INFECTION IN LONG-TERM CARE: FOCUS ON RESPIRATORY AND URINARY TRACT INFECTIONS

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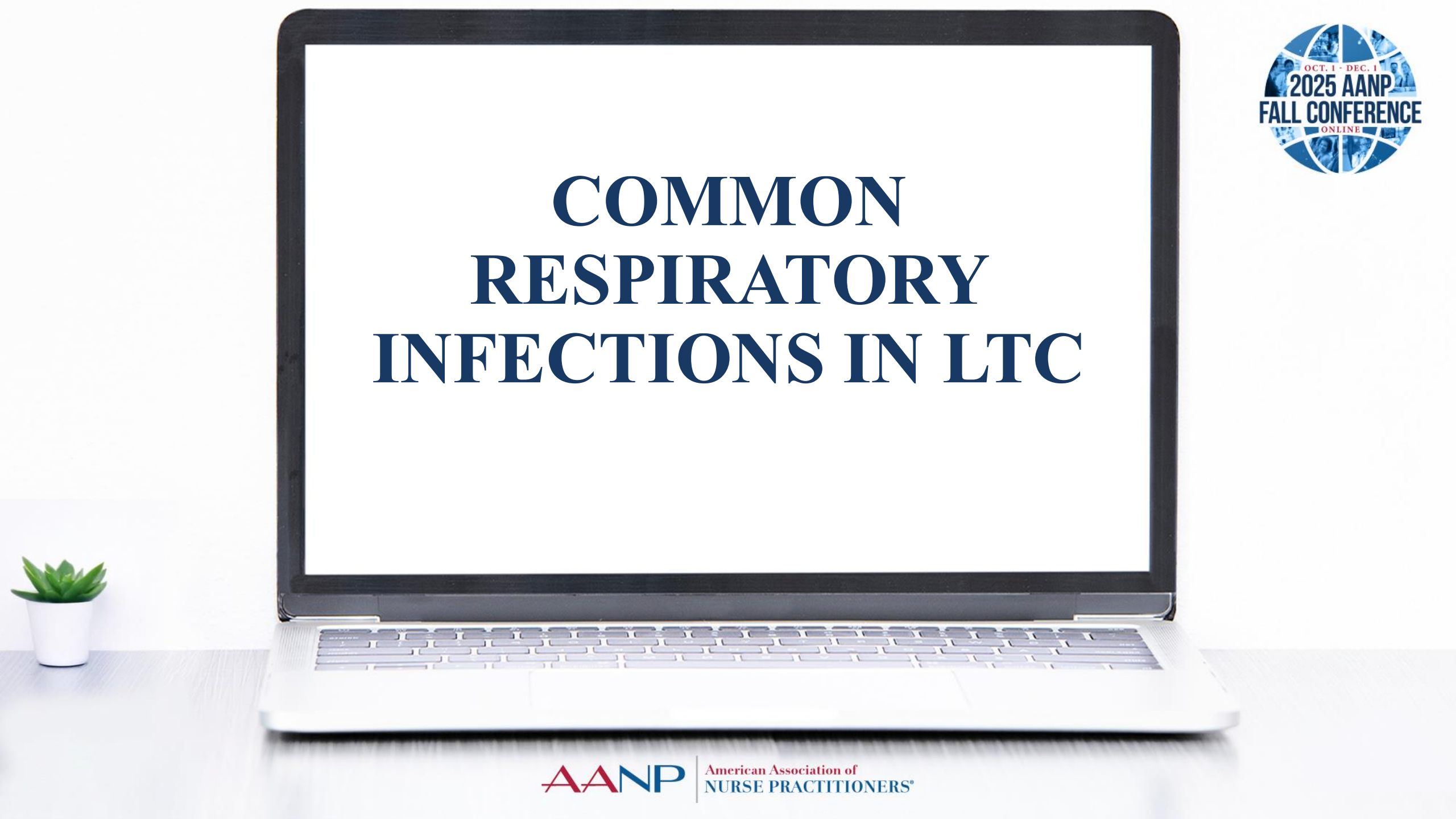
OBJECTIVES

- At the end of this presentation, participants will outline epidemiologic data and trends of common respiratory infections in long-term care (LTC) patients in the United States.
- At the end of this presentation, participants will differentially diagnose sinusitis, bronchitis, and pneumonias using historical, physical examination, and diagnostic data.
- At the end of this presentation, participants will outline epidemiologic data and trends of urinary tract infections in LTC patients in the United States.
- At the end of this presentation, participants will differentially diagnose uncomplicated and complicated urinary tract infections using historical, physical examination, and diagnostic data.
- At the end of this presentation, participants will describe prevention strategies and pharmacologic management of sinusitis, bronchitis, pneumonias, uncomplicated and complicated urinary tract infections in LTC patients.



COMMON RESPIRATORY INFECTIONS IN LTC

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EPIDEMIOLOGY

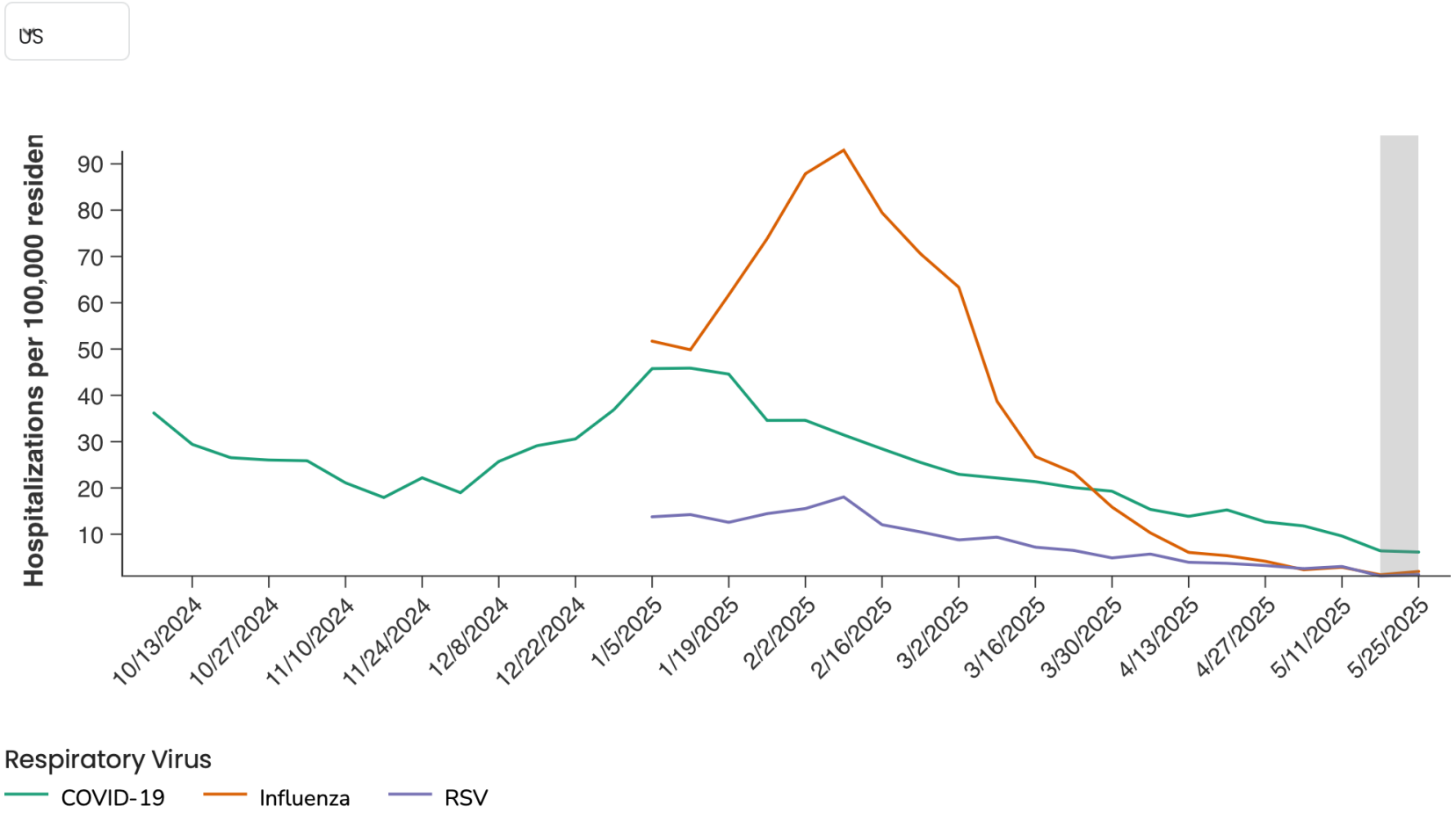
- Somewhat difficult to determine
- According to Childs and colleagues (2019):
  - The wide range of estimates offers little useful guidance for decision-making to decrease respiratory infection burden.
  - Large, well-designed epidemiologic studies are therefore still necessary to credibly quantify the burden of respiratory infections among older adults in LTCFs, which will ultimately help inform future surveillance and intervention efforts (p. 1).

RISK FACTORS

- Around 5% or more of persons ≥65 years are in LTCFs in developed countries
- Residents are in close quarters, significant consideration for communicable respiratory infections
- Proximity, advanced age, multimorbidity, and frailty = greater susceptibility to infections and their complications
- Clustering of frail older residents in close living quarters allows infections to spread more quickly
- Low vaccination rates can contribute to the development of outbreaks

Reference: Childs et al., 2019.p. 2

EPIDEMIOLOGY



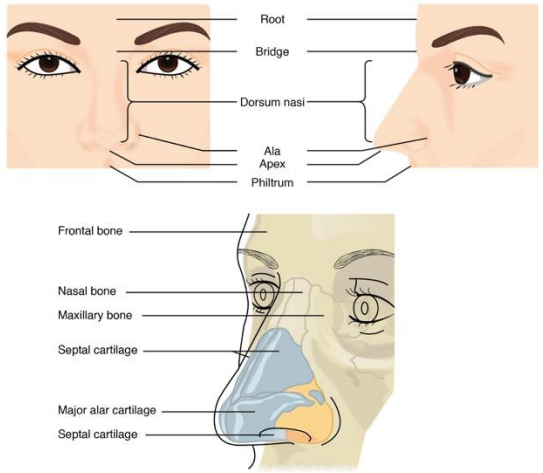
SINUSITIS

- Up to one-third of patients seen by an otolaryngologist are older than the age of 65 years
- Poorly controlled rhinitis and rhinosinusitis can act as triggers for respiratory disease exacerbation and affect the patient's quality of life, underlining the importance of assessing and treating these conditions
- Presbynasalis refers to the changes in the sinonasal tract that occur with age:
  - Fibroconnective tissues become weaker because of collagen fiber atrophy and a decrease in facial musculature
  - Atrophy of nasal mucosa with advancing age = thinning of both the epithelium and the basal membrane, variably affecting nasal airflow and altering mucociliary clearance
  - Decrease in ciliary beat frequency and mucociliary clearance accompanied by alterations of the microtubules

Content Reference: Valdes & Tewfik, 2018

SINUSITIS

- Presbynasalis refers to the changes in the sinonasal tract that occur with age:
  - Nasal vasculature also changes as submucosal vessels become less patent, resulting in a decreased ability of nasal structures to warm and humidify inhaled air.
  - Consequently, older individuals are more susceptible to suffering from nasal dryness.
  - Decrease in the production and secretion of nasal mucous, there is an increase in the viscosity of secretions, which further contributes to the sensation of dryness and irritation.
  - Two major changes noted: immunosenescence and development of chronic inflammation



Content Reference: Valdes & Tewfik, 2018
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SINUSITIS

- History
  - Evaluate Risk Factors during history:
    - Smoking, **older age**, air travel, experiencing changes in atmospheric pressure, swimming, asthma, allergies, dental disease, and immunodeficiency
    - Fungal infections higher prevalence in people with diabetes and immunocompromised.
      - Nurse practitioners (NPs) should suspect acute invasive fungal sinusitis in immunocompromised patients with orbital or CNS complications of rhinosinusitis
    - Suspect acute sinusitis with URTI that persists >7-10 days, particularly if severe and accompanied by high fever, purulent rhinorrhea, or periorbital edema (ethmoid sinusitis)
    - Patient may seem to be recovering; however, the condition becomes acutely worse around day 7
    - This should be considered a red flag because most upper respiratory tract infections last 5-7 days

Content Reference: Brook & Benson, 2025

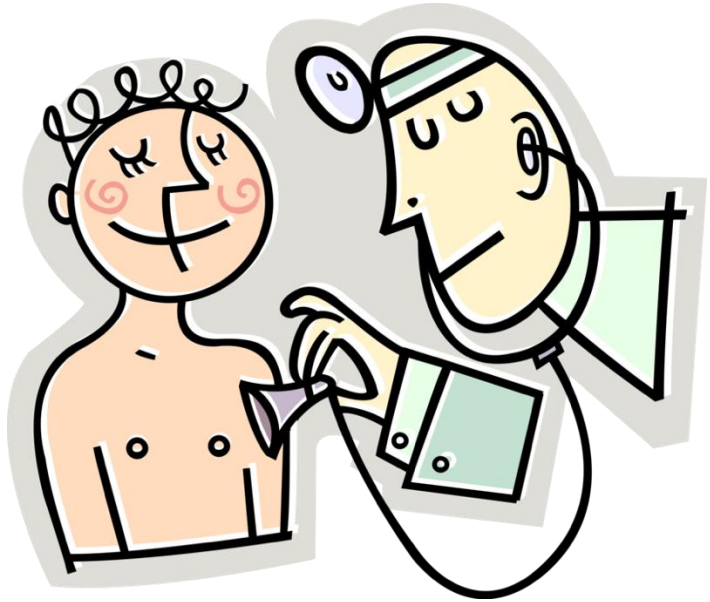
SINUSITIS

- History
  - Facial pain or pressure (especially unilateral)
  - Hyposmia/anosmia
  - Nasal congestion
  - Rhinorrhea/ PND
  - Fever
  - Cough
  - Fatigue
  - Maxillary dental pain
  - Ear fullness/pressure

Content Reference: Brook & Benson, 2025

SINUSITIS

- Physical Examination
  - Pain over cheek and radiating to frontal region or teeth, increasing with straining or bending down
  - Erythema of nose, cheeks, or eyelids
  - Tenderness to pressure over the floor of the frontal sinus immediately above the inner canthus
  - Referred pain to the vertex, temple, or occiput
  - PND
  - Persistent coughing or pharyngeal irritation
  - Facial pain
  - Hyposmia



Content Reference: Brook & Benson, 2025
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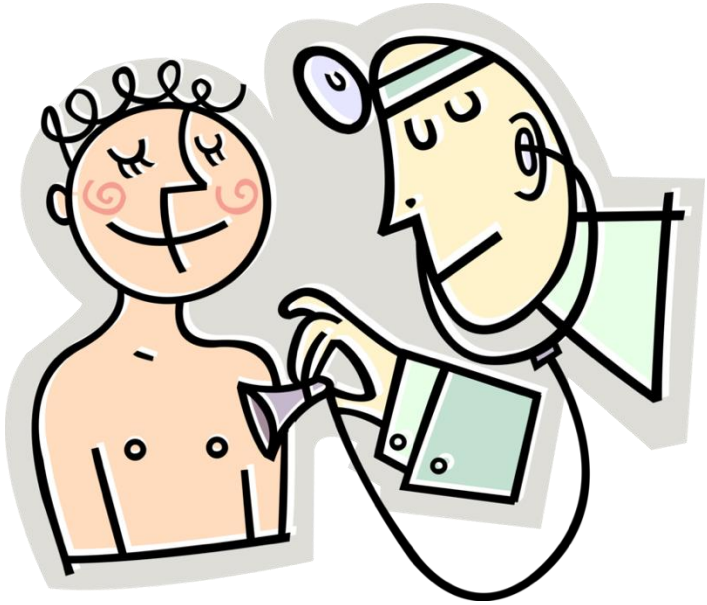
SINUSITIS



- Physical Examination
  - Purulent nasal secretions
  - Purulent posterior pharyngeal secretions
  - Mucosal erythema
  - Periorbital edema
  - Tenderness overlying sinuses
  - Air-fluid levels on transillumination of the sinuses (60% reproducibility rate for assessing maxillary sinus disease)
  - Facial erythema

Content Reference: Brook & Benson, 2025
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SINUSITIS

- Common Differential Diagnosis:
  - Asthma
  - Allergic Rhinitis
  - Bronchitis
  - COVID-19
  - Influenza
  - Migraine/ Tension HA
  - Mucormycosis
    - Life-threatening fungal infection usually w/ severe sinusitis w/ brain abscess
  - Otitis Media
  - *Staph* Infections

Content Reference: Brook & Benson, 2025

SINUSITIS

- Diagnostic Workup:
  - Radiography:
    - Does patient meet diagnostic criteria for acute sinusitis w/o complication?
      - NO radiographic imaging
    - Complication or alternative diagnosis is suspected?
      - Obtain radiographic imaging
    - Sinus radiographs may demonstrate mucosal thickening, air-fluid levels, and sinus opacification
    - Limitations of plain films:
      - Interobserver variability
      - Challenges differentiating polyps or tumors
      - Poor depiction of the ethmoid and sphenoid sinuses
    - CT scan is adequate for Dx cheaper than other methods
      - Needed ONLY in cases of treatment failure or chronic rhinosinusitis
      - Complete sinus CT scan with frontal and coronal planes if alternative diagnosis (eg, tumors) must be excluded.
  - Laboratory Testing:
    - ESR and CRP many be elevated (non-specific); CBC may by within expected lab parameters

Content Reference: Brook & Benson, 2025

SINUSITIS

- Treatment:
  - Intranasal corticosteroids (INCSs) as monotherapy for mild and moderate cases (modest benefit)
  - INCSs plus antibiotics is reserved for patients who fail to respond to INCSs after 72 hours and for initial treatment of patients with severe symptoms
  - Choice of ATBx must account for the suspected pathogen, the risk for resistance, comorbid conditions, and local antimicrobial resistance trends
  - NS irrigation recommended.
  - Offer watchful waiting (without antibiotics) or:
  - Adults with uncomplicated acute bacterial rhinosinusitis:
    - Amoxicillin with or without clavulanate as first-line therapy for 5-10 days (if the decision is made to treat acute bacterial rhinosinusitis with an antibiotic)

Content Reference: Brook & Benson, 2025

SINUSITIS

- Treatment:
  - *S. pneumoniae*
    - Amoxicillin 500mg PO Q8h
      - Good activity against bacteria if sensitive
      - Moderate activity if intermediate
      - Low activity if resistant
    - Clarithromycin 250mg-500mg PO BID
      - Moderate activity against bacteria if sensitive or intermediate
      - Low activity if resistant
    - Azithromycin 500mg PO x 1 day, then 250mg PO QD x 4 days
      - Moderate activity against bacteria if sensitive or intermediate
      - Low activity if resistant
  - Other organisms such as *Haemophilus influenza, Moraxella catarrhalis,* and anaerobic bacteria have varying activity with these agents

Content Reference: Brook & Benson, 2025
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BRONCHITIS

- Epidemiology & Pathophysiology:
  - Chronic bronchitis, which affects most patients with chronic obstructive pulmonary disease (COPD), is characterized by a chronic cough productive of sputum lasting more than 3 months of the year for 2 consecutive years (more common in those >50)
  - Usually results from smoking-related obstructive disease
  - Age-related decline in lung function can also precipitate COPD symptoms
  - In elderly patients with chronic bronchitis, acute exacerbations of chronic bronchitis (AECB) are common
  - Acute Bronchitis = Top 5 reasons for patients seeking care
  - AECB is defined as worsening shortness of breath and cough and/or sputum production that cannot be accounted for by daily variability and requires a change in therapy
    - AECB can lead to poor quality of life, loss of functional status, hospitalizations, loss of lung function, and more often fatality in elderly patients.

Content Reference: Fayyaz, et al., 2024; Juthani-Mehta & Quaglirello, 2009

BRONCHITIS

- Epidemiology & Pathophysiology:
  - AECB is defined as worsening shortness of breath and cough and/or sputum production that cannot be accounted for by daily variability and requires a change in therapy
    - Risk factors = respiratory infection, environmental exposures (e.g., air pollution), and poor compliance with prescribed COPD therapies
    - Lower respiratory tract infection often triggers AECB accounting for 80% of episodes
    - Viral infections, including influenza, parainfluenza, and rhinoviruses, account for 30% of exacerbations and are associated with superimposed bacterial infections
    - *Streptococcus pneumoniae, Haemophilus influenzae,* and *Moraxella catarrhalis* are the most common pathogens in mild cases of AECB and account for 40–60% of cases

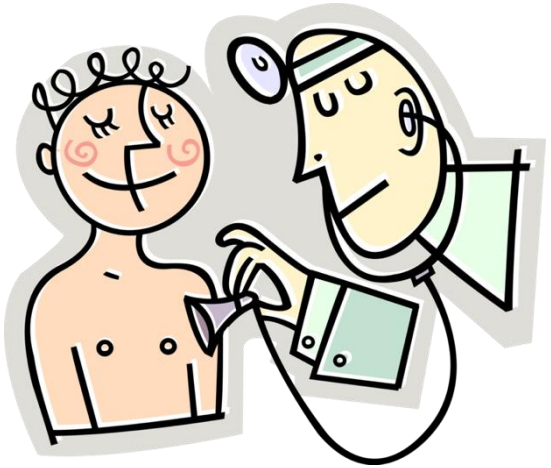
Content Reference: Juthani-Mehta & Quaglirello, 2009

BRONCHITIS

- History:
  - Exposure to toxic substances
  - Smoking and pack years
  - Cough (most common symptom)
  - Sputum production (clear, yellow, green, or even blood-tinged)
  - Fever (relatively unusual; in conjunction with cough, suggestive of influenza or pneumonia)
  - Nausea, vomiting, and diarrhea (rare)
  - General malaise and chest pain (in severe cases)
  - Dyspnea and cyanosis (only seen with underlying chronic obstructive pulmonary disease [COPD] or another condition that impairs lung function)
  - Odynophagia
  - Rhinorrhea
  - HA
  - Myalgias
  - Extreme fatigue

Content Reference: Fayyaz, et al., 2024; Juthani-Mehta & Quaglirello, 2009

BRONCHITIS



- Physical Examination Findings:
  - Continuous diffuse wheezes
  - Accessory muscle use (in severe cases)
  - Diffuse, severe reduction of air intake or inspiratory stridor (indicative of bronchial or tracheal obstruction)
  - Sustained heave along the left sternal border (indicative of right ventricular hypertrophy secondary to **chronic bronchitis**)
  - Clubbing on the digits and peripheral cyanosis in chronic ischemic illnesses
  - Bullous myringitis (suggestive of mycoplasmal pneumonia)
    - Severe otitis media with painful blisters on the TM
  - Conjunctivitis, adenopathy, and rhinorrhea (suggestive of adenoviral infection)

Content Reference: Fayyaz, et al., 2024; Juthani-Mehta & Quaglirello, 2009
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BRONCHITIS

- Common Differential Diagnoses:
  - Exercise-induced asthma
  - Bacterial tracheitis
  - Cough
  - Influenza
  - Hyperreactive airway disease
  - Retained foreign body
  - Tonsillitis
  - Occupational exposures
  - Acute/ Chronic Sinusitis
  - Alpha-1 Antitrypsin Deficiency
  - Asthma
  - Bacterial/ Viral Pharyngitis
  - Bronchiectasis/Bronchiolitis
  - COPD
  - GERD
  - Group A *Strep* Infections (GAS)
  - Influenza

Content Reference: Fayyaz, et al., 2024; Juthani-Mehta & Quaglirello, 2009

BRONCHITIS

- Diagnostic Workup:
  - Laboratory:
    - CBC w/ differential (may show inc. bands)
    - Procalcitonin (can help reduce ATBx misuse)
      - Values $\geq$ 0.25 mcg/L in non-ICU patients and > 0.5 mcg/L in ICU patients may be appropriate to use as cutoffs for initiation of antibiotic therapy
    - Cough persistent? Get a sputum cytology & culture
  - Radiography:
    - Elderly pts can benefit even when PE doesn't suggest PNA because these individuals may not show s/s of severe infection/PNA
  - Spirometry:
    - Acute bronchitis often causes significant bronchospasm, with a large reduction in forced expiratory volume in one second (FEV_1)
      - Generally resolves over 4-6 weeks.

Content Reference: Fayyaz, et al., 2024; Juthani-Mehta & Quaglirello, 2009

BRONCHITIS

- Treatment:
  - AECB/ Acute Bronchitis:
    - SABA or Ach bronchodilators should be administered during the acute exacerbation
    - Short course of systemic corticosteroid therapy
    - NSAIDs for treating constitutional symptoms and mild-to-moderate pain
    - Albuterol and guaifenesin products treat cough, dyspnea, and wheezing
  - Pts w/ COPD:
    - Mucolytics for patients with moderate-to-severe COPD, especially in the winter months
    - PDE-4 inhibitors (eg, roflumilast) may decrease COPD exacerbations in patients with concomitant chronic bronchitis by decreasing mucus secretions
    - GOLD guidelines recommend considering adding roflumilast in patients with COPD, $FEV_1 < 50\%$ predicted, and at least one hospitalization for an exacerbation in the past 12 months

Content Reference: Fayyaz, et al., 2024; Juthani-Mehta & Quaglirello, 2009

BRONCHITIS

- Treatment:
  - ATBx:
    - Generally, guidelines advise *against* ATBx in acute bronchitis
      - Recommended in patients > 65 years with acute cough ***if*** they have had a hospitalization in the past year, have DM, CHF, COPD/ other pulm Dz, or on chronic steroid Tx
      - Recommended in AECB
    - Simple Exacerbation:
      - COPD w/ risk factors; increased mucopurulent sputum + dyspnea; *H. influenzae*, *S. pneumoniae*, *M. catarrhalis*
        - Amoxicillin/cephalosporins (2^{nd}/3^{rd} generation eg. ceftriaxone)
        - DCN
        - Macrolides
        - Trimethoprim/sulfamethoxazole

Content Reference: Fayyaz, et al., 2024; Albertson, Louie, & Chan, 2010; Juthani-Mehta & Quaglirello, 2009

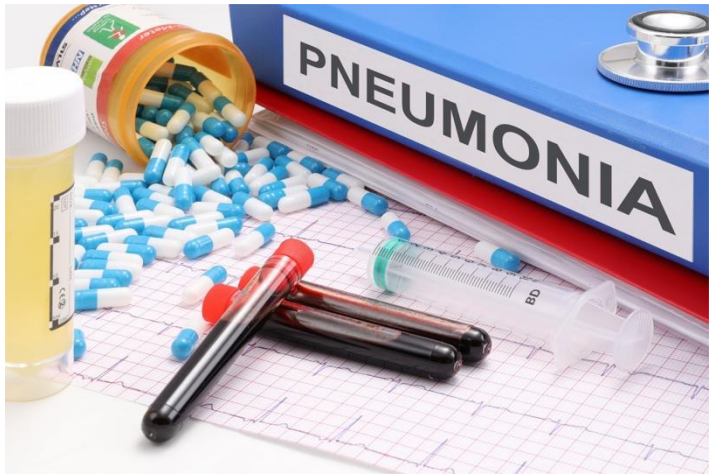
BRONCHITIS

- Treatment:
  - Complicated Exacerbation:
    - COPD w/ risk factors; Same s/s as simple, but +:
      - $FEV_1 < 50\%$
      - Hx of ischemic heart Dz
      - Chronic O_2-dependence
      - Chronic oral steroid use
    - Increased mucopurulent sputum + dyspnea; *Klebsiella; PSA*
      - Respiratory fluroquinolone (eg. levofloxacin/moxifloxacin)
      - Beta-lactam/beta lactamase inhibitor (eg. amoxicillin + clavulanate; piperacillin + tazobactam)
    - **ORAL formulations of ATBx = Efficacy of Intravenous ATBx**
  - Prevention:
    - Influenza vaccine

Content Reference: Fayyaz, et al., 2024; Albertson, Louie, & Chan, 2010; Juthani-Mehta & Quaglirello, 2009

PNEUMONIA (PNA)

- Epidemiology & Pathophysiology:
  - SNF-acquired PNA occurs is estimated at 1-2 patients for every 1000 days of nursing home residence
  - Mortality rates range from 13 to 41%
    - Multifactorial risk
      - Functional status
      - Chronic pulmonary disease
      - Age
      - Comorbidities (CVA), MS Dz, and immunosuppression
      - > 2 days hospitalization in last 90 days
      - Hemodialysis



Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Epidemiology & Pathophysiology:
  - Overwhelming infection of the lower respiratory tract, involving pulmonary parenchyma
    - Viruses, fungi, and bacteria are etiologies
    - Exposure to large volumes of pathogens in inspired air, increasingly virulent pathogen exposure, aspiration, or impaired host defenses
    - SNF-acquired pneumonia is classified as part of HAP
      - Increased risk for infection with opportunistic and MDROs
        - Secondary to close living conditions, close quarters with commonly ill residents, chronic antibiotic use, and immune-suppressive therapies/immunosenescence

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023
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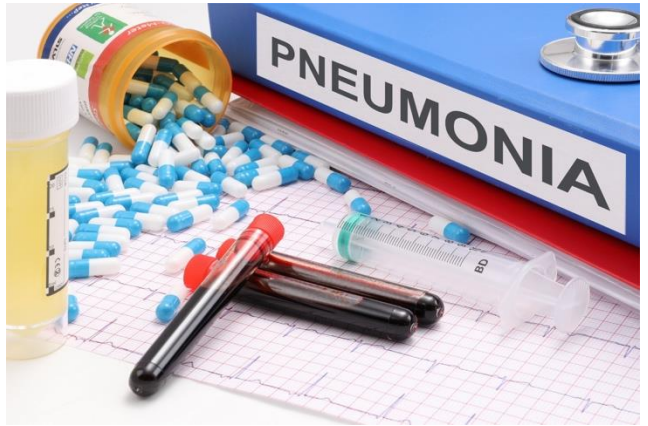
PNEUMONIA (PNA)

- Epidemiology & Pathophysiology:
  - Pathogens in SNF PNA pts mostly in-line with the general population:
    - *Streptococcus pneumoniae, Haemophilus influenzae,* and *Klebsiella pneumoniae*
    - More virulent organisms
      - *K. pneumoniae* and *Pseudomonas aeruginosa:*
        - Frequent in pts w/ multiple hospitalizations
        - Invasive lines placed during hospitalization
        - ETT/MV
    - MRSA very common in SNF pts, chronically ill, and frequently hospitalized
    - Oropharyngeal micobes:
      - *Peptostreptococcus*, *Bacteroides,* and *Provotella* species
      - Comorbidities (CVA, dementia/delirium/confusion, and MS) make aspiration more likely
        - Probability of having anaerobic bacterial species increased

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

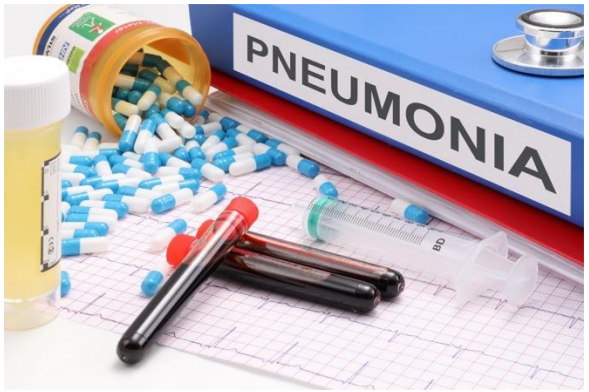
PNEUMONIA (PNA)



- Epidemiology & Pathophysiology:
  - Infecting organism overwhelms host defense
  - Proliferation of infectious agent
  - Microbes' replication initiates host-immune response, perpetuating inflammation, alveolar irritation, and impairment
    - Classic signs and symptoms develop:
      - Cough, sputum production, dyspnea, tachypnea, and hypoxia
      - Elderly patients often present with **nonspecific complaints** such as **confusion, lethargy, falls, and fever**

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)



- Epidemiology & Pathophysiology:
  - Elderly more likely to aspirate:
    - Polymicrobial oral flora escape an impaired gag and seed the lower respiratory tract (LRT)
    - LRT can be sterile or have a sub infectious threshold of bacterial organisms resulting in chemical pneumonitis
    - If adequate inoculum reaches parenchyma and multiplies, aspiration pneumonia results, **suspected with bilateral consolidations**
  - Chronically ill and pts w/ frequent exposure to healthcare more likely to be colonized with resistant and virulent organisms from:
    - Antibiotic exposure(s)
    - Wounds
    - Invasive lines (PEGs, Foleys, and ports)
    - ETT/MV

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023
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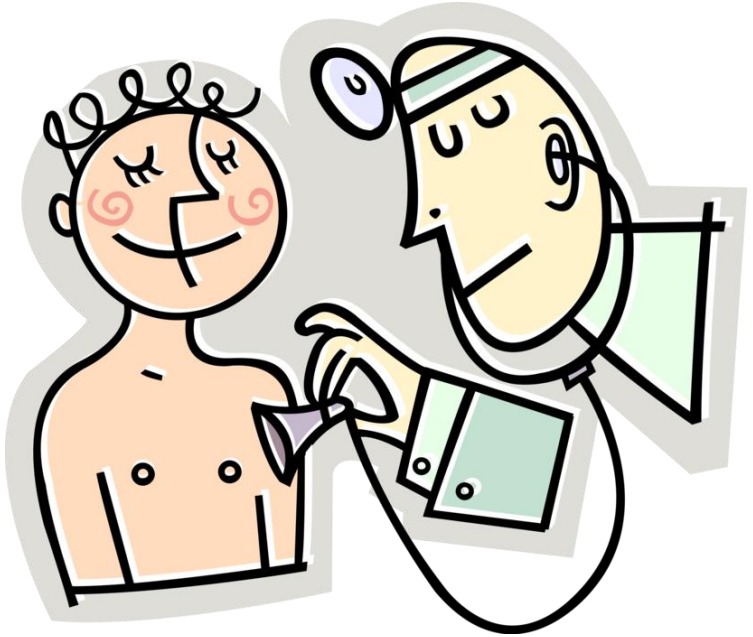
PNEUMONIA (PNA)

- History:
  - Pt may not be able to provide Hx due to mentation or baseline dementia
  - Question caregivers and family members
    - Establish timeline, risk factors, history of MDRO infections, or any deviance from baseline

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Physical Examination Findings:
  - Observe for typical symptoms and signs:
    - Cough
    - SOB
    - Sputum production
    - Fever
    - Tachypnea
    - Hypoxia
  - Bronchophony (pt says, “99” and it’s clear)
  - Egophony (“E” → “A”)
  - Whispered Pectoriloquy (pt whispers, “99” and it’s clear)
  - Hydration assessment
  - Accessory muscle use
  - Change in mental status
  - Auscultation
    - Unilateral crackles? Suspect lobar pneumonia
    - Bilateral crackles? Suspect aspiration pneumonia or ARDS
  - Palpation/Percussion:
    - Increased tactile fremitus (use lateral hands and compare vibration from “99” throughout lung fields)
    - Dullness



Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Common Differential Diagnoses:
  - Acute bronchitis
  - AECB
  - Aspiration pneumonitis
  - Tracheobronchitis
  - MI/CHF/Pulm edema
  - PE
  - Pulmonary fibrosis
  - Sarcoidosis
  - SLE pneumonitis
  - Rx-hypersensitivity reactions (nitrofurantoin, daptomycin)
  - Rx-induced pulm Dz (adenosine, bleomycin, checkpoint inhibitors [used in CA Tx])
  - Bronchogenic CA
  - Radiation pneumonitis
  - Wegener granulomatosis (rare disease, causing edema of small blood vessels mainly affecting blood vessels in nose, sinuses, throat, lungs and kidneys)
  - Lymphoma

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Common Diagnostic Workup:
  - Radiography:
    - CXR:
      - Differentiate viral from nonviral pneumonias
        - Viral PNAs often show few or no infiltrates
          - If present = bilateral, perihilar, symmetric, and interstitial, which can be confused with pulmonary edema (what is pt's Hx?)
        - Bacterial PNAs usually exhibit a focal segmental or lobar distribution, occasionally accompanied by pleural effusions
        - Atypical bacterial pathogens display variable radiographic findings, from focal segmental to bilateral interstitial patterns.
      - **Radiographic findings alone cannot reliably distinguish the specific etiologies of CAP**

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Common Diagnostic Workup:
  - Radiography:
    - CXR:
      - CHF = increased interstitial markings with vascular redistribution to upper lobes; cardiomegaly
      - Cavitation hallmark of MRSA, which presents as fulminant CAP with rapid cavitation and necrotizing pneumonia, sometimes following influenza; can also suggest TB and pulm malignancy
    - **Serial chest radiography useful for monitoring the progression of severe CAP if there is no improvement within 5 to 7 days**
    - Severe typical bacterial CAP = worsen rapidly and take a significant time to improve, **clinical resolution precedes radiologic resolution**
    - CT under further research; Chest US may be most helpful in ED

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Common Diagnostic Workup:
  - Laboratory Analysis:
    - Sputum & blood cultures recommended in patients with severe disease & all inpatients empirically treated for MRSA or PSA
    - Serum LFTs, Na+, ferritin, serum phosphorus, and CPK) levels may differentiate pathogens,(eg. *Legionella*)
    - Lactic acid, WBCs, GFR, BUN, and creatinine may help classify severity
    - Procalcitonin released in response to bacterial infections and is regulated by cytokines
      - More data are needed about usefulness in guiding ATB escalation/de-escalation
    - *Pneumococcal* urinary antigen testing (UAT):
      - Reported sensitivity of 50% to 80% and specificity of more than 90%
      - Negative result *does not rule out Pneumococcal* PNA.
      - Remain positive after ATBx (helpful when cultures were not obtained prior to initiation of ATBx)
      - Recent IDSA guidelines recommend use of pneumococcal urinary antigen testing in adults with **severe CAP only**

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Calculating Severity:
- Due to delayed presentation and nonspecific presentation, SNF/elderly pts frequently need full workup including (w/ labs + imaging)
  - Vital to screen for evidence of SIRS (fever/hypothermia, tachycardia, tachypnea, and leukocytosis/leukopenia)
    - Patients meeting 2/4 criteria, along with a presumed source of PNA, meet sepsis criteria
  - CURB-65:
    - (C) Confusion (+1)
    - (U) Uremia > 19 (+1)
    - (R) RR > 30 (+1)
    - (B) SBP < 90 (+1)
    - (65) > 65 years (+1)
      - 0-1 = manage in SNF/outpatient
      - ≥ 2 morality > 9.2% = Hospital admission
  - Pneumonia Severity Index (PSI)

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023

PNEUMONIA (PNA)

- Treatment:
  - Severe SNF-acquired PNA (lab abnormalities, mildly deranged vitals, or have comorbidities):
    - Hospitalize! ≥ 2 abnormal VS meet admission criteria
    - First-line treatment is frequently an intravenous fluoroquinolone versus ceftriaxone plus azithromycin
  - Well-appearing (good normal hydration status and VS):
    - Tx w/ oral fluoroquinolone (eg. levofloxacin), or amoxicillin/clavulanic acid + azithromycin with close monitoring

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023
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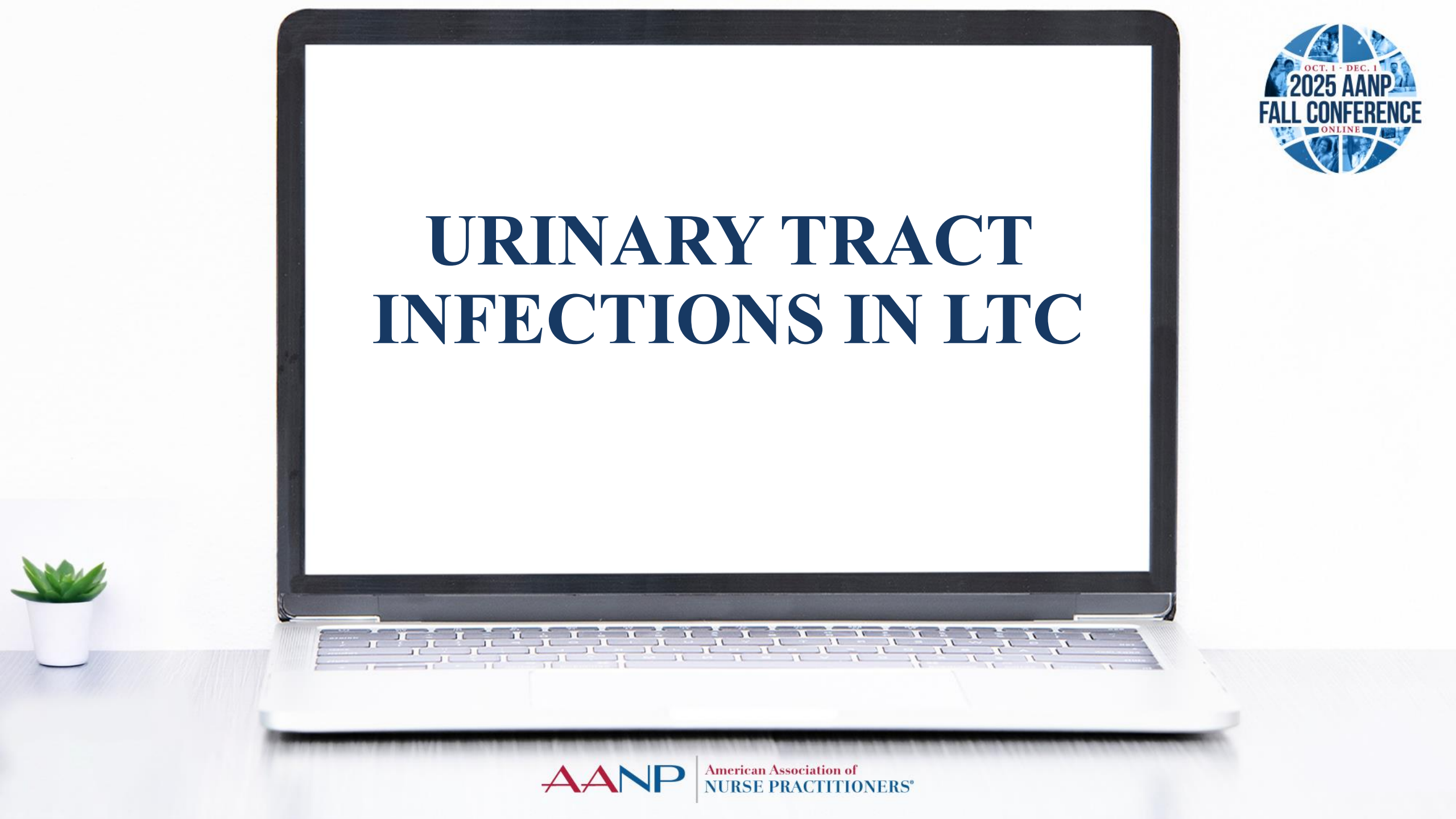
PNEUMONIA (PNA)

- Treatment:
  - Appear acutely ill, have abnormal VS (s/s of septic shock [hypotension/tachycardia/respiratory distress], positive sepsis screen):
    - Empiric treatment with broad-spectrum antibiotics (cefepime or piperacillin-tazobactam); narrow as culture data evolves, or w/ clinical improvement
    - Antipseudomonal = broad gram-negative coverage, with the addition of vancomycin for broad gram-positive coverage including MRSA
    - Suspect aspiration? = Anaerobic coverage with piperacillin-tazobactam or metronidazole is an appropriate addition to therapy
  - Adjunct therapy = Antipyretics, volume resuscitation (LR if intact liver), vasopressor support, and NIPPV/MV

Content Reference: Tran, Baer, & Askar, 2025; Stamm, Katta, & Stankewicz, 2023



URINARY TRACT INFECTIONS IN LTC

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URINARY TRACT INFECTION (UTI)

- Epidemiology & Pathophysiology:
  - UTI incidence much higher in women
    - #1 reason for Rx for ATBx in elderly adults!
    - > 8 million annual entrances to healthcare in the US per year
    - Cystitis = most UTI infections
    - 20% of women suffer from at least one UTI in their lifetime
  - Asymptomatic bacteriuria:
    - Asymptomatic
    - 2 consecutive urine cultures positive with same organism (> 105 Colony Forming Units/mL [CFU/mL])
  - Pyelonephritis:
    - Renal, upper tract involvement
  - Uncomplicated UTIs:
    - Develop in healthy men or women with completely normal GU system.
  - Complicated UTIs:
    - Hosts suffer from underlying medical conditions (eg, diabetes mellitus) or various anatomic abnormalities that make them prone to infection

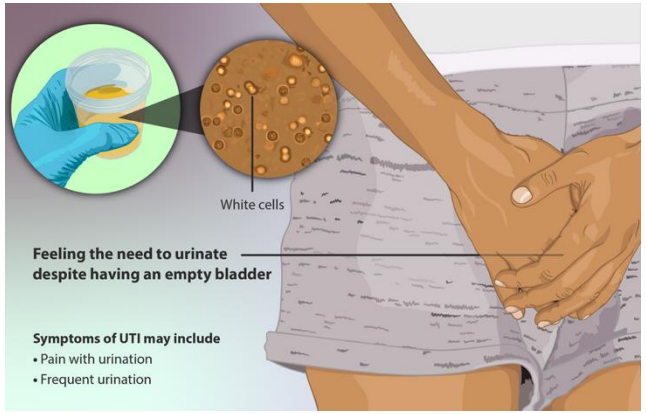
Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- History:
  - Dysuria
  - Urgency
  - Frequency
  - Sense of bladder fullness and/or lower ABD pain/discomfort
  - Referred pain can result in even simple lower UTI w/ flank pain CVTA tenderness
    - Assume these symptoms represent upper UTI until proven otherwise
  - Gross hematuria is seen with hemorrhagic gastritis:
    - 10% of cases in heathy women
    - Fevers, chills, and malaise may be accompanying s/s but are more prevalent with upper UTI (ie, pyelonephritis).
  - Vaginal discharge = vaginitis, cervicitis, or PID:
    - Causes s/s of dysuria and requires pelvic exam

Content Reference: Brusch, Bavaro, & Tessier, 2025

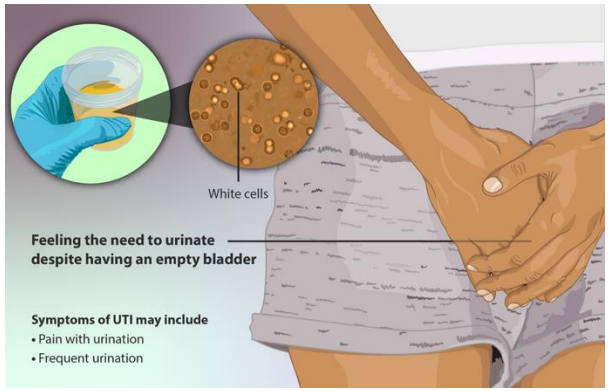
URINARY TRACT INFECTION (UTI)



- Physical Examination:
  - Pt is uncomfortable but not toxic
    - **Toxic fever, chills, nausea, and vomiting suggests pyelonephritis rather than cystitis**
    - Immunosuppressed and even immunocompetent patients with pyelonephritis may be asymptomatic
  - Assess for signs of dehydration:
    - Dry mucous membranes, tachycardia clavicular skin tenting
    - **Clammy extremities and symptomatic orthostasis suggest poor vascular tone due to gram-negative bacteremia rather than simple cystitis**
  - Most women with simple lower UTI:
    - Suprapubic tenderness
    - Pelvic exam to exclude vaginitis, cervicitis, or pelvic tenderness (+ Chandelier's Sign, which suggests PID)

Content Reference: Brusch, Bavaro, & Tessier, 2025
Image licensed through Creative Commons: My Upchar Digital Hospital (https://www.myupchar.com/en/disease/urinary-tract-infection-uti)

URINARY TRACT INFECTION (UTI)

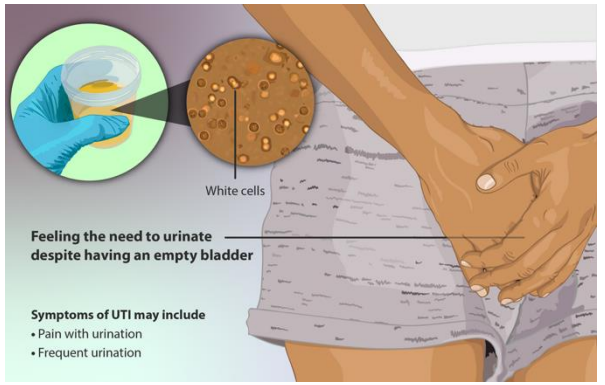


- Physical Examination:
  - Occult pyelonephritis common (at least 15-50%) of all UTIs
    - More frequent occurrence in older women
      - Patients can't mount a fever or develop an elevated WBCs or CVAT
      - These patients may present after inexplicable fall or w/ AMS.
- Senile Urethritis in Post-Menopausal Women:
  - Dysuria, frequency, and urgency + c/o vaginal and vulvar itching and discharge
  - Physical exam = dry, pale vaginal epithelium and urethral mucosa eversion
    - Rx = Topical estrogen therapy

Content Reference: Brusch, Bavaro, & Tessier, 2025
Image licensed through Creative Commons: My Upchar Digital Hospital (https://www.myupchar.com/en/disease/urinary-tract-infection-uti)

URINARY TRACT INFECTION (UTI)

- Catheter-Associated UTI (CAUTI):
  - S/S:
    - Generally nonspecific
    - Fever and leukocytosis found with high incidence
    - Significant pyuria = > 50 WBCs per high-power field (WBC/hpf)
    - Colony counts on urine culture = 100-10,000 CFU/mL
    - May be polymicrobial
    - *Pyuria and elevated bacterial colony counts are seen in all patients in whom a catheter has been in place for more than a few days, this doesn't indicate Dx of UTI*



Content Reference: Brusch, Bavaro, & Tessier, 2025
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URINARY TRACT INFECTION (UTI)

- Differential Diagnosis:
  - Acute pyelonephritis
  - Bladder CA
  - Chlamydial infections
  - Nonbacterial Cystitis
  - Herpes Simplex
  - Interstitial Cystitis
  - PID
  - Urethritis
  - Vaginitis
  - Perinephric abscess

Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- Differential Diagnosis:
  - Urethral syndrome
    - Renal TB and fungal infections
  - Noninfectious causes of pyuria include the following:
  - Uric acid and hypercalcemic nephropathy
  - Lithium and heavy metal toxicity
  - Sarcoidosis and other granulomatous diseases (eg, tuberculosis)
  - Interstitial cystitis
  - Polycystic kidney disease
  - Genitourinary malignancy
  - Renal transplant rejection
  - Any periurethral process

Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- Differential Diagnosis:
  - Additional Considerations for DM (more likely to develop complicated):
    - Renal and perirenal abscess
    - Emphysematous pyelonephritis
    - Emphysematous cystitis
    - Fungal infections
    - Xanthogranulomatous pyelonephritis
    - Papillary necrosis

Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- Common Diagnostic Workup:
  - Uncomplicated UTI (cystitis)? Skip UC unless:
    - Failure of empiric/targeted therapy, suspected upper UTI, or complicated UTI, as well as those in whom initial treatment fails
    - UC necessary in elderly women, immunosuppressed patients and with recent history of exploitation with instruments, antibiotic use, or infection recurrence
  - CBC mostly unhelpful
  - Bacteremia seen in pyelonephritis, corticomedullary abscesses, and perinephric abscesses
    - 10-40% of patients with pyelonephritis or perinephric abscesses have positive BCs
    - Bacteremia doesn't = higher morbidity or mortality in women with uncomplicated UTI
  - Microscopic hematuria in half of cystitis
    - If found in asymptomatic women (or w/ pyuria) **suspect malignancy**
    - Other etiologic considerations:
      - Calculi, vasculitis, renal tuberculosis, and glomerulonephritis

Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- Common Diagnostic Workup:
  - UA:
    - > 10 WBCs/mL = abnormal
    - Noncontaminated specimen = **No squamous epithelial cells**
    - Pyuria is a sensitive (80-95%) but nonspecific (50-76%) sign of UTI
    - White cell casts may not = infection and may not be present in pyelonephritis
    - Proteinuria usually is low grade
      - >2 g of protein/24 hours = glomerular disease.
  - Dipstick:
    - In uncomplicated cases s/s + dipstick and microscopic analysis showing pyuria and/or positive nitrite and leukocyte esterase tests can be used as presumptive evidence of UTI
    - Glucose, protein, blood, nitrite, and leukocyte esterase
    - Leukocyte esterase = screen for pyuria; consider the possibility of false-positive results, particularly with asymptomatic patients undergoing evaluation for recurrent UTI
    - Pyuria in vast majority with UTI
      - GREAT screening examination in LTC settings
        - No pyuria? Question UTI Dx until urine culture results

Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- Common Diagnostic Workup:
  - Candida in Culture?:
    - S/S like cystitis from other pathogens
    - Repeat UA and UC to verify
    - Pyuria is a nonspecific finding
    - *C glabrata* may be differentiated from other species by morphology
    - *Candida* casts in the urine indicate renal candidiasis but rarely are seen
    - Colony counts have not proved diagnostically useful
      - Renal US and collecting systems US preferred initial study in symptomatic or critically ill patients with candiduria
      - CT better for detecting pyelonephritis or perinephric abscess

Content Reference: Brusch, Bavaro, & Tessier, 2025

URINARY TRACT INFECTION (UTI)

- Treatment:
  - Treat INFECTION, not colonization!
  - ISDA Guidelines:
- Nitrofurantoin monohydrate or macrocrystals 100 mg PO BID x 5 days
- Trimethoprim-sulfamethoxazole 160 mg-800 mg PO BID x 3 days
- Fosfomycin 3 g in a single dose
- Fluoroquinolones for 3 days (PO = IV efficacy)
  - Try to avoid given risk for confusion, hypoglycemia, tendon rupture, QT prolongation, and *C difficile* infection
- B-lactam agents including amoxicillin-clavulanate, cefaclor, and cefpodoxime for 3 to 7 days

Content Reference: Brusch, Bavaro, & Tessier, 2025; Plascencia & Ashraf, 2024
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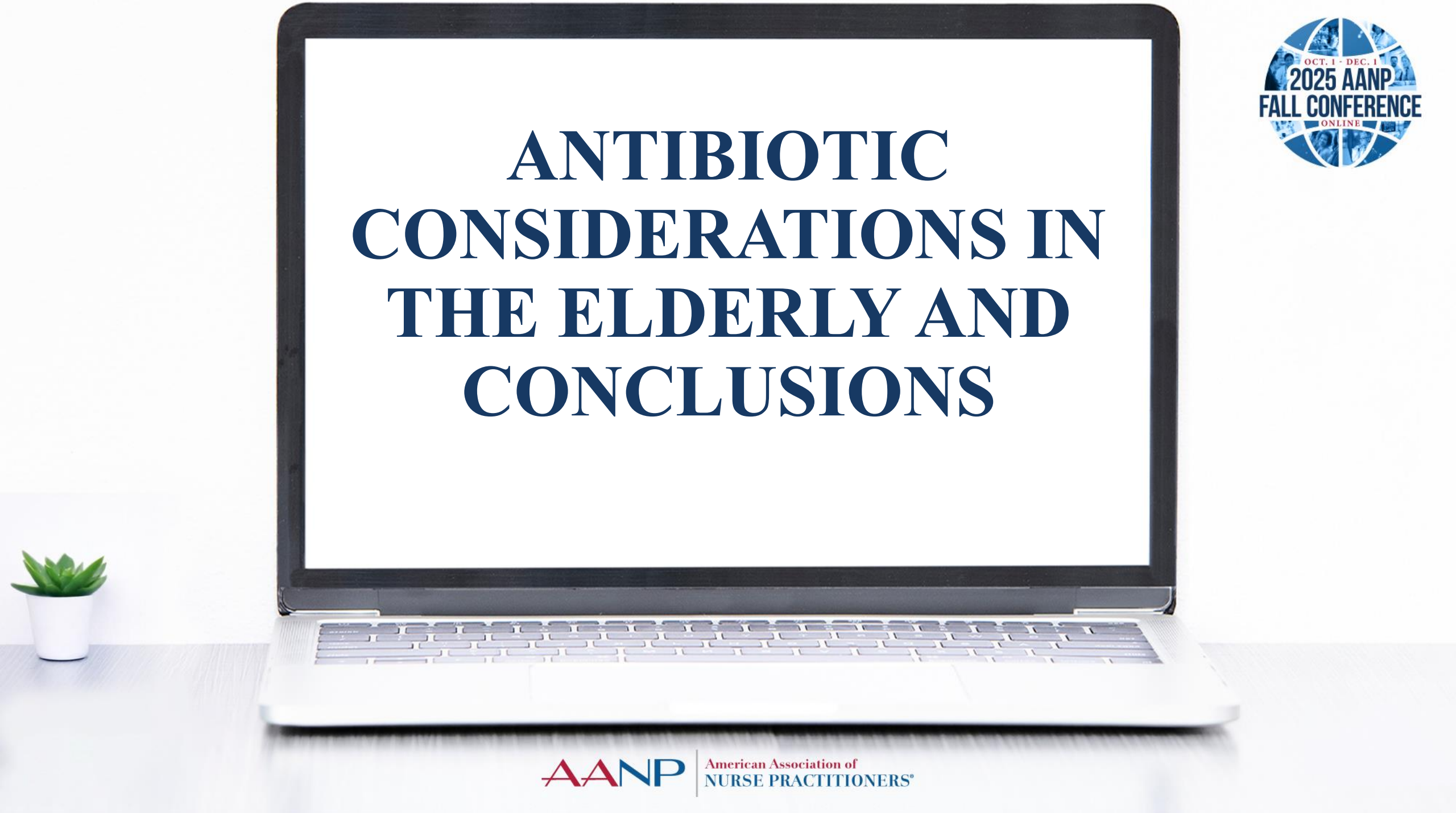
URINARY TRACT INFECTION (UTI)

- Treatment:
  - New agent for uncomplicated UTI with recent FDA-approval:
    - Gepotidacin
      - First in-class Rx: Triazaacenaphthylene antibiotic
      - Selectively disrupts bacterial DNA replication that is unique to this Rx only
      - Indicated in infections with:
        - *Enterococcus faecalis*
        - *Staphylococcus saprophyticus*
        - *Citrobacter freundii* complex
        - *E. coli*
        - *Klebsiella pneumoniae*
      - 2 750mg (1.5gm) PO BID x 5 days (better to give AC to avoid GI upset
      - Contraindications/Interactions/Common AEs:
        - Avoid use in pts with relevant cardiac Dz, Hx of QTc prolongation, those taking antidysrhythmics, GFR < 30 mL/min
        - Interacts with CYP3A4 inhibitors; monitor with concomitant use of anticholinergics
        - Common AEs: Diarrhea (16%), nausea (9%), ABD pain (9%), flatulence (3%), HA (2%)

Content Reference: https://gskpro.com/content/dam/global/hcpportal/en_US/Prescribing_Information/Blujepa/pdf/BLUJEPA-PI-MG.PDF

ANTIBIOTIC CONSIDERATIONS IN THE ELDERLY AND CONCLUSIONS



ANTIBIOTIC CONSIDERATIONS IN THE ELDERLY AND CONCLUSIONS

- Prescribing of ATBx in LTC is unbelievably high
  - This is resulting in MDROs, *C. diff* infections, nephrotoxicity, Rx interactions, and adverse events
  - Infections with PNAs and UTIs increased significantly since 2004
  - Research suggests 50% of ATBx Rx in LTC are inappropriate:
    - Examples:
      - ATBx are prescribed not just when infection is strongly suspected, but also acute deterioration without a clear infective source
      - IV ATBx are often felt to be superior to PO
      - Clinicians fail to change a drug, dose or duration

Content Reference: Hayward et al., 2019

ANTIBIOTIC CONSIDERATIONS IN THE ELDERLY AND CONCLUSIONS

- Antibiotic Stewardship (both formal and informal are vital)
  - ATBx Clinical Pearls from Dr. Blackwell:
    - Before prescribing, ensure infection is present!
      - Obtain beneficial labs and diagnostics that are appropriate for the Dx you suspect
    - Remember that LESS IS MORE!
      - Take a moment to look up the most recent recommendations for duration of Tx
    - Safety is PRIORITY!
      - Evaluate drug-drug interactions (I like mobilePDR—it's free but requires registration)
      - Evaluate indications, contraindications, and potential adverse events
        - Remember that adverse events may be accentuated in the elderly
      - Evaluate renal function and determine appropriate dosing considerations
    - Utilize Resources!
      - In complicated cases or in cases of treatment failure, consult specialists (eg. Infectious Disease, Urology, Pulmonary)
      - Don't be afraid of the RPh! Reach out to your clinical pharmacist and ask away. DOCUMENT those discussions and recommendations.

Please see the supplemental handout, which includes a bibliography and additional resources for more information.

Scan the QR Code to access the online bibliography!

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Andrew Todd, MLIS, BSN, RN

Reference Librarian, College of Nursing

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INFECTION IN LONG-TERM CARE: FOCUS ON RESPIRATORY AND URINARY TRACT INFECTIONS

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