thank you!

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