Pneumonia Facts and UTI Myths

Nathan Shively, MD
Medical Director, Antimicrobial Stewardship Program
Allegheny Valley Hospital

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Learning Objectives

- Identify appropriate workup and empiric treatment for patients with pneumonia.
- Distinguish asymptomatic bacteriuria from urinary tract infection (UTI), and identify first-line treatments for UTI.

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Outline

- Pneumonia classification and diagnostics
- CAP/HAP/VAP, and the death of HCAP
  - Which of these does my nursing home patient have and how do I treat it?
- Asymptomatic bacteriuria
  - When to treat
  - More importantly, when not to treat
- Urinary tract infection
  - First line therapy

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Pneumonia Fact #1: Not all patients with pneumonia need antibiotics.

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Microbiology of CAP

- More than 100 microbes can cause CAP
- Bacteria
  - *Streptococcus pneumoniae* (generally the most common)
    - Preantibioitic era – 95%
    - Now 10-15%
  - *Staphylococcus aureus*
  - *Haemophilus influenzae*
  - *Moraxella catarrhalis*
  - *Legionella pneumophila*
  - *Mycoplasma pneumoniae*
  - *Chlamydophila pneumoniae*
  - *Pseudomonas aeruginosa*
    - Risk factors: Structural lung disease, bronchiectasis
  - Gram-negative enteric bacilli
  - *Klebsiella pneumoniae*
    - Alcoholics

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Restrepo, Chest 2008
Jain et al. N Engl J Med 2015
Musher DM et al. N Engl J Med 2014

Microbiology of CAP

- Viruses are common
  - Influenza
    - Seasonal variation
  - Rhinovirus, RSV, parainfluenza, adenovirus, human metapneumovirus, coronavirus

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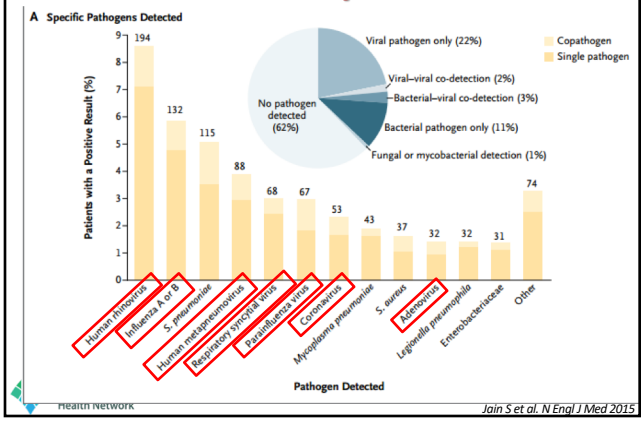
Restrepo, Chest 2008
Jain S et al. N Engl J Med 2015
Musher DM et al. N Engl J Med 2014

CDC Multicenter Study: 2,320 cases of confirmed CAP



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Jain S et al. N Engl J Med 2015

Specific Populations

- ICU vs non-ICU
  - *S. pneumoniae*
    - (8% vs. 4%)
  - *S. aureus*
    - (5% vs. 1%)
  - Enterobacteriaceae
    - (3% vs. 1%)
- > 65 years old:
  - 5 x incidence of influenza and *S. pneumoniae*
  - 10x incidence of rhinovirus

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Jain S et al. N Engl J Med 2015

Pneumonia Fact #2: HCAP is dead.

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Definitions

- Hospital-acquired pneumonia (HAP)
  - Occurs within 48 hours or more after admission
  - Not incubating at the time of admission
- Ventilator-associated pneumonia (VAP)
  - Occurs within 48-72 hours after endotracheal intubation
- Healthcare-associated pneumonia (HCAP)
  - Ho… for 2 d or more in the …d
  - Re… …ility
  - Receipt of in… …therapy (even outpatient), and wound care…
  - Ch… …d
  - Inci… …d VAP

Concept of HCAP removed from 2016 IDSA/ATS HAP/VAP Guidelines and abandoned in 2019 IDSA/ATS CAP Guidelines

Kalil AC et al. CID 2016

Metlay JP et al. Am J Respir Crit Care Med 2019

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Definitions

- Community-acquired pneumonia (CAP)
  - Acquired outside of the hospital
  - Essentially, now everything that is not HAP or VAP
  - Does not include patients with immunocompromising conditions
    - HIV/AIDs with low CD4 count
    - Neutropenic patients
    - Transplant patients

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Metlay JP et al. Am J Respir Crit Care Med 2019

What Happened to HCAP?

- Premise of "HCAP"
  - Exposure to the healthcare environment increases likelihood of infection with resistant organisms
    - MRSA and Pseudomonas
  - *We should cover "HCAP" like HAP/VAP*
- **Reality**
  - Pathogens in "HCAP" actually resemble CAP
  - After creation of "HCAP," patients received more broad-spectrum antibiotic therapy
  - Broader therapy did not improve patient outcomes
  - **Conclusion**: "HCAP" is not a helpful classification – has been retired

Metlay JP et al. Am J Respir Crit Care Med 2019
Chalmers JD et al. Clin Infect Dis 2011
Chalmers JD et al. Clin Infect Dis 2014
Gross et al. AAC 2014
Jones BE et al. CID 2015

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Pneumonia Fact #3:
Nursing home patients have community-acquired pneumonia.

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CAP Empiric Therapy: Outpatient

- In patients without coexisting illnesses or recent use of antibiotics
  - Macrolide

EXCEPT: if > 25% of pneumococci in the community exhibit macrolide resistance

- If coexisting illness, recent use of antibiotics, or > 25% resistance:
  - **Amoxicillin-clavulanate + Azithromycin**
  - Mild PCN allergy: Cefdinir + Azithromycin
  - IgE-mediated PCN allergy: Levofloxacin or Moxifloxacin
  - Contraindication to macrolide: Substitute doxycycline

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Metlay JP et al. Am J Respir Crit Care Med 2019

CAP Empiric Therapy: Inpatient

- First line
  - **Ampicillin-sulbactam (Unasyn) 3G IV Q6hrs + Azithromycin 500mg IV/PO Q24hrs**
- Mild PCN allergy
  - Ceftriaxone 1-2G IV Q24hrs + Azithromycin 500mg IV/PO Q24hrs
- Severe PCN allergy:
  - Levofloxacin 750mg IV/PO q24h monotherapy
- Contraindication to macrolides: substitute doxycycline
- Influenza active in the community:
  - Empiric Oseltamivir even if > 48h elapsed since onset of symptoms
  - If PCR (-), discontinue antiviral
    - Note rapid antigen test has poor (40-70%) sensitivity

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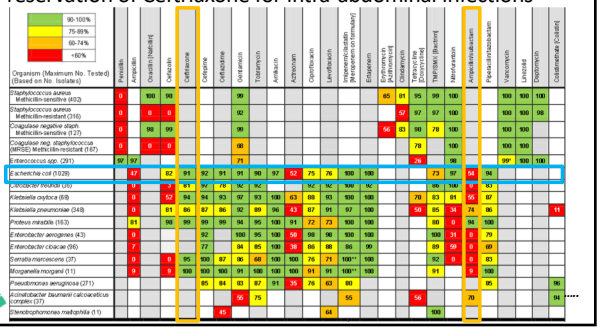
Metlay JP et al. Am J Respir Crit Care Med 2019
Uyeki TM et al. CID 2019
ACIP. MMWR Recomm Rep 2011

Why Unasyn, not Ceftriaxone?

- Same efficacy
  - Excellent coverage for CAP bacterial pathogens
- Preservation of Ceftriaxone for intra-abdominal infections



Why Unasyn, not Ceftriaxone?

- **More collateral damage with Ceftriaxone**
  - Risk factor for *C. diff* infection
  - Risk factor for ESBL colonization / infection
  - Risk factor for VRE colonization / infection

Unasyn should be the beta-lactam of choice for CAP

Muto CA et al. Infect Control Hosp Epidemiol 2005
Wilcox MH et al. Journal of Antimicrobial Chemotherapy 2004
Settle CD et al. Aliment Pharmacol Ther 1998
Asensio A et al. Clin Infect Dis 2000
Du BY et al. Intensive Care Med 2002
Eveillard MJ et al. Infect. Control Hosp Epidemiol 2002
Kim BN et al. J. Hosp. Infect 2002
Lautenbach E et al. Clin Infect Dis 2001
Lee SO et al. . Infect Control Hosp Epidemiol 2004
Pessoa-Silva CL et al. J Hosp Infect 2003
Schiappa DA et al. J Infect Dis 1996
Tornieporth NG et al. Clin Infect Dis 1996
McKinnell JA et al. Infect Control Hosp Epidemiol 2012
Loeb M et al. Infect Control Hosp Epidemiol 1999
Fridkin SK et al. Ann Intern Med 2001
Ostrowsky BE et al. Arch Intern Med 1999

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When do patients need MRSA and Pseudomonas coverage?

- Strongest risk factors:
  - Prior isolation from the respiratory tract
  - Recent hospitalization AND parenteral antibiotics (last 90 days)
- Coverage suggestions:
  - Prior isolation of **MRSA**
    - Add **Vancomycin** or Linezolid
  - Prior isolation of **Pseudomonas**
    - Add **Cefepime** or Piperacillin-tazobactam
  - Recent hospitalization AND parenteral antibiotics
    - **Nonsevere** pneumonia:
      - **Standard CAP therapy** with diagnostics (sputum culture, MRSA nasal swab)
    - **Severe** pneumonia
      - **Vancomycin** and **Cefepime** (and Azithromycin)
      - De-escalate based on culture data

Table 1. 2007 Infectious Diseases Society of America/American Thoracic Society Criteria for Defining Severe Community-acquired Pneumonia

Validated definition includes either one major criterion or three or more minor criteria

Minor criteria
- Respiratory rate ≥ 30 breaths/min
- Pa_{O2}/F_{IO2} ratio ≤ 250
- Multilobar infiltrates
- Confusion/disorientation
- Uremia (blood urea nitrogen level ≥ 20 mg/dl)
- Leukopenia* (white blood cell count < 4,000 cells/μl)
- Thrombocytopenia (platelet count < 100,000/μl)
- Hypothermia (core temperature < 36°C)
- Hypotension requiring aggressive fluid resuscitation

Major criteria
- Septic shock with need for vasopressors
- Respiratory failure requiring mechanical ventilation

*Due to infection alone (i.e., not chemotherapy induced).

Metlay JP et al. Am J Respir Crit Care Med 2019

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Switch to Oral Therapy

- Clinically stable and improving
  - Temperature ≤ 37.8
  - Heart rate ≤ 100 bpm
  - Respiratory rate ≤ 24 bpm
  - Systolic blood pressure ≥ 90
  - Not hypoxic (defined by the guidelines as arterial oxygen saturation ≥ 90% or pO2 ≥ 60 mm Hg on room air)
  - Tolerating PO
  - Normally-functioning GI tract

Mandell LA et al. Clin Infect Dis 2007
Metlay JP et al. Am J Respir Crit Care Med 2019

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Pneumonia Fact #4:
5 days of therapy is enough for most patients.

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Duration for CAP

- Multiple RCTs and meta-analyses have consistently demonstrated short-course therapy equally efficacious as compared to long-course therapy
- Guidelines suggest **5 days of therapy** as long as patients achieve clinical stability at 48-72 hours
  - If MRSA or Pseudomonas pneumonia, 7 days

Mandell LA et al. Clin Infect Dis 2007
Metlay JP et al. Am J Respir Crit Care Med 2019
https://www.bradspellberg.com/shorter-is-better
Li JZ et al. Am J Med 2007
Dimopoulos G et al. Drugs 2008

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Research

JAMA Internal Medicine | Original Investigation | LESS IS MORE

Duration of Antibiotic Treatment in Community-Acquired Pneumonia
A Multicenter Randomized Clinical Trial

Ane Uranga, MD; Pedro P. España, MD; Amaia Bilbao, MSc, PhD; Jose María Quintana, MD, PhD; Ignacio Arriaga, MD; Maider Intxausti, MD; Jose Luis Lobo, MD, PhD; Laura Tomás, MD; Jesus Camino, MD; Juan Nuñez, MD; Alberto Capelastegui, MD, PhD

- Validation of IDSA/ATS guideline recommendations
- 312 patients
- 5 days antibiotics (if afebrile x 48hrs and no clinical instability) vs physician-guided
- **No difference** in clinical success at 10 days or 30 days
- Less antibiotics in intervention group (10 days vs 5 days, p<0.001)
- More readmissions in the control group (6.6% vs 1.4%, p=0.02)

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Uranga A et al. JAMA Int. Med. 2016

Summary so far…

- A lot of pneumonia is caused by viruses
- Many patients with pneumonia don't need antibiotics
- Nursing home patients have community-acquired pneumonia
  - If they need antibiotics, most don't need Vancomycin and Cefepime

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Pneumonia Fact #5: Diagnostics can help.

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Pneumonia Diagnostics

- CXR
- Sputum induction panel -> Sputum cultures
- Blood cultures
- Strep pneumo urine antigen
- Legionella urine antigen
- Influenza PCR / Respiratory Viral Panel
- Procalcitonin
- MRSA nasal swab

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Pneumonia Diagnostics

- Blood cultures:
  - --Positive in 20-25% of inpatients with pneumococcal CAP
  - --Far fewer in cases of *H. influenzae* and very rare in *M. catarrhalis*
- Pneumococcal urinary antigen:
  - --Sensitivity: 50%–80%; Specificity of > 90%
  - --Positive in in 77% of patients with bacteremic pneumococcal pneumonia, 64% without bacteremia
- Legionella urinary antigen:
  - --Several urinary antigens available, all detect L. pneumophila serogroup 1
  - --80-95% of community-acquired cases of legionnaires
  - --Sensitivity of 70%–90% and Specificity of nearly 99% in culture-proven legionnaires
  - --Positive on day one on disease, remains positive for weeks

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Mandell LA et al. CID 2007; 44:S27–72
Musher DM et al. N Engl J Med 2014

Pneumonia Diagnostics

- Sputum gram stain and culture:
  - --The earlier, the better
  - --Positive in 80% of cases of pneumococcal CAP with high quality specimen *(>10 WBCs/epithelial cell*) if obtained within 6 hours of Abx administration
  - --Legionella culture
- Negative cultures **do have value**
  - No isolation of *S. aureus* or GNR means these pathogens are unlikely to be present
  - Growth inhibition by antibiotics is lower with these pathogens than *S. pnuemoniae*

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Mandell LA et al. CID 2007; 44:S27–72
Musher DM et al. N Engl J Med 2014
Musher DM et al. Clin Infect Dis 2004

FilmArray Respiratory Panel

Pathogens	Sensitivity		Specificity
	Prospective	Retrospective	Prospective
Adenovirus	88.9%	100%	98.3%
Coronavirus HKU1	95.8%	n/a	99.8%
Coronavirus NL63	95.8%	n/a	100%
Coronavirus 229E	100%	100%	99.80%
Coronavirus OC43	100%	100%	99.60%
Human Metapneumovirus	94.6%	n/a	99.2%
Human Rhinovirus/Enterovirus	92.7%	95.7%	94.6%
Influenza A	90.0%	n/a	99.8%
Influenza A/H1	n/a	100%	100%
Influenza A/H3	n/a	100%	100%
Influenza A/H1-2009	88.9%*	100%	99.6%
Influenza B	n/a	100%	100%
Parainfluenza Virus 1	100%*	97.1%	99.9%
Parainfluenza Virus 2	87.4%*	100%	99.8%
Parainfluenza Virus 3	95.8%	100%	98.8%
Parainfluenza Virus 4	100%*	100%	99.9%
Respiratory Syncytial Virus	100%	n/a	89.1%
Bordetella pertussis	100%*	94.6%	99.90%
Chlamydophila pneumoniae	100%*	100%†	100%
Mycoplasma pneumoniae	100%*	84.4%	100%

www.biomerieux-diagnostics.com/filmarray-respiratory-panel

Biomarkers: Procalcitonin (PCT)

- Precursor peptide of mature hormone calcitonin
- Released in multiple tissues in response to bacterial infections via direct stimulation of cytokines

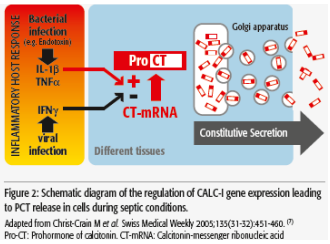

Figure 2: Schematic diagram of the regulation of CALC-I gene expression leading to PCT release in cells during septic conditions.
Adapted from Christ-Crain M *et al.* Swiss Medical Weekly 2005;135(31-32):451-460. [7]
Pro-CT: Prohormone of calcitonin. CT-mRNA: Calcitonin-messenger ribonucleic acid

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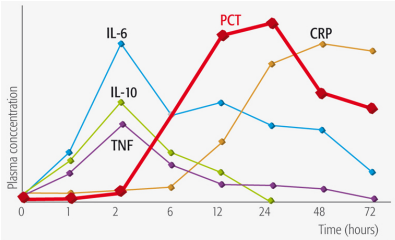
Muller B et al. J Clin Endocrinol Metab 2001| Meisner M. J Lab Med 1999
Christ-Crain M et al. Eur Respir J 2007 |Linscheid P et al. Endocrinology 2005

Procalcitonin

- Increases promptly within 4-6 hrs upon stimulation
- Decreases by ~ 50% daily if bacterial infection is controlled by immune system and supported by effective Abx



Kinetic profiles of different biomarkers of bacterial infection.
Adapted from Meisner M.[1]

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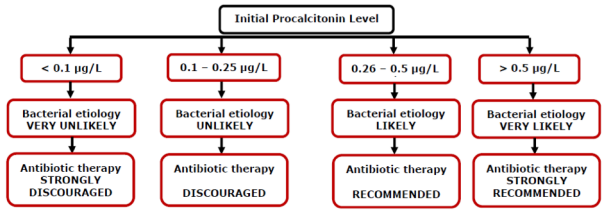
Haeruptle J et al. Eur J Clin Microbiol Infect Dis 2009
Meisner M. J Lab Med 1999

Procalcitonin Algorithm



IF NO ANTIBIOTIC THERAPY INITIATED:
Re-measure PCT after 6-24 hours

Initial antibiotics can be considered in case of:
- Respiratory instability
  - Respiratory rate > 30 breaths per minute
  - Oxygen saturation < 90% on 6L oxygen/minute
- Hemodynamic instability
- Life-threatening co-morbidity
- Need for intensive care unit admission

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Effect of procalcitonin-guided antibiotic treatment on mortality in acute respiratory infections: a patient level meta-analysis

Philipp Schuetz, Yannick Wirz*, Ramon Sager*, Mirjam Christ-Crain, Daiana Stolz, Michael Tamm, Lila Bouadma, Charles E Luyt, Michel Wolff, Jean Chastre, Florence Tubach, Kristina B Kristoffersen, Olaf Burkhardt, Tobias Welte, Stefan Schroeder, Vandack Nobre, Long Wei, Heiner C Bucher, Djillali Annane, Konrad Reinhart, Ann R Falsey, Angela Branche, Pierre Damas, Maarten Nijsten, Dylan W de Lange, Rodrigo O Deliberato, Carolina F Oliveira, Vera Maravić-Stojković, Alessia Verduri, Bianca Beghé, Bin Cao, Yahya Shehabi, Jens-Ulrik S Jensen, Caspar Corti, Jos A H van Oers, Albertus Beishuizen, Armand R J Girbes, Evelien de Jong, Matthias Briel*, Beat Mueller*

- 6708 patients, 26 eligible trials, 12 countries
- First meta-analysis to show a **mortality benefit**
  - 286 deaths (9%) in PCT-guided patients, 336 (10%) in controls, p=0.037
- Reduction in antibiotic exposure (5.7 vs 8.1 days)
- Reduction in antibiotic-related side-effects (16% vs 22%)

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Schuetz P et al. Lancet Infect Dis 2018; 18: 95–107

At AHN

Table 2. Antibiotic Treatment Duration

Variable	Pre-Intervention (n = 152)	Post-Intervention (n = 232)	*P* value
Total antibiotic duration, d [a]	9.9 (3.3)	6.0 (3.8)	<0.001
Intravenous antibiotic duration, d [a]	5.0 (3.1)	3.3 (2.4)	<0.001
Total antibiotic duration, n (%)			<0.001
0 to 1 day	0 (0)	40 (17.2)	
2 to 5 days	11 (7.2)	51 (22.0)	
6 to 7 days	30 (19.7)	63 (27.2)	
8 to 10 days	55 (36.2)	52 (22.4)	
11 to 14 days	39 (25.7)	21 (9.1)	
More than 14 days	17 (11.2)	5 (2.2)	

[a]Mean ± standard deviation

Length of stay decreased in the postintervention group --4.9 vs 3.5 days; P = .006

Pneumonia-related 30-day readmission rates unaffected

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Walsh TL et al. Am J Med 2018

Using MRSA Nasal Swab to Rule Out MRSA Pneumonia

Clinical Infectious Diseases

MAJOR ARTICLE

The Clinical Utility of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Nasal Screening to Rule Out MRSA Pneumonia: A Diagnostic Meta-analysis With Antimicrobial Stewardship Implications

- 22 studies
- Negative predictive value for CAP/ "HCAP" > 98%
- **If MRSA nasal swab negative -> discontinue Vancomycin**
- Guideline-supported

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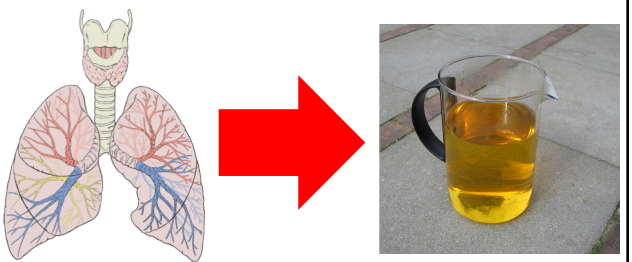
Parente DM et al. CID 2018
Metlay JP et al. Am J Respir Crit Care Med 2019



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https://en.wikipedia.org/wiki/Lung
https://en.wikipedia.org/wiki/Urine

UTI Myth #1:

A positive urine culture or abnormal urinalysis (UA) always indicates a UTI and requires antibiotics.

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FACT: *Symptoms* are needed to diagnose a UTI

- **Asymptomatic Bacteriuria (ASB)**
  - Isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen obtained from a person WITHOUT symptoms or signs referable to urinary infection
- **Simply stated:**
  - Bacteria in the urine
  - 10^2 vs 10^3 vs 10^5 → does not matter
  - NO urinary symptoms or signs of systemic infection

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Rubin RH et al. Clin Infect Dis 1992
Nicolle LE et al. Clin Infect Dis 2005
Nicolle LE et al. Clin Infect Dis 2019

Definition of UTI

- **Acute uncomplicated UTI**
  - **SYMPTOMATIC** bladder infection characterized by frequency, urgency, dysuria, or suprapubic pain in a non-pregnant woman with normal GU tract
- **Complicated UTI**
  - **SYMPTOMATIC** urinary infection involving either the bladder or the kidneys in individuals with functional or structural GU tract abnormalities
- **UTI is a CLINICAL diagnosis**
  - **Cannot diagnose a UTI by looking at a UA/culture**
  - Need history and objective data to differentiate colonization from infection

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Hooton TM et al. Infect Dis Clin North Am 1997
Nicolle LE. Drugs Aging 2001
Nicolle LE et al. Clin Infect Dis 2005

How common is asymptomatic bacteriuria?

	Prevalence of ASB	% with ASB who have pyuria
Healthy Women	1-5%	32%
Pregnant Women	2-10%	30-70%
Diabetic Women	9-27%	70%
Diabetic Men	1-11%	
Elderly Women (community)	11-16%	
Elderly Men (community)	4-19%	
Elderly Women (long-term care)	25-50%	90%
Elderly Men (long-term care)	15-40%	
Hemodialysis	28%	90%
Long-term indwelling catheter	100%	50-100%

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Clin Infect Dis. 2005;40(5):643-54.

Who to Screen/Treat for ASB

- **Pregnant women (A-I)**
  - 20 - 30x increased risk of developing pyelonephritis during pregnancy
  - Antibiotic therapy for ASB during pregnancy decreases risk of subsequent pyelonephritis from 20 – 30% to 1 – 4%
  - Higher rates of premature delivery and low birth weight infants
- **Before transurethral resection of the prostate (TURP) (A-I)**
- **Other urologic procedures for which mucosal bleeding is anticipated (A-III)**
  - High rates of post-procedure bacteremia and sepsis
  - Bacteremia occurs in up to 60% of ASB patients who undergo TURP

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Nicolle LE at al. Clin Infect Dis 2005
Elder HA et al. Am J Obstet Gynecol 1971
Grabe M. J Urol 1987
Grabe M et al. Eur J Clin Microbiol 1987
Smaill F. Cochrane Database Syst Rev 2001
LeBlanc AL et al. Biol Med 1964
Cafferkey MT et al. J Antimicrob Chemother 1982
Allan WR et al. Brit J Urol 1985

Whom NOT to Screen/Treat for ASB

- **Everyone else**
- Prospective, randomized controlled trials of treating ASB have been done in:
  - Diabetics
  - **Long-term care facility patients**
  - **Outpatient elderly**
  - Long-term catheter use
  - Spinal cord injury patients
  - Renal transplant patients (> 1 month from transplant)
- **Treating DOES NOT decrease the rate of symptomatic infection or alter long term outcomes**
- **Treating DOES increase cost, adverse effects, and resistance**

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Clin Infect Dis. 2005;40(5):643-54.

UTI Myth #2:
Cloudy or malodorous urine is always diagnostic of a UTI.

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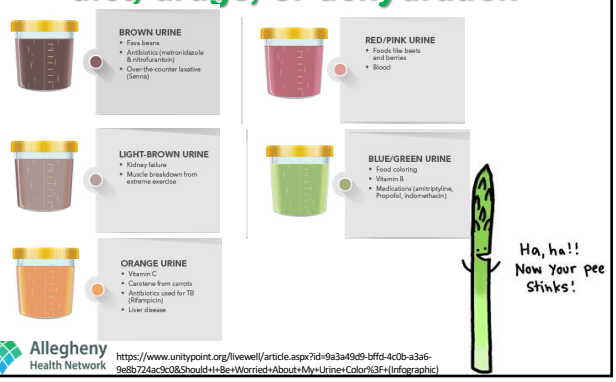
FACT: *Changes are often due to diet, drugs, or dehydration*



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https://www.unitypoint.org/livewell/article.aspx?id=9a3a49d9-bffd-4c0b-a3a6-9e8b724ac9c0&Should+I+Be+Worried+About+My+Urine+Color%3F+(Infographic)

UTI Myth #3:
Elderly patients often have UTI with no symptoms except for a change in mental status or delirium.

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FACT: *Change in mental status or delirium is a non-specific syndrome and requires an exploration of alternative causes*

- Dehydration
- Constipation
- Polypharmacy
- Urinary retention
- Metabolic derangements
- Head trauma
- Sensory deprivation
- Environmental changes

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What to do when the patient can't give a history?

- Updated McGeer Criteria (2012)
- Both 1 & 2 must be met:

1. **At least 1 of following signs and symptoms:**
   a) **Dysuria OR acute pain**, swelling, tenderness of testes/epididymis/prostate
   b) **Fever or leukocytosis AND at least 1 of following:**
      i. CVAT, suprapubic pain, gross hematuria, new/increased incontinence, urgency, frequency
   c) If no fever/leukocytosis, then 2 or more of following:
      i. Suprapubic pain, gross hematuria, new/increased incontinence, urgency, frequency
2. **One of the following:**
   a) ≥ 10^5 CFU/mL of no more than 2 organisms in a voided urine
   b) ≥ 10^2 CFU/mL of any number of organisms in an in/out cath sample

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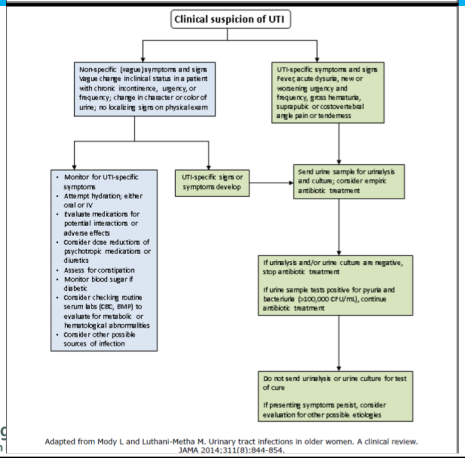
Stone ND et al, Infect Control Hosp Epidemiol, 2012.

Algorithm for Elderly Patients with Possible Urinary Tract Infection



Adapted from Mody L and Luthani-Metha M. Urinary tract infections in older women. A clinical review. JAMA 2014;311(8):844-854.

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UTI Myth #4:
My patient needs a screening UA / urine culture before hip replacement.

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FACT: *Only patients undergoing <u>UROLOGIC</u> surgery should be screened and treated for ASB.*

- **IDSA guidelines recommend AGAINST screening for or treating ASB in patients undergoing elective nonurologic surgery**

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No change in risk for prosthetic joint infection.

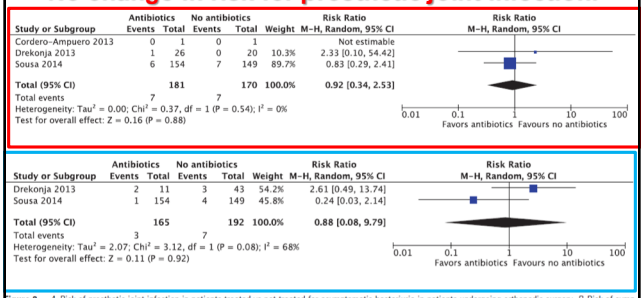

Figure 2. *A*, Risk of prosthetic joint infection in patients treated vs not treated for asymptomatic bacteriuria in patients undergoing orthopedic surgery. *B*, Risk of symptomatic urinary tract infection in the postoperative period in patients treated vs not treated for asymptomatic bacteriuria in patients undergoing orthopedic surgery. Abbreviations: CI, confidence interval; M-H, Mantel-Haenszel.

No change in risk for post-op symptomatic UTI.

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UTI Myth #5:

Better safe than sorry - we should treat for UTI when we aren't sure. A few days of an antibiotic will not hurt.

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ASB Treatment Harm

- **Collateral damage**
  - *Clostridium difficile* infection (CDI)
  - Drug-drug interactions
  - Adverse drug events
  - Worsening antimicrobial resistance
  - Increased healthcare costs

Number Needed to HARM:

3

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Stone ND et al, Infect Control Hosp Epidemiol, 2012.
https://www.sign.ac.uk/assets/sign88.pdf

If they really, truly, have a UTI

- UA + Urine culture
- Empiric treatment for the most likely pathogens
  - E. coli in 75-95%

E. coli Susceptibilities Across AHN		
Sensitive to Ciprofloxacin	Sensitive to TMP/SMX	Sensitive to Nitrofurantoin
64-79%	69-80%	91-97%

- If concerned for pyelonephritis / sepsis with urinary source
  - Ceftriaxone 2G IV Q24hrs
- If uncomplicated cystitis

1st Line Empiric Therapy Recommendations	
Regimen	Duration
Nitrofurantoin (monohydrate/macrocrystals) 100mg PO BID • Not recommended for CrCl <40mL/minute	5 Days
Cephalexin 500mg PO BID	3-7 Days

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Take Home

Pneumonia

- Viral > bacterial
- Procalcitonin can help
- HCAP is dead
- If antibacterials needed:
  - Amp-sulbactam / Azithro for most
  - Duration = 5 days
  - Cover MRSA/pseudomonas:
    - If isolated previously
    - If severe pneumonia and recent admission with IV antibiotics

UTI

- +UA / Urine culture ≠ UTI
  - Need SYMPTOMS to diagnose UTI
- Only treat asymptomatic bacteriuria in pregnancy and before UROLOGIC surgeries
- ASB very common in elderly
  - Confusion in elderly with +UA / Urine culture ≠ UTI
  - Treatment risks >> benefits (NNTH = 3)
- If true UTI, treat empirically with Nitrofurantoin or Keflex

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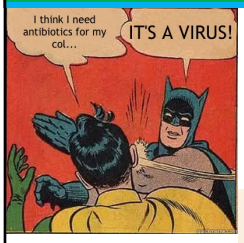

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Tom Walsh, MD
Lyn Weinberg, MD

Nathan.Shively@ahn.org

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