



HAZARDS OF HOSPITALIZATION CASES FOR SYNTHESIS BLOCKS

Abstract:

As part of the new curriculum at the University of Nebraska Medical School, geriatrics was utilized as “synthesis block”. This allowed the presentation of geriatric material with the emphasis of review of material previously learned in the core curriculum in preparation for boards. The cases were developed with this emphasis on review with the design to teach the information through a geriatric lens. We addressed several of the major geriatric syndromes while reviewing board-pertinent information through discussion of cases. The cases that follow were presented in the section of the course focused on the hazards associated with hospitalization.

Educational objectives:

1. Identify potential hazards of hospitalization for all older adult patients.
2. Identify potential prevention strategies for potential hazards of hospitalization in older adults.

Cases:

1. [C Diff / Clostridium Difficile](#) (pages 2 – 6)
2. [Delirium](#) (pages 7 – 12)
3. [UTI / Urinary Tract Infection](#) (pages 13 – 19)



HAZARDS OF HOSPITALIZATION CASES FOR SYNTHESIS BLOCKS

C DIFF / CLOSTRIDIUM DIFFICILE

Ms. M is an 82 yo Female who presents to your clinic for diarrhea. Two months ago Ms. M suffered a stroke leaving her with impaired mobility and residual dysphagia resulting in her placement in a SNF. Three weeks following her stroke she was again hospitalized with pneumonia and was treated 3 days inpatient with IV levofloxacin before being transitioned to PO levo and discharged to SNF. While her respiratory symptoms have resolved, and her mobility is progressing well with daily OT and PT, she has noticed an increase in loose, watery stools over the last week. She normally stools every other day but now has 3-5 BMs a day. She has also experienced fecal incontinence twice in the last week while waiting on staff to help with transfers. She has not had problems with continence before. Denies hematochezia and melena. No pain with stooling, but she has had some abdominal cramps.

PMH:

- Essential Hypertension
- Pre-diabetes; last A1C of 6.9
- Hypercholesterolemia
- Degenerative Joint Disease
- Hypothyroidism

PSH:

- Tonsillectomy as a child
- Hysterectomy

All:

- Penicillin- angioedema as a child

Meds:

- Lisinopril 10 mg PO qd
- Atorvastatin 40 mg PO qd
- Aspirin 325 mg PO qd- added following her stroke
- Clopidogril 75 mg PO qd- added following her stroke
- Synthroid 50 mcg PO qd
- Tylenol 1000 mg TID for acute flares of DJD. On a typical day she takes 500 mg qd.
- Multivitamin

PE:

VS: BP 124/82; HR 96; RR 16; T 36.4°C

General: alert elderly female, diaphoretic, sitting in wheelchair- transfers with 1 assist.

HEENT: Mucous membranes moist

Heart: RRR, grade I/VI crescendo decrescendo murmur at the L sternal border (consistent with prior physical exams), no gallops or rubs.

Lung: CTAB with no wheezes, crackles, or rhonchi

Abd: obese abdomen, normal bowel sounds x 4, soft, non-tender to palpation, no hepatosplenomegaly

Ext: Trace lower extremity edema.



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Defining diarrhea:

- 3 loose or liquid stools/ day, >200 g of stool/day, or stools that are more frequent than what is normal for the individual.
- Acute diarrhea: < 14 days.
- Persistent diarrhea: > 14 days but < 4 weeks
- Chronic diarrhea: > 4 weeks
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What are common causes of diarrhea in an older adult?

- Infectious diarrhea. Most commonly viral. Can present with generalized symptoms of infection such as fever, but may be limited to diarrhea only.
- Drug associated diarrhea
- Antibiotic associated diarrhea: Either as a side effect during the duration of the medication or caused by *Clostridium difficile*.
- Ischemic diarrhea. More common in elderly adults with a history of vascular disease.
- Malabsorption (lactose intolerance)
- Irritable bowel syndrome

Diarrhea is often a presenting symptoms of many malabsorption syndromes. What are common malabsorption syndromes and how do you screen for them?

Malabsorption syndromes:

Celiac disease: Gluten sensitive enteropathy. Autoimmune mediated intolerance of gluten protein (gliadin) causing malabsorption and steatorrhea.

- Risks: Decreased bone density, increased risk of malignancy (T cell lymphoma)
- Decreased mucosal absorption affects the distal duodenum and/or proximal jejunum primarily
- Testing: D-xylose test
- Treatment: gluten-free diet

Lactose intolerance: Lactase deficiency

- Normal appearing villi
- Testing: Lactose hydrogen breath test

Pancreatic insufficiency: Due to chronic pancreatitis, cystic fibrosis, obstructing cancer

- Causes malabsorption of fat-soluble vitamins (A, D, E, K) and B12
- Decreased duodenal pH and fecal elastase

Tropical sprue: Similar to celiac sprue, but responds to antibiotics

- Decreased mucosal absorption
- Associated with megaloblastic anemia

Whipple disease: Infection with *Tropheryma whipplei*

- Foamy macrophages in intestinal lamina propria



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Differentiate Irritable Bowel Syndrome (IBS) from Inflammatory Bowel Disease (IBD).

IBS:

- Recurrent abdominal pain associated with at least 2 of the following
 - Change in frequency of stooling
 - Change in stool consistency
 - Pain associated with defecation
- No abnormalities in structure
- More common in women
- Can be constipation-predominant, diarrhea-predominant, or mixed

Inflammatory Bowel disease

- Crohn disease
 - Location: Terminal ileum and colon – skip lesions, spares the rectum
 - Morphology: Transmural inflammation
 - Gross: Fistulas, cobblestone mucosa, creeping fat, bowel wall thickening
 - Microscopic: Noncaseating granulomas, lymphoid aggregates
 - Complications: Malabsorption/malnutrition, colorectal cancer, fistulas, strictures
 - Clinical manifestations: Diarrhea (+/- blood)
 - Extraintestinal: arthritis, eye inflammation (uveitis), erythema nodosum, pyoderma gangrenosum, aphthous ulcers, kidney stones, primary sclerosing cholangitis, gallstones
 - Treatment: Corticosteroids, azathioprine, antibiotics, infliximab, adalimumab
- Ulcerative colitis
 - Location: Colitis (colon inflammation), continuous lesions, always involves the rectum
 - Morphology: Mucosal and submucosal inflammation
 - Gross: Friable mucosa with superficial +/- deep ulcerations
 - Microscopic: Crypt abscesses and ulcers, bleeding, no granulomas
 - Complications: Fulminant colitis, toxic megacolon, perforation
 - Manifestations: Bloody diarrhea
 - Extraintestinal: Eye Inflammation (uveitis), Skin manifestations (erythema nodosum, pyoderma gangrenosum), Primary sclerosing cholangitis
 - Treatment: 5-aminosalicylic preparations, 6-mercaptopurine, infliximab, colectomy



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What common medications should be suspected as contributing to diarrhea? Is our patient on any suspect drugs?

- Laxatives, antimicrobials, magnesium coated antacids, NSAIDS, Colchicine, Cholinergics, statins, metformin
- Mrs. M is taking Synthroid. Care should be taken to check if she's had a recent change in dose and is not having any other symptoms of hyperthyroidism.
- Diarrhea can also be a side effect of atorvastatin

What risk factors predispose to C. diff associated diarrhea?

- Age > 65 yo
- Prolonged hospitalization or residence in a long-term care facility (Carrier rate is 8-10% in long)
- Prolonged antibiotic usage- leads to disruption of normal enteric flora particularly bacteroides particularly fluoroquinolones, clindamycin, metronidazole, broad spectrum penicillins and cephalosporins.
- Gastric acid suppression – a less acidic environment permits C. diff growth. PPIs are most commonly implicated, though H2 blockers have also been linked.
- Enteral feeding, obesity, cirrhosis, and IBD are also risk factors
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What are our next steps in evaluation and treatment?

- Basic Metabolic panel – checking for electrolyte abnormalities and renal function in an elderly patient with severe diarrhea and multiple comorbidities
- CBC- Patients with C. diff are more likely to have leukocytosis than viral infectious diarrhea
- C. Diff testing

How do we test for C.Diff?

- Enzyme-linked Immunosorbent Assay for Toxins A and B in the stool sample. Specific for toxin producing C. diff.
- Enzyme-linked Immunosorbent Assay for C. diff GDH enzyme. Positive test doesn't indicate a toxin producing strain of C. diff
- Nucleic Acid Amplification test for Toxin B gene
- Colonoscopy may show pseudo-membranes. Scopes are generally performed to look for other causes of colitis on the differential.

A liquid stool sample is collected from Ms. M and tests positive for C. diff Toxins A and B. With which medications will you treat her?

- Oral Vancomycin. – Vancomycin is NOT absorbed systemically through the GI mucosa and will reach high levels in the colon.



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- Metronidazole- now no longer recommended due to high levels of resistance
- Oral Fidaxomicin- Niche drug which is bactericidal to *C. diff.* while minimally disrupting other colonic flora
- Fecal Transplant- for treatment resistant, recurrent *C. diff.*
- Colectomy- for treatment resistant, recurrent *C. diff.*

What instructions should be given to her caretakers at the SNF?

- She should be placed on contact precautions as *C. diff.* is transmitted by spores. All nursing staff should wash their hands with soap and water rather than using hand sanitizer as the spores are resistant to alcohol.

Geriatrics *C. diff.* case quiz:

1. Which of the following correctly identifies *Clostridium difficile*?
 - a. Gram positive cocci, non-spore-forming, endotoxin producing anaerobe
 - b. Gram positive bacillus, spore-forming, exotoxin producing anaerobe
 - c. Gram positive bacillus, spore-forming, endotoxin producing aerobe
 - d. Gram positive cocci, spore-forming, exotoxin producing aerobe
2. What is the mechanism of action of Toxin B?
 - a. Depolymerizes actin
 - b. Disrupts the brush border
 - c. Induces TNF- α to cause inflammation
 - d. Directly activates neutrophils
3. A nurse on the floor is concerned that one of your inpatients may have developed *C. diff.* colitis as she has noticed a change in the odor of stool which she says smells like *C. diff.* Patient has had 3 less solid than normal, but still formed stools yesterday. What is your next step?
 - a. Run a NAAT for *C. diff.* on the stool.
 - b. Run an EIA for *C. diff.* toxins A and B on the stool.
 - c. Start the patient on probiotics
 - d. Reassess the patient's Miralax and Senna bowel regimen.



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DELIRIUM

CC: Two years later, Mrs. Smith, now 77yo with moderate to severe Alzheimer type dementia, is in the ED due to altered mental status and confusion worse than her baseline.

HPI:

- Mrs. Smith moved to a long-term care facility that specializes in Alzheimer disease approximately 1 year ago.
- Her transition to the facility went well and she enjoys the staff and other patients
- Over the past 3 days, Mrs. Smith has become progressively confused.
- She is no longer oriented to place or time.
- She is speaking clearly but the context does not make logical sense. She keeps stating she needed to get ready to go to work despite having retired 15 years ago.
- The staff at the long-term facility noted she had a fever of 101F and brought her to the ED for evaluation.
- Mrs. Smith was unable to give an accurate history upon presentation but did deny cough, dysuria, nausea/vomiting, and constipation/diarrhea.

ROS: could not collect accurate information from Mrs. Smith

PMH/Surgical history/FH: unchanged

Medications:

- Calcium-elemental 1200 mg PO qd
- Vitamin D 1000 IU PO qd
- Hydrochlorothiazide 12.5mg PO qd
- Aspirin 81mg PO ad
- Donepezil 10mg PO qhs
- Fluoxetine 20mg PO qam
- Multivitamin
- Fish oil
- Oxybutinin

Allergies: Penicillin-rash

PE:

VS: temp 101.2F; BP 130/82; pulse 90; respiration 16;

Orthostatic BP: 130/84 lying; 118/80 standing 1 minute, 125/82 standing 3 minutes

General: pleasantly confused older woman who appears stated age. Not in acute distress

HEENT: normocephalic, atraumatic. PERRLA, EOM intact. TM pearly white with no effusion or injection. Oropharynx non-erythematous with no postnasal drip or tonsillar exudates. Nares patent, nasal turbinates non-erythematous and not boggy.

Neck: bruit present over the left carotid artery; no lymphadenopathy; thyroid non-palpable



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Lungs: poor effort on deep inspiration but otherwise CTA bilaterally. No rhonchi or rales. No CVA tenderness.

Heart: RRR. No murmurs, rubs or gallops.

Abdomen: soft, non-distended. BS+. No masses or HSM.

MSK: normal ROM across all joints; no edema

Skin: non-blanching erythematous 3cm x 4cm closed lesion on the sacrum

Neurologic: right handed

Orientation: oriented to person only; not oriented to place or time

Attention: inattentive with disorganized thinking

CN: II-XII intact. II was tested with corrective glasses in place

Strength: 4/5 hip flexors bilaterally, otherwise 5/5

Tone: normal

Sensory: light touch intact. Proprioception and vibratory sensation absent at the ankle.

DTR: 2+ bilaterally for biceps; 1+ bilaterally for triceps, brachioradialis, patellar. Achilles absent.

Plantar/babinski: mute

Finger to nose: normal

Heel to shin: could not understand instructions to complete maneuver.

Pronator drift: negative

Get-up-and-go: must use both hands to rise from chair

Gait: decreased arm swing, stride length. Normal base width

Rhomberg: normal

Sternal nudge: takes 3 steps (abnormal)

What is the differential diagnosis of delirium?

- **Infection: pneumonia, UTI, pressure ulcer**
 - o Frequently have atypical presentation in geriatric patients. Do not always have the classic signs/symptoms one would expect
 - o Pressure ulcers are a concern in a patient who is not mobile.
- **Metabolic abnormalities**
 - o Dementia patients frequently do not remember to drink or eat and their appetite may be decreased. This can lead to metabolic derangement. Additionally, if an infection is present, it can lead to abnormalities of electrolytes.
- **Endocrine abnormalities**
- **Medications: Especially anticholinergic medications**

Is this simply progression of underlying Alzheimer disease?

- Always a possibility but this change seems more abrupt than one would expect for normal progression of dementia.

Discussion point:

What are the differences between delirium and dementia?



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	Dementia	Delirium
Attention	Clear until late	Clouded, fluctuates
Psychomotor	May occur late	Altered, fluctuates
Onset	Gradual, insidious	Acute
Memory	Immediate memory intact, recent worse than remote	Impaired immediate and recent Remote relatively intact
Speech and Thinking	Impoverished, vague Word-finding problems	Incoherent, disorganized

What additional work-up should be done?

- CAM Assessment
- Head CT (status of fall/head injury unknown; commonly performed to evaluate altered mental status)
- CXR
- CBC with diff
- CMP
- lactic acid
- pro-calcitonin
- UA with microscopy and culture
- Consider LP if no other work-up positive.

CAM Assessment:

Score: 3 of 4

1. Acute change in mental status
2. Inattention
3. Disorganized thinking

Results:

CBC:

Hb: 14.0

Platelets: 200,000

WBC: 13,000

Differential: primarily neutrophils

CMP:

Na: 134

K: 3.4

Cl: 100

Bicarb: 16



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Cr: 1.4
BUN: 28
Glucose: 90
Calcium: 8.6
AST: 50
ALT: 50
Alk Phos: 70
Total bilirubin: 1.0
Albumin: 3.8
eGFR: >60

Lactic acid: 2.5mmol/L (slightly elevated)

Pro-calcitonin: 0.8u/L

Head CT: negative for acute bleeds or mass lesions

CXR: No acute cardiopulmonary processes

UA:

- Glucose: negative
- Ketones: negative
- Specific gravity
- Blood: negative
- pH: 5
- Protein: <150mg/d
- Nitrite: Positive
- Leukocyte esterase: positive
- WBC: 10-15

Urine culture pending: Preliminary report shows Gram Negative Rods

Discussion points:

Given the description in the preliminary culture report, what are some possible causative organisms?

[E. coli](#)
[Klebsiella](#)
[Proteus](#)

What is the most common cause of UTI in an older adult?

[E. coli](#)

What is the best initial antibiotic treatment for Mrs. Smith?

[IV ceftriaxone until sensitivities return on the urine culture. Then narrow the spectrum.](#)



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**If patient had been asymptomatic – treatment of bacteruria (“dirty urine”) in older adults is not indicated

Plan based on the above differential and laboratory results:

- Admit for management
- Antibiotic therapy
- IV fluids

Discussion points:

What are precipitating factors for delirium?

- Medication: changes or withdrawal
- Procedures, surgery
- Acute organ insufficiency
- Stroke
- Infections
- Bladder catheters
- Restraints
- Electrolyte or metabolic derangements
- Alcohol/drugs
- psychosocial

What predisposes patients to delirium?

- Cognitive impairment
- Comorbid diseases: increased number leads to an increased severity
- Functional impairment
- Advanced age
- Chronic renal insufficiency
- Dehydration
- Malnutrition
- Depression
- Vision, hearing
- Immobilization
- Substance use



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Delirium part 2:

The next day during pre-rounds, Mrs. Smith was much more alert. She was able to tell the resident where she was, the date, and the year. However, when the attending spoke with Mrs. Smith during formal rounds, Mrs. Smith was again confused. She did not know where she was or the date.

What do you believe is going on?

Fluctuating cognition, which is very common in delirious patients.

How do you treat this condition?

Re-orientation and treat the underlying cause of delirium.

What if the re-orientation techniques do not work?

Ensure adequate pain management and use a low dose of haloperidol only to prevent the patient from harming themselves or others.

How can delirium be prevented in the hospital?

Minimize comorbid conditions; maintain hydration, nutrition; maximize vision and hearing; limit tethers and mobility restrictions.

By the time rounds occur, Mrs. Smith's urine culture returns and is positive for *E. coli* that is pan-susceptible.

What is the next step, now that you know the susceptibilities?

Switch antibiotic to be less broad. For example, switch from IV ceftriaxone to TMP-SMX (Bactrim).

What should be done to prepare for Mrs. Smith's discharge?

Determine if Mrs. Smith is fit to return to her previous living environment or if she needs to go to an acute rehabilitation/SNF prior to returning to her ALF. Consult OT and PT to have them evaluate Mrs. Smith's functionality. Additionally, involve social work and the family in planning for Mrs. Smith's transfer.

****Discharge planning is essential in care of geriatric patients.**

Adequate discharge planning that begins at admission, early involvement of social work, physical therapy, and occupational therapy; discussing discharge goals; involving primary care provider and clinical pharmacists. Ensure adequate medical reconciliation and follow-up with primary care.

What are the options for discharge for a geriatric patient? And which would be appropriate for Mrs. Smith?

- home with support
- home with home health care
- SNF
- Nursing home, ALF, custodial care
- Acute rehab
- Long term acute care
- Hospice
- For Mrs. Smith, either acute care or return to her previous ALF with proper follow-up with her primary care provider.



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URINARY TRACT INFECTION

Mr. K

CC: Lethargy and confusion

HPI: Mr. K is a 65 year-old gentleman with paraplegia and neurogenic bladder with suprapubic catheter. He has resided at the local nursing home for the past 6 years as he is unable to care for himself due to his severe mobility impairment. At baseline he is cognitively intact and makes his own decisions.

The nurses ask you to evaluate Mr. K this morning because he “does not seem himself.” He has had intermittent vomiting and loose stools and seems lethargic and confused. He has had decreased oral intake for the past 24 hours.

He admits that his appetite is decreased and he has back pain and abdominal pain and states that he feels “awful!”

PMH: T7 Paraplegia due to T7 Diskitis/Spinal abscess 6 years ago; Diabetes Mellitus type 2 with nephropathy and retinopathy; Recurrent UTIs; Multiple renal calculi; Chronic pain syndrome; Recurrent UTIs; 2 hospitalizations for Urosepsis in past; Paroxysmal Atrial Fibrillation; Chronic Diastolic Heart Failure; Mixed-type COPD; HTN, Severe Obesity, Hypothyroidism.

Current Medications:

Acetaminophen 650 mg po Q4 hours PRN fever greater than 100.
Apixaban 5 mg po Q 12 hours
Atorvastatin 20 mg po daily
Baclofen 20 mg po Q6 hours
Cyclobenzaprine 5 mg po BID
Fluticasone propionate 250 mcg/salmeterol 50 mcg; 1 inhalation BID
Furosemide 40 mg po BID
Guaifenesin 600 mg po Q 12 hours
Hydromorphone 8 mg po TID
Insulin aspart 8 units subcutaneously TID AC
Insulin detemir 40 units subcutaneously once daily
Levothyroxine 200 µg po daily
Lisinopril 2.5 mg po daily
Melatonin 3 mg; 2 tabs (6 mg) po at HS PRN insomnia
Metformin 1000 mg po BID
Metoprolol tartrate 12.5 mg po BID
Omeprazole 20 mg po daily
KCl 20 mEq po; 2 tabs (40 mEq) po TID
Senna 8.6 mg po once daily
Tiotropium 18 µg inhaled once daily

Allergies: Sulfa (rash); alprazolam (“Blackout”); Promethazine (Muscle spasms); Quinine (CHF)

FH: Heart Disease in both parents; Diabetes in Sister;



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Habits: Smokes cigarettes, 1 ppd; Denies ETOH; Previous use of street drugs in distant past

SH: Divorced. Has 1 daughter, contacts occasionally

Advance Directives per chart: Wants life-prolongation; Full Code

ROS:

Constitutional: Denies fevers or chills; Feels “weak”.

Pulmonary: Denies any dyspnea or cough

CV: Denies any CP or palpitations

GI: Appetite is decreased. Has intermittent nausea, has vomited twice and has had 4 loose stools; he has chronic fecal incontinence

GU: Has had intermittent hematuria past 24 hours

Neurologic: Has chronic spasticity of lower extremities and develops severe leg spasms with his transfers or any manipulation of his lower extremities.

Remainder of the ROS is negative except as above in HPI.

Physical Exam:

VS: T: 98.4; HR: 98; RR: 22; BP sitting: 102/68; Wt: 346.2 lbs

General: This is a WN WD 65 y/o male who looks younger than stated age who appears pale and listless.

ENT: Oral mucosa is slightly dry

Neck: No adenopathy or thyromegaly

Chest: Decreased breath sounds at both lung bases, otherwise clear

CV: RRR without obvious murmur

Abdomen: Obese contour; normal bowel sounds, soft, mild tenderness over left CVA region; no obvious masses or organomegaly; assessment of abdomen is limited due to body habitus.

Extremities: There is 2+ pitting edema at the mid anterior tibial area bilaterally

Mental Status: He dozes frequently during the interview. Is oriented to person and place, but is off 3 days when asked the date.

Laboratory that could be obtained this am at facility:

Fingerstick blood sugar: 168

UA:



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Source: Suprapubic catheter

Color: Red

Appearance: Hazy

Glucose: Negative

Bilirubin: Negative

Ketones: Negative

Specific gravity: 1.014

Blood: Large

pH: 5.5

Protein: 30 to 70

Urobilinogen: Negative

Nitrites: Negative

Leukocyte Esterase: Large

Micro:

Squamous Cells: None Seen

RBC, UA >50

WBC, UA >50

WBC Clumps, UA Present

What are this patient's acute problems?

Acute mental status changes/Delirium

Hematuria; Pyuria; Probable Catheter-associated UTI; Suspect sepsis secondary to UTI

Vomiting and diarrhea with poor oral intake; probable volume depletion; at risk for AKI

What risk factors for UTI does this patient have?

Diabetes, indwelling catheter, renal calculi, chronic fecal incontinence

What are other risk factors for UTI?

Urinary retention, fecal incontinence, BPH, Atrophic vulvovaginitis, Urinary tract obstruction (BPH, scarring, stones, tumors)



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Female gender; decreased functional ability; impaired cognition; pelvic prolapse; anticholinergic medicines; neurogenic bladder;

Abnormalities in function or anatomy of the GU tract; Recent instrumentation of the GU tract; Limited functional status

What further laboratory testing would you recommend?

CBC with diff

CMP

Procalcitonin (+ or -)

Blood cultures

Blood gases

Urine C&S

Chest x-ray

CT abdomen and pelvis without contrast

Should this patient's acute illness be treated in the nursing home setting or should he be transferred to the hospital?

His goal of care is life-prolongation. He shows systemic signs of sepsis and delirium which are medical emergencies. He should be sent to the ER for rapid assessment and initiation of broad spectrum intravenous antibiotic therapy while awaiting C&S results. Clinically he also shows signs of volume depletion and may have acute kidney injury also and likely needs vigorous IV fluid replacement.

Does your plan of care change if he is 40 years old? 95 years old?

What are common symptoms of UTI?

Dysuria; increased urinary frequency; urinary urgency; suprapubic pain; new onset UI; hematuria, malaise; nausea and vomiting; flank pain; fever, chills,

What are common symptoms of UTI in older adults?

Urinary urgency and frequency, confusion, malaise

Compare and contrast the clinical presentations of cystitis vs pyelonephritis.

Cystitis: Suprapubic pain, rarely have fever; no back pain, CBC usually shows normal WBC

Pyelonephritis: Fever, chills, flank pain, vomiting, leukocytosis



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List the diagnostic markers of UTI:

Urine culture: Specimen obtained by clean catch: >100,000 cfu/ml;
Specimen obtained by straight catheterization: > 1000 cfu/ml

Common urinalysis findings suggestive of UTI:

Increased WBCs; positive nitrites; positive leukocyte esterase; bacteruria;

White cell casts suggest renal origin for pyuria.

What are common UTI pathogens?

Non-catheterized patients: *Escherichia coli*, *Proteus mirabilis*, *Providencia spp*, *Klebsiella*, *Pseudomonas aeruginosa*, *Citrobacter spp*, *Enterobacter*, Coagulase-negative staphylococci, *Gardnerella vaginalis*; group B streptococci

Additional common organisms in nursing home catheterized patients: All above plus *Enterococci*, *Staphylococcus aureus* (MRSA); and fungus.

[*Escherichia coli* was the most prevalent (44.8%), followed by *Proteus mirabilis* (20.4%), *Providencia spp.* (8.9%), *Klebsiella spp.* (6.4%) and *Pseudomonas aeruginosa* (4.6%). *Enterococci* were the most frequently isolated Gram-positive **organisms** (7.4%). (*Staphylococcus aureus* (MRSA) (Case Files Geriatrics)

Reference: De Vecchi E, Sitia S, Romano CL, et al. Aetiology and antibiotic resistance patterns of urinary tract infections in the elderly: a 6-month study. *Journal of Medical Microbiology* 2103 June; Vol 62 (Pt 6): 859-863.]

Which antibiotics are frequently prescribed for UTI's in the older patient?

Bactrim (May cause increase in creatinine level in older individuals; stop Bactrim if creatinine rises > 25% baseline, also watch for changes in INR if patient is also on warfarin)

Nitrofurantoin** Do not use if creatinine clearance is less than 30 ml/min; May be used for short term treatment of uncomplicated cystitis (Source: Lexicomp)

Amoxicillin

Cephalosporins

Fluoroquinolones* Should not be used for first line due to adverse drug reactions and increasing resistance

What are possible complications of UTIs?



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Delirium, Sepsis, Shock, Acute renal failure, Renal abscess, Nephrolithiasis (struvite stones only form in patients with chronic upper urinary tract infection)

You tell the patient that you are concerned that he has a serious UTI and probable sepsis and that he should go to the hospital. You ask the nurses to arrange for medical transport to the hospital. The patient then tells you that he is fine, that he is not sick and he is adamant that he doesn't want to go to the hospital. He continues to insist that he is fine and refuses go to the hospital. The ambulance crew arrives and they do not feel that they should take him to the hospital because he is refusing to go.

Does he have currently have capacity to make the decision to refuse hospitalization?

Prior to the onset of this illness and acute mental status changes, patient was very clear that he wanted life-prolongation. He now has fluctuating attention, is confused and is showing obvious signs of delirium. He appears to have a life threatening illness and is at high risk of rapid clinical decline. He lacks capacity to make critical medical decisions at this time and should be transported to the hospital.

Ultimately patient is transferred to the emergency room and is found to have hypotension, AKI and sepsis with presumed urinary source. Patient was initially admitted to the ICU with continuing hypotension on intravenous fluids and transferred to the general medical ward soon after. His suprapubic catheter was exchanged. Patient was initially treated with vancomycin and zosyn, then transitioned to meropenem given history of resistance. His urine cultures grew multiple organisms consistent with prior cultures. He finished a 5-day course of meropenem and discharged in fair/chronic condition back to his facility. When he returns to the nursing facility, he thanks you for sending him to the hospital. (This is a true story!)

Asymptomatic bacteriuria in older patients

(Case from Juthani-Mehta M et al. JAMA 2014; 312(16):1687-1688)

Mrs. B

Mrs. B is an 84 y/o nursing home resident was thought to have UTI eight times and treated with AB six times over past 2 years. Today, family reports that "patient doesn't look right". Nursing staff states she is not confused. Mrs. B denies dysuria or abdominal pain but has longstanding complaint of voiding frequently.

Physical Exam:

Afebrile; VSS

Chest: Clear.

CV: RRR.

Abdomen: No abdominal, suprapubic, or flank tenderness.

Urine has "a foul odor."



HAZARDS OF HOSPITALIZATION CASES FOR SYNTHESIS BLOCKS

A catheterized urine specimen shows: Blood 1+; Nitrites 1+; Leukocyte esterase 3+; Bacteria 3+; WBCs 40-100/hpf; RBCs 2/hpf; Epis 0-5/lpf

Urine C&S: E coli >100,000 cfu/ml; sensitive to all AB except ampicillin

How do you interpret these test results?

- The patient has asymptomatic pyuria & bacteriuria
- The patient has UTI because of chronic UI and positive C&S
- A positive urinalysis and urine culture are always a UTI
- Since patient has a history of recurrent UTIs, these urine test results indicate that she has another UTI

Answer: A

Should Mrs. B be treated with an antibiotic?

Antibiotic treatment of asymptomatic bacteriuria **in elders** does not improve outcomes (**in contrast to pregnant patients**). Risks of unnecessary antibiotics in elders outweighs the benefits of treatment.

What is the prevalence of asymptomatic bacteriuria in nursing home residents?

**25 to 50% of nursing home residents have asymptomatic bacteriuria – This should NOT be treated

What are criteria for initiating antibiotics for urinary tract infection in a non-catheterized nursing home resident?

Loeb Minimum Criteria for Initiating Antibiotics in Nursing Home Residents

Acute dysuria alone OR

Fever (>37.9° or 1.5° increase above baseline temperature) and at least 1 of the following:

New or worsening

- Urgency
- Frequency
- Suprapubic pain
- Gross hematuria
- Costovertebral tenderness
- Urinary incontinence

What are possible complications of unnecessary antibiotic therapy in elders?

Adverse medication side effects; Adverse drug interactions; Multi-drug antimicrobial resistance; Clostridium difficile colitis, excessive costs.