

Common Infections in Nursing Homes (RCHEs)

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OBJECTIVES

- Pathway to infections in Nursing Homes (NH/RCHE)
- Significance of infections in Nursing Homes
- Atypical manifestations of infections in NH residents
- How should we define infections?
- Overview of management of common infections in NHs

Demographics of Aging

- 1900: Life expectancy at 47 yrs (M:46, F:48)
- 2010: Life expectancy at 75 yrs (M:73, F: 80)
- Older adults:
 - 13% of entire US population
 - Increase to 21% in next three decades
 - > 80yrs, fastest growing segment

Nursing home demographics - US

- No. of residents receiving care in LTCFs
 - 1.63 million in 2004 in 16,000 facilities
- 42% of US population >70yrs will spend some time in LTCFs
- Length of stay
 - ~ 200 days
- A place to live
 - 25-30% of residents with > 3 years stay after admission
- Trends of increasing age and dependence

Evolution of Nursing Home Care (RCHE)

- Long stay → short + long stay
- Low level care → increasing acuity
- Wider range of residents:
 - Post-operative care
 - Rehabilitation
 - Prolonged antibiotics
 - Long-term ventilation
 - Long-term care

Prevalence of Infections in NHs in US

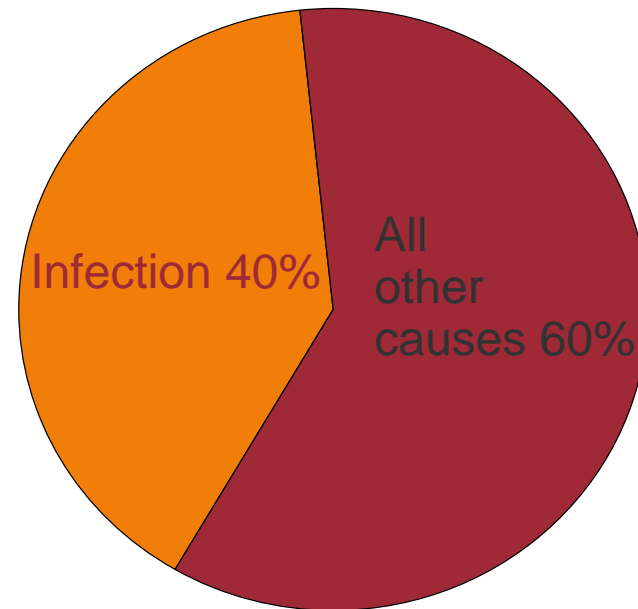
- 1.8-13.5 per 1,000 patient-care days
- Wide range reflect diversity of population
- Common infections:
 - Urinary tract infections
 - Pneumonia
 - Skin and soft tissue
 - GI, eye, osteomyelitis
- Prevalence of specific agents unclear, often biased
 - ease of specimen collection, availability of diagnostic testing and the likelihood that the results will alter treatment

CONSEQUENCES OF INFECTION

- Infections a leading cause of mortality and morbidity in nursing homes
- 1.6-3.8 million infections/ year
- 1.8-13.5 infections per 1,000 resident-care days
- Mortality: 0.04-0.71/1,000 resident-days
- 26-50% of transfers due to infections
- 150,000-300,000 hospital admissions each year
- Infection prevention a key component of quality of care in Nursing homes

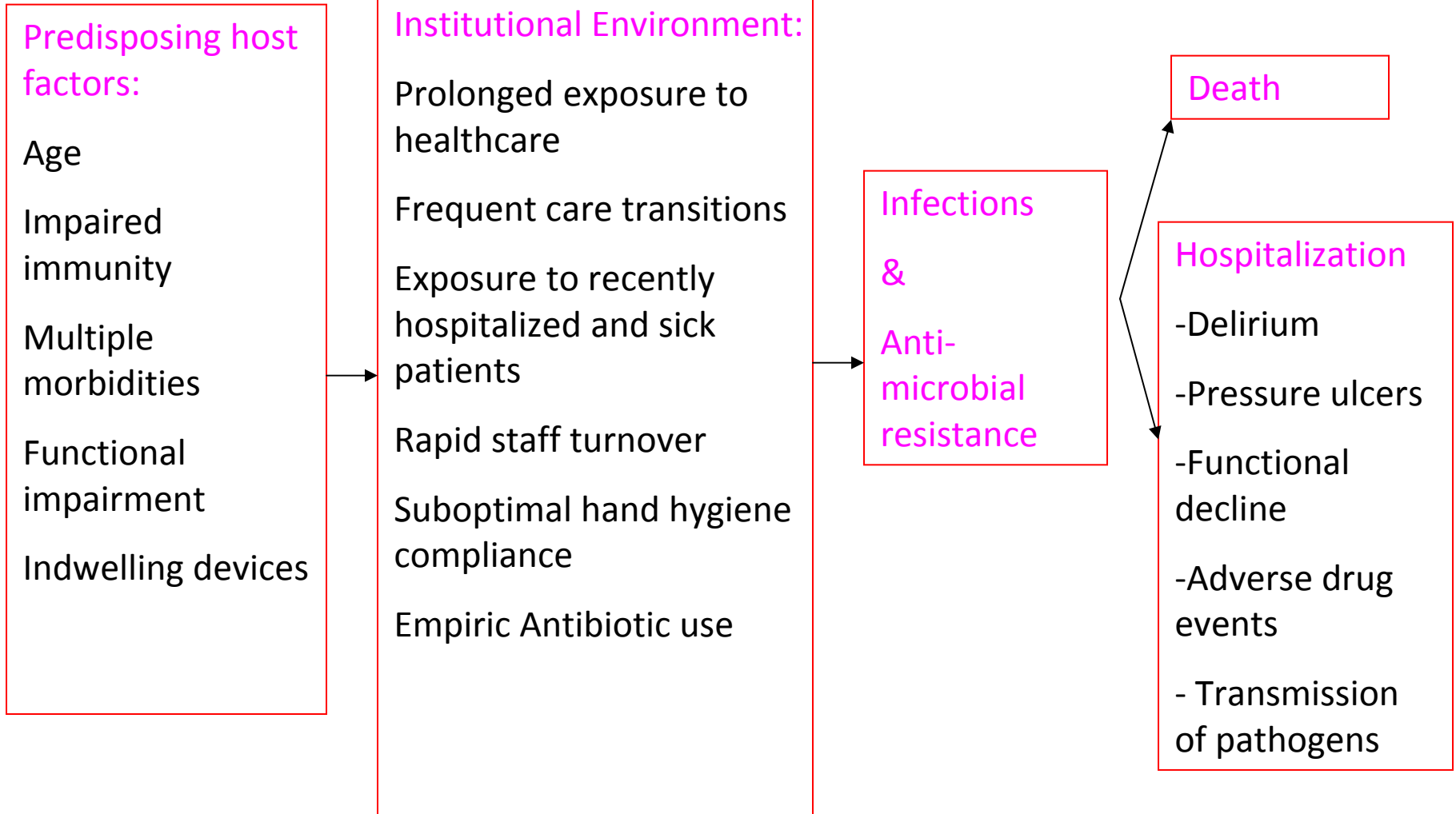
CONSEQUENCES OF INFECTION

- **Mortality**—Infection is a major cause of death in older adults
- **Morbidity**—Infection often exacerbates underlying illness or leads to hospitalization



Major cause of death in adults ≥ 65 years

Pathway to NH Infections



AGE-RELATED ALTERATIONS IN IMMUNE FUNCTION

- Immune response declines with age, a phenomenon known as **immune senescence**
- The main features are depressed T-cell responses and depressed T-cell/macrophage interactions
- The most marked deficits of immunity in the elderly:
 - Drying and thinning of the skin and mucous membranes
 - Poor antibody production
 - Decreased production of IL-2 and T-cell “help”

IMPACT OF COMORBIDITY ON IMMUNE FUNCTION

- The impact of comorbidities on innate immune function and host resistance is greater than the impact of age itself
- Comorbid diseases also indirectly complicate infections (eg, community-acquired pneumonia in an elderly person with multiple comorbidities often requires hospitalization)

IMPACT OF NUTRITIONAL STATUS ON IMMUNE FUNCTION

- On hospital admission, global undernutrition is present in 30%–60% of patients ≥ 65 years
- 11% of older outpatients suffer from undernutrition, mostly due to reversible conditions such as depression, poorly controlled diabetes mellitus, and medication side effects
- Some nutritional interventions may boost immune function in older adults, but results vary depending on the population studied and the supplements used

Endemic Infections in NHs

Type of infection	Frequency/1,000 days
Urinary tract	0.46-4.4
Respiratory tract	0.1-2.4
Skin and soft tissue	0.1-2.1
GI tract	0 – 0.9

NH outbreaks

- Respiratory
 - Influenza
 - Para-influenza
 - RSV
- GI outbreaks
 - *E. coli* O157:H7
 - Salmonella
 - Norovirus
 - *C. difficile*
- Scabies

All Infections: ATYPICAL PRESENTATION

- Older adults may present without typical signs and symptoms, even if the infection is severe
- Fever may be absent in 30%–50% of frail older adults with serious infections
- Fever in elderly nursing-home residents can be redefined as:
 - Temperature $> 2^{\circ}\text{F}$ (1.1°C) over baseline, or
 - Oral temperature $> 99^{\circ}\text{F}$ (37.2°C) on repeated measures, or
 - Rectal temperature $> 99.5^{\circ}\text{F}$ (37.5°C) on repeated measures

All Infections: Clinical Manifestations

- May not provide reliable clinical history
- Age, comorbidity, medications: impair host inflammatory response, leading to blunting of focal symptoms and physical findings
- Significance of diagnostics can be misinterpreted
- Atypical symptoms/signs to watch for:
 - Acute change in function (toileting, mobility, dressing, feeding, transfers, grooming)
 - Fever
 - Mental status changes
 - Signs of dehydration

Diagnosis

- Often a big challenge
- Paucity of symptoms/signs
- Lack of diagnostic availability
- Interpretation of diagnostic testing
- Lack of reliable valid diagnostic definitions

Laboratory diagnostics: What is useful?

- Few studies addressing this question
 - CBC useful
 - Evidence of leukocytosis ($> 14,000/\text{mm}^3$) with left shift
 - More than 6% bands
 - Signs of dehydration
 - Hypernatremia
 - Prerenal azotemia
 - $> 60\%$ of NH residents with infections can have these abnormalities

UTI: Definitions

A. For residents w/out indwelling urinary catheter

McGeer's Criteria for surveillance

Must have at least 3 of the following:

1. Fever ($\geq 38^{\circ}\text{C}$ [100.4°F]) or chills
2. New/increased burning pain on urination, frequency/urgency
3. New flank or suprapubic pain or tenderness
4. Change in character of urine
5. Worsening of mental or functional status (may be new/increased incontinence)

Minimum Criteria to initiate antibiotics

Acute dysuria alone

OR

Fever ($\geq 37.9^{\circ}\text{C}$ [100°F]) or 1.5°C [2.4°F] increase above baseline temp) chills

And at least one of the following:

1. New/increased urgency
2. Frequency
3. Suprapubic pain
4. Urinary incontinence

B. For residents with indwelling urinary catheter

McGeer's Criteria for surveillance

Must have at least two of the following:

- Fever ($\geq 38^{\circ}\text{C}$ [100.4°F]) or chills
- New flank or suprapubic pain or tenderness
- Change in character of urine
- Worsening of mental or functional status (may be new/increased incontinence)

Minimum Criteria to initiate antibiotics

Include at least one of the following:

- Fever ($\geq 37.9^{\circ}\text{C}$ [100°F]) or 1.5°C [2.4°F]
- New costovertebral tenderness
- Rigors (shaking chills) with or without identified cause
- New onset of delirium

Pneumonia Definitions

McGeer's Criteria

Both of the following criteria must be met:

Interpretation of chest radiograph as demonstrating PNA, probable PNA, or presence of infiltrate.

The resident must have at least two of the signs and symptoms described under “other lower respiratory tract infections.”

Minimum Criteria

A. Febrile resident

If resident with temp $>38.9^{\circ}\text{C}$ [102°F], at least one of the following:

Respiratory rate >25 breaths/min

Productive cough

If resident with temp $>37.9^{\circ}\text{C}$ [100°F] (or a 1.5°C [2.4°F] increase above baseline temp) but $\leq 38.9^{\circ}\text{C}$ [102°F], must include presence of cough, and at least one of the following:

Pulse >100

Delirium

Rigors (shaking chills)

Respiratory rate >25

B. Afebrile resident

If afebrile residents have COPD, must include:

New/increased cough with purulent sputum production

If afebrile residents do not have COPD, must have presence of new cough with purulent sputum production and at least one of the following:

Respiratory rate >25 /min

Delirium

In the setting of a new infiltrate on chest radiograph thought to represent PNA, any one of the following symptoms or signs would constitute appropriate minimum criteria: respiratory rate >25 breaths/min, productive cough, fever (temp $>37.9^{\circ}\text{C}$ [100°F] or 1.5°C [2.4°F] increase above baseline temp).

Skin and Soft tissue infections

- Minimum criteria:

New or increasing purulence at the site of the lesion or the wound

OR

>/= 2 of the following:

- a. Temperature of $> 100.4^{\circ} \text{F}$ (37.9) or an increase of 2.4°F over baseline
- b. Erythema
- c. Tenderness
- d. Warmth or pain
- e. New or increasing swelling at the affected site

Infection Rates (per 1,000 resident-mo)

	Number of Infections		Incidence Rate (infections/1000 resident-mos)		Relative Risk (95%)	P-value	Attributable Risk	Attributable Fraction (AR%)
	Device (263 f/u-mos)	No-Device (644 f/u-mos)	Device (IRe)	No-Device (IRu)				
Total infections	87	110	331	171	1.9 (1.4-2.6)	<0.001*	160	48%
Urinary tract infections	49	54	186	84	2.2 (1.5-3.3)	<0.001*	102	55%
Pneumonia	23	20	87	31	2.8 (1.5-5.4)	0.0004*	56	64
Other infections†	15	36	57	56	1.0 (0.5-1.9)	0.47	5.7	2
McGeer's Definitions	8	15	30	23	1.3 (0.5-3.3)	0.27	7.1	23
Minimum Criteria	12	10	46	16	2.9 (1.2-7.6)	0.007*	30	66
McGeer's of Minimum Criteria	15	18	57	28	2.0 (1.0-4.3)	0.02*	29	51

ANTIBIOTIC MANAGEMENT: General Principles

- Drug distribution, metabolism, excretion, and interactions can be altered with age
- Even in the absence of disease, aging is associated with a reduction in renal function
- Antibiotic interactions occur with many medications commonly prescribed for elderly persons
- Risk factors for poor adherence include poor cognitive function, impaired hearing or vision, multiple medications, and financial constraints

ANTIBIOTIC MANAGEMENT: General Principles

- Must be based on patient condition
 - Not all infections require urgent antibiotics
 - Let minimum criteria be a guide
 - Stratified by presence of risk factors e.g. devices, severity of presentation, underlying conditions
- If urgent treatment required:
 - Based on most likely clinical syndrome and most likely organism
 - Prevalence of microorganisms and antibiotic susceptibilities may vary
 - Consultation with ICP and pharmacist
- Route (IV vs oral):
 - Depends on severity, NH capabilities, IV access, advanced directives
 - Non-functioning GI tract: needs IV
- Treatment should be altered based on susceptibility data
- Duration: based on the infection being treated
- Remember: cost, drug interactions, drug toxicity

Urinary Tract Infections

URINARY TRACT INFECTION (UTI)

- One of the most common illnesses in older adults
- As in younger adults, gram-negative bacilli are most common
- Older adults are more likely to have resistant isolates, such as *Pseudomonas aeruginosa*, and gram-positive organisms, including enterococci, coagulase-negative staphylococci, and *Streptococcus agalactiae*
- Additional organisms in patients with indwelling catheters include enterococci, *S. aureus*, and fungi, particularly *Candida* spp.

Epidemiology

- Most common infection
 - Urinary stasis
 - Perineal soiling and urinary contamination in functionally impaired
 - Bacteriuria: Men-15-40%; Women-25-50%
- Urinary catheters
 - Bacteriuria universal after 30 days
 - Indwelling foley catheters vs. intermittent vs. suprapubic

Diagnosis

- Asymptomatic bacteriuria:
 - Many studies show no benefit in well-being, relief of symptoms, prevention of UTI or improved survival
 - Emergence of resistance a real risk
- Pyuria:
 - 30-50% may have asymptomatic pyuria
 - If leucocyte esterase and nitrate negative, then UTI can be excluded
- Localizing signs and symptoms help
- May not present with fever
- If a resident has non-specific symptoms, then other etiologies should be considered, before it is assumed to be UTI
- Bacteriuria and foul smelling urine alone not criteria to treat
- McGeer and Loeb's criteria are not very sensitive, but remain specific
- Using these can reduce inappropriate antibiotics

ASYMPTOMATIC BACTERURIA

- Affects up to 15% of women in the community and 40% of women in nursing homes
- Incidence in men is approximately half that in women
- Treatment is not recommended
 - No clinical benefit
 - Associated with adverse effects, expense, potential for selection of resistant organisms

Management Considerations

- Asymptomatic: do not treat
- Symptomatic: treat to reduce symptoms, not to clear bacteria
- Usually broad spectrum to start off
- Intravenous: severe infection, patient tolerance and drug absorption
- Switch to oral once patient stable
- Indwelling device: start antibiotics if fever with new costo-vertebral tenderness, rigors and new-onset delirium

Antibiotic treatment

- Recommendations largely based on studies in younger populations
 - Local prevalence of resistance
 - Oral:
 - Initial: Trimethoprim/Sulfa
 - Fluoroquine alternate; nitrofurantoin could be considered
 - Parental:
 - aminoglycoside with ampicillin; renal failure then cephalosporin, fluroquinolone
- Duration:
 - Women: 3-5 days usual; pyelonephritis: 10-14 days
 - Men: 10-14 days
 - Urinary catheters: as short as possible, 7 days due to antimicrobial pressure and emergence of resistance

PNEUMONIA

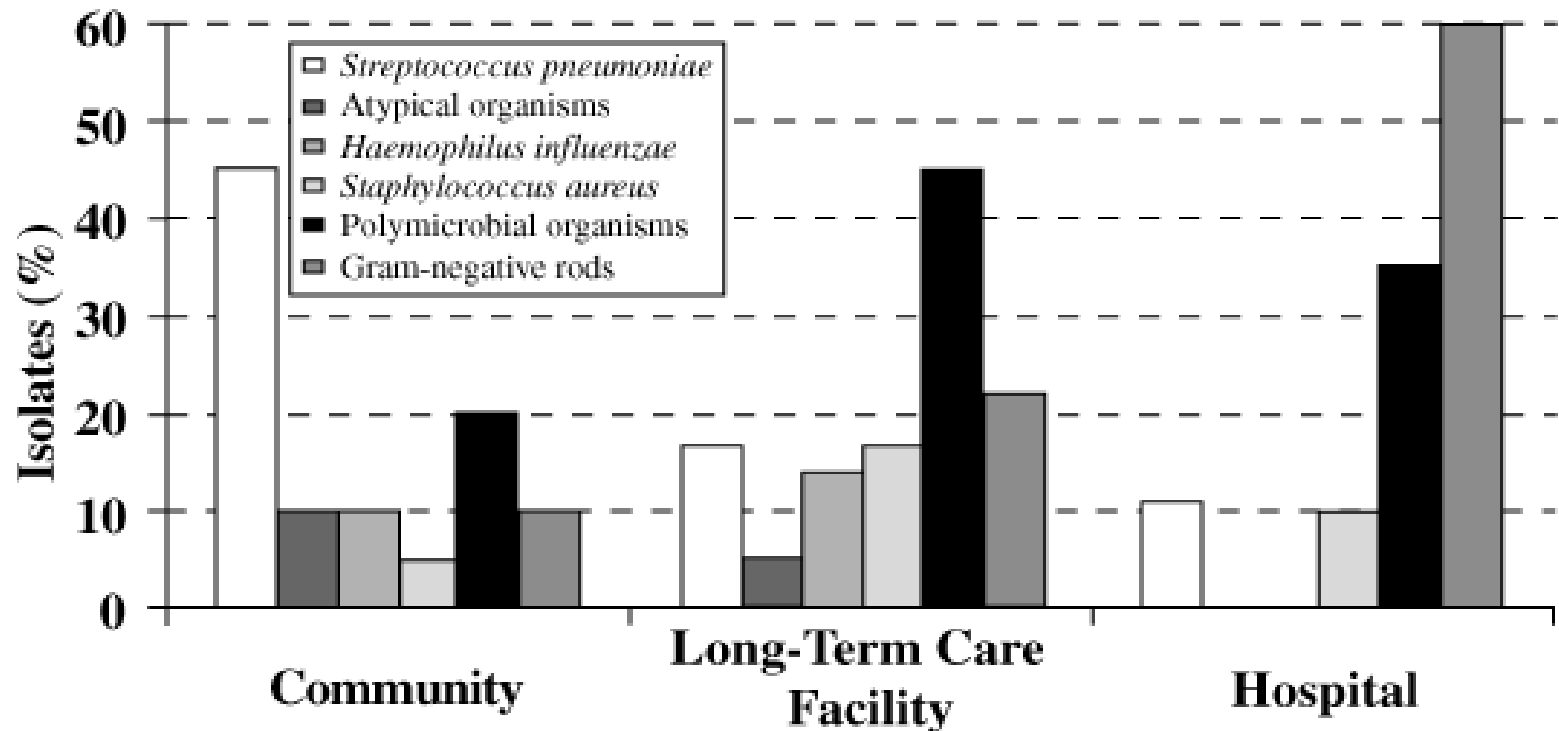
PNEUMONIA: EPIDEMIOLOGY

- Patients ≥ 65 account for over 50% of cases
- Cumulative 2-year risk for NH residents is about 30%
- Mortality in elderly patients is 3x to 5x times that of younger adults
- Functional impairment is the strongest independent predictor of mortality

Risk Factors

- Advancing age
- Functional impairment
- Inadequate oral intake
- Swallowing disorders
- Feeding tubes
- Tracheostomy
- Neurological disorders

CAUSES OF PNEUMONIA



Adapted from AGS GRS 7

Clinical Manifestations

- Typical symptoms rare
- Most will have some respiratory symptom
- Fever may be lacking
- Cough, dyspnea, fever, altered cognition
- Less than 60% with classic triad of fever, cough, shortness of breath
- Watch for new or worsening tachypnea, rates of > 25/min: sensitive and specific
- Pulse ox should be monitored
 - Single O₂ sat of < 94% was 80% sensitive and 91% specific for pneumonia diagnosis
 - Can also assist in making transfer decisions
- Chest X-ray helps
 - NHs increasingly equipped to get radiologic studies
 - Multilobar, pleural effusion, prognostic
- Sputum
 - Should be obtained if possible, can guide therapeutic decisions
- Viral swabs during influenza seasons

Management Considerations

- When should antibiotics be started?
 - High fever with tachypnea: pneumonia until proven otherwise
 - Low fever with non-productive cough: supportive management until more signs develop
 - COPD and no fever but new or worse cough: antibiotics can be started sooner than later
 - CBC with leukocytosis and fever points to an infection: look for specific syndrome
- Should all patients receive antibiotics
 - End of life considerations
 - Half of all patients with dementia will develop pneumonia within last 6 months of their death
 - Despite poor prognosis, 91% receive antibiotics towards end of life
- Should patients be hospitalized?
 - No clear answer
 - Risk indices can help
 - Risk of functional decline, pressure ulcers

COMMUNITY-ACQUIRED PNEUMONIA

- Infectious Diseases Society of America guidelines suggest the following as first-line therapy in adults over 60, with or without comorbidity:
 - β -lactam/ β -lactamase combination or advanced-generation cephalosporin (ceftriaxone or cefotaxime) with or without a macrolide
 - Alternatively, one of the newer fluoroquinolones with enhanced activity against *S. pneumoniae* (levofloxacin, sparfloxacin, moxifloxacin, gatifloxacin)

INSTITUTIONALLY ACQUIRED PNEUMONIA

- Initial regimens should be broadly inclusive, followed by step-down therapy to narrower coverage if the causative agent is identified
- For MRSA-colonized patients or patients in units with high rates of MRSA, initial regimens should include vancomycin or linezolid until MRSA is excluded
- Patients with improving hospital-acquired pneumonia not caused by nonfermenting gram-negative bacilli (eg, *Pseudomonas*, *Stenotrophomonas*) can receive short courses of antibiotics (8 days)

INFLUENZA

- Annual influenza vaccination is recommended for all adults over 50
- Treatment with M2 inhibitors or neuraminidase inhibitors is most effective if initiated within 24 hours of symptom onset
- Oseltamivir (oral) is easier to use than zanamivir (inhaled)

Prevention

- Immunizations
 - Pneumonia
 - Somewhat controversial, but recommended
 - Influenza
 - Staff immunization important
- Prevention of aspiration
 - Elimination of medications that can increase aspiration
 - Feeding tubes can increase risk of aspiration
- Infection control
 - Oral hygiene
- Smoking cessation

Skin and Soft Tissue Infections

Skin and Soft Tissue Infections: Epidemiology

- Third most common clinical syndrome
- Rates of 1-9% reported
- Risk factors:
 - Peripheral vascular disease
 - Peripheral edema
 - Lymphedema
 - Immobility
 - Physical trauma, maceration, pressure, use of devices allow secondary infections via hands of healthcare workers

Skin and Soft Tissue Infections: Types

- Cellulitis, folliculitis, impetigo, conjunctivitis, secondary infections of pressure ulcers
- Mucocutaneous fungal infections such as thrush, denture stomatitis, cheilitis, intertrigo
- Scabies, Herpes zoster
- Prevalence estimates scant:
 - 6% of pressure ulcers will become infected
 - 10,000 – 20,000 will have Herpes zoster
 - 0.1-1%/1,000 resident days of conjunctivitis

SSTIs: Common Etiologic Pathogens

- Primary skin and soft tissue:
 - *S. aureus*, b-hemolytic streptococci
 - Mucocutaneous fungal infections
 - *Candida* spp esp. *albicans*
 - Viral: Herpes zoster, simplex
- Conjunctivitis:
 - Mostly viral
 - Bacterial in less than 40% cases, can be *S. aureus*, *M. catarrhalis*, group A strep
- Secondary infections:
 - Often polymicrobial esp for infected pressure ulcers

REACTIVATED VARICELLA ZOSTER VIRUS (HERPES ZOSTER, SHINGLES)

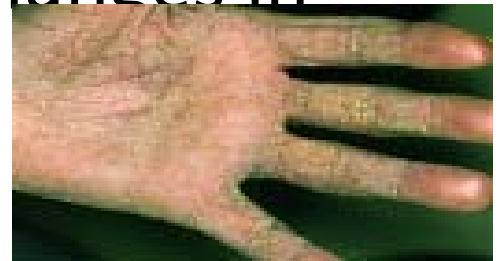
- Advancing age is the major risk factor
- The most disabling complication, post-herpetic neuralgia, is common in elderly persons
- A recently reported vaccine can reduce the risk of zoster and post-herpetic neuralgia by >50%

SSTI: Diagnosis and Treatment

- Do not substantially differ in NHs
- Minimum criteria to start antibiotics:
 - New or increasing purulence at the site of the lesion or the wound
 - OR**
 - >/= 2 of the following:
 - a. Temperature of $> 100.4^{\circ} \text{ F}$ (37.9) or an increase of 2.4° F over baseline
 - b. Erythema
 - c. Tenderness
 - d. Warmth or pain
 - e. New or increasing swelling at the affected site

Diagnosis of Scabies

- Difficult
- Pruritus, burrows, inflammatory changes in intertrigenous areas
- Often these symptoms are absent
- Norwegian (atypical) scabies hard to diagnose and can lead to prolonged infestation
- Permethrin 5%, ivermectin (in severe cases)



Prevention of all SSTI

- Contact isolation when appropriate
- Decolonization in outbreak situations (MRSA)
- Prevention of pressure ulcers
 - Treatment of incontinence
 - Good nursing care to avoid contamination
- Herpes zoster: contact isolation, antivirals
- Scabies:
 - washable items to be washed in hot water, floors and environment thoroughly cleaned
 - Secondary symptomatic cases to be treated
 - Consider treating all roommates and HCWs
 - Follow local guidelines

Infectious Diarrhea

Infectious Diarrhea

- About 7% of all NH infections
- Spread facilitated by:
 - Thermometers, devices, other inanimate objects, direct contact, inadequate food preparation
 - *C. difficile* most common
 - Newer strains more severe
 - Outbreaks: viral and bacterial
 - Norwalk, rotavirus, adenoviruses
 - Salmonella, *E. coli*, *S. aureus*, Shigella, Campylobacter

Clinical Considerations

- Maintain fluid balance
- Strict adherence to infection control
- Treatment of nausea and vomiting
- Monitoring or correcting electrolyte imbalances
- If antibiotic exposure, then evaluation for *C. difficile*
 - Often empiric *C. diff* treatment may be required

Prevention

- Good personal hygiene
- Hand disinfection: staff, visitors, patients
- Adherence to food preparation guidelines
- *C. difficile* eradication:
 - sporicidal agent (bleach) for environmental cleaning
 - Soap and water for hand hygiene

Other Infections

BACTEREMIA AND SEPSIS

- Elderly patients with bacteremia are less likely than younger adults to have chills or sweating, and fever is commonly absent
- GI and genitourinary sources of bacteremia are more common than in younger adults
- Mortality rate with nosocomial gram-negative bacteremia: 5%–35% in younger adults, 37%–50% in elderly patients

MANAGEMENT OF BACTEREMIA AND SEPSIS

- Similar in older and younger patients
- Rapid administration of antibiotics aimed at the most likely sources is essential
- Although bleeding is more common, the survival benefit of adjunctive therapy with activated protein C remains in septic adults \geq age 75

OSTEOMYELITIS

- *S. aureus* is the predominant organism
- GI and genitourinary flora are more common than in younger adults, so a specific microbiologic diagnosis is useful
- Infections of pressure ulcers and diabetic foot infections commonly require surgical consultation plus aggressive antimicrobial therapy aimed at mixed aerobic and anaerobic bacteria
 - ❖ Surface swab cultures of pressure ulcers are *not* useful

SEPTIC ARTHRITIS

- More likely in joints with underlying pathology
- Early arthrocentesis is indicated in any mono- or oligoarticular syndrome, to exclude infection
- *S. aureus* is the most likely pathogen
- Aggressive antibiotic therapy should be combined with serial arthrocentesis in uncomplicated cases
- Surgical drainage required when conservative strategy fails

PROSTHETIC DEVICE INFECTIONS

- Device removal usually required for cure
- Early and prolonged (months) antibiotic intervention, combined with aggressive surgical drainage, may be successful if symptoms have been present only for a brief duration
- When full functionality is the goal, the best course is device removal and administration of antibiotics for 6–8 weeks, followed by reimplantation
- Administration of prophylactic antibiotics other than for heart valves remains controversial

TUBERCULOSIS: EPIDEMIOLOGY

- Patients ≥ 65 account for 25% of active cases in US
- In long-term-care residents, prevalence of skin-test reactivity is 30%–50%, due to high rates of exposure in the early 1900s
- Thus, most active cases in older adults are due to reactivation
- Primary infection is of particular concern in nursing-home outbreaks

TUBERCULOSIS: PRESENTATION

- Older adults may present with fatigue, anorexia, decreased functional status, or low-grade fever instead of classic symptoms
- Lung involvement common (75%); pneumonic processes in older adults should raise suspicion
- Elderly patients are more likely than younger adults to have extrapulmonary disease
- Virtually any body structure can be involved, and that organ system can account for the major presenting symptom

TUBERCULOSIS: SKIN TESTING

- **Induration ≥ 15 mm** 48 to 72 hours after placement of a 5-tuberculin-unit PPD indicates a positive test in all situations
- **Induration ≥ 10 mm** is considered positive in nursing-home residents, recent converters (previous PPD < 5 mm), immigrants from countries with high endemicity of TB, underserved US populations, and persons with specific risk factors
- **Induration ≥ 5 mm** is considered positive in HIV-infected patients, those with a history of close contact with persons with active TB, and those with chest radiographs consistent with TB

QFT-G vs. TST

QFT-G	TST
<i>in vitro</i> , controlled laboratory test with minimal inter-reader variability	<i>in vivo</i> , subject to errors during implantation and interpretation
<i>M. tb</i> specific antigens used	Less specific PPD antigen used
No boosting; 2 step testing not needed	Boosting with repeated testing
1 patient visit possible	2 patient visits minimum
Unaffected by BCG and most environmental mycobacteria	False-positive results can occur after BCG and environmental mycobacteria exposure
Simple positive/negative result	Interpretation based on patient's risk of TB exposure or development of disease

TUBERCULOSIS: MANAGEMENT

- Treatment of active TB is similar to that in younger adults
- Regardless of age, provide 9 months of prophylactic isoniazid for asymptomatic patients:
 - Who have a positive PPD and are recent converters (defined in persons over 35 as a PPD that has gone from <10 mm to ≥ 15 mm within 2 yrs)
 - Regardless of PPD positivity if the patient has a specific risk factor for TB

INFECTIVE ENDOCARDITIS

- In the elderly, associated with degenerative valvular disorders and prosthetic valves
- Age does not increase mortality risk
- Treatment is IV antibiotics for 2–6 weeks
- Consider surgery for severe valvular dysfunction, recurrent emboli, marked heart failure, myocardial abscess, fungal endocarditis, or failure of antibiotics to sterilize blood cultures

FEVER OF UNKNOWN ORIGIN

- Defined as temperature $> 38.3^{\circ}\text{C}$ (101°F) for at least 3 weeks, undiagnosed after 1 week of medical evaluation
- About 35% of cases are due to treatable infections, especially intra-abdominal abscess, bacterial endocarditis, and tuberculosis
- Collagen vascular diseases are more common causes than in younger patients (about 30% of cases)
- Neoplastic disease accounts for another 20% of cases

EVALUATING FEVER OF UNKNOWN ORIGIN IN OLDER ADULTS (1 of 2)

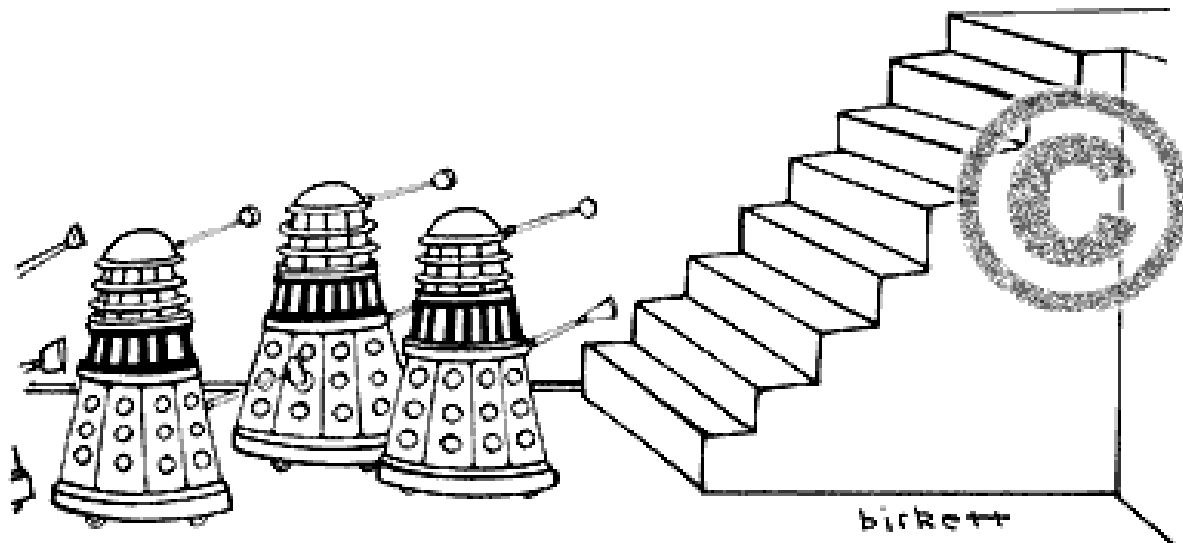
1.	Confirm fever; conduct thorough history (include travel, MTB exposure, drugs, constitutional symptoms, symptoms of giant cell arteritis) and physical exam. Discontinue nonessential medications.
2.	Initial laboratory evaluation: CBC with differential, liver enzymes, ESR, blood cultures × 3, PPD skin testing, TSH, antinuclear antibody. Consider antineutrophilic cytoplasmic-antibody or HIV-antibody testing.
3.	a) Chest or abdomen or pelvic CT scan—if no obvious source; <i>or</i>
	b) Temporal artery biopsy—if symptoms or signs are consistent with giant cell arteritis or polymyalgia rheumatica and increased ESR; <i>or</i>
	c) Site-directed work-up on basis of symptoms or laboratory abnormalities, or both.

EVALUATING FEVER OF UNKNOWN ORIGIN IN OLDER ADULTS (2 of 2)

4.	If 3a is performed and no source is found, then 3b, and vice versa.
5.	a) BM biopsy—yield best if hemogram abnormal—send for H&E, special stains, cultures, <i>or</i>
	b) Liver biopsy—very poor yield unless abnormal liver enzymes or hepatomegaly.
6.	Indium-111 labeled white blood cell or gallium-67 scan—nuclear scans can effectively exclude infectious cause of FUO if negative.
7.	Laparoscopy or exploratory laparotomy.
8.	Empiric trial—typically reserved for antituberculosis therapy in rapidly declining host or high suspicion for tuberculosis (ie, prior positive PPD).

SUMMARY

- Infections are common and lead to significant morbidity and mortality
- Presentation of infection can be atypical
- Diagnostic criteria should guide therapy
- Some differences but several similarities to management in younger adults
- Avoidance of antibiotic over use crucial
- More research needed to define simple questions pertaining to NH infections



"Well, this certainly buggers our plan to conquer the Universe."

Extra slides

LOWER-TRACT UTI (CYSTITIS) IN OLDER WOMEN

- Characterized by dysuria, frequency, and urgency
- 3 days of therapy sufficient for uncomplicated cystitis
- Fluoroquinolones (FQs) more efficacious than TMP-SMX in recent trials (TMP-SMX resistance usually >10%–20%)
- Options in some settings are amoxicillin (particularly for enterococcal infection) and first-generation cephalosporins for patients with FQ intolerance
- Culture not required unless first-line therapy fails

UTI IN OLDER MEN

- Causative organisms and treatment choices are similar to those for older women
- Usually due to obstructive prostatic disease or functional disability; ≥ 14 days of therapy needed
- If prostatitis is suspected, ≥ 6 weeks of therapy is usually required
- Culture and sensitivity data should guide therapy for virtually all UTIs in older men

UPPER-TRACT UTI (PYELONEPHRITIS) IN OLDER WOMEN

- Characterized by fever, chills, nausea, and flank pain; commonly accompanied by lower-tract symptoms
- Requires 7 to 21 days of therapy
- Consider IV antibiotics for patients with suspected urosepsis, those with upper tract disease due to relatively resistant bacteria such as enterococci, and those unable to tolerate oral medications
- Culture and sensitivity data should be obtained in most cases

GASTROINTESTINAL INFECTIONS

- Can present diagnostic dilemmas in the absence of fever or elevated WBC counts; a high index of suspicion is necessary
- Diagnostic aids:
 - **Intra-abdominal infection**—CT or labeled WBC study
 - **Cholecystitis, appendicitis, abscess**—ultrasound
 - **Ischemic bowel**—often requires angiography or flexible sigmoidoscopy
- Treat **infectious diarrhea** as in younger adults