Just the facts: Diagnosis and treatment of urinary tract infections in older adults

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Received: 31 December 2020 / Accepted: 29 March 2021 / Published online: 21 April 2021

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Clinical scenario

An 86-year-old male is brought to the emergency department (ED) by family members due to 2 days of generalised weakness, decreased appetite, and new confusion today. The patient lives in his own home. Past medical history reveals hypertension, atrial fibrillation and benign prostatic hypertrophy with an indwelling catheter. His vital signs are: HR 75, RR 13, O₂ 97% RA, BP 140/85, T 37.2 °C, and glucose 6.8 mmol/L. The bedside nurse asks if you want to send off urine investigations.

What is the prevalence of asymptomatic bacteriuria in older adults?

Asymptomatic bacteriuria in older adults (age > 65) is defined as bacteriuria (isolation of urinary pathogen(s) at $\geq 10^5$ CFU/mL in mid-stream urine in the absence of signs or symptoms attributable to a urinary tract infection [1]. It is highly prevalent in older adults, with variations depending on patient gender, place of residence, and presence of a foley catheter. Among community-dwelling adults 70 years and older, the prevalence of asymptomatic bacteriuria is up to 19% in males and 16% in females. The prevalence of asymptomatic bacteriuria among people living in long-term care is up to 50%. In persons with indwelling catheters, the prevalence of asymptomatic bacteriuria is 100% with long-term use and 5%/day of catheter use in the short term [1].

When should I send a urinalysis and culture for suspected urinary tract infection for an older adult?

Routine urine investigations should not be sent for older adults in the ED. This should be reserved for patients with a clinical suspicion of urinary tract infection or as part of the workup for sepsis without a localizing source [1]. Clinical suspicion requires signs and/or symptoms to be present. Choosing Wisely Canada published guidelines for urinary tract infection among long-term care residents, which suggests using the modified Loeb criteria for determining when to send a urine culture in non-catheterized long-term care residents: acute dysuria OR two or more of the following—fever, suprapubic pain, gross hematuria, flank pain, and new or worsening urgency, frequency or urinary incontinence [2]. A common misconception is that foul-smelling or dark urine suggests a urinary tract infection, however, this is more typical of dehydration and is not a reason to send urine investigations. Because of the high rate of asymptomatic bacteriuria, sending urine investigations without clinical suspicion for urinary tract infection is likely to result in unnecessary treatment and distract clinicians from identifying the true cause.

The challenge often raised by health care providers is what to do when the patient cannot provide a reliable history due to cognitive impairment or delirium. According to infectious disease guidelines, the presence of delirium, falls, and behavioral changes are not the sole indications for the investigation of a urinary tract infection and clinicians must consider other common causes and careful observation first [1].

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When and how do I send a urinalysis and culture for a suspected urinary tract infection in an older adult with an indwelling catheter?

Catheter-acquired urinary tract infection is defined as a positive urine culture in a patient with a catheter or post-catheter removal within 72 h [3]. The presence of a catheter increases the rate of asymptomatic bacteriuria and catheterized patients often lack classic symptoms of urinary tract infection. Clinicians are recommended to only order urine testing for patients who have new supra-pubic tenderness or costovertebral angle tenderness, particularly during urination, fever or new delirium [1, 2]. This is important as studies have shown no benefit to antibiotics for asymptomatic bacteriuria in catheterized patients and an increased risk of antimicrobial-resistant pathogens. If you determine that a urine culture needs to be collected, the catheter should be changed prior to sending urine investigations [3].

How should I manage an older adult with a confirmed or presumed urinary tract infection?

Empiric treatment of urinary tract infection should be directed by local antibiogram data on resistance patterns, as well as any previous urine cultures for that patient. The cost of medication and eligibility for drug coverage should

be factored in as well. Calculating the creatinine clearance for your older adult patients is important prior to antibiotic prescription as most medications will require a dosage adjustment. A thorough medication review is crucial to avoid drug interactions [4, 5].

How should I manage urosepsis in an older adult?

Urosepsis has a high mortality rate and rapid recognition and response are required. Initial management in the ED should include resuscitative efforts in keeping with the patient's goals of care. Medical management should include volume resuscitation and empiric antibiotics within 1 h. Antibiotic dosing should be adjusted based on patients' renal and hepatic function. In community-acquired urosepsis, third-generation cephalosporins, piperacillin/beta-lactamase inhibitor or urinary fluoroquinolones (e.g. ciprofloxacin, levofloxacin) should be used (caution with urinary fluoroquinolones use in areas of high resistance). The addition of an aminoglycoside (e.g. gentamicin, tobramycin) should be considered when severe gram-negative sepsis is suspected. For healthcare-acquired urosepsis, an antipseudomonal third-generation cephalosporin (e.g. Ceftazidime) or piperacillin/beta-lactamase inhibitor in combination with an aminoglycoside or a carbapenem may be initiated as empirical therapy [6] (Fig. 1).

Fig. 1 UTI in older adults

Case resolution

You inform your nursing colleagues that because of the high risk of asymptomatic bacteriuria, it is important to do a full assessment before deciding to send off urine investigations. You complete your history including a medication review (Ramipril, Metoprolol and Warfarin). On physical exam, there is no evidence of urinary retention on a bladder scan, however the abdominal exam demonstrates suprapubic tenderness. A rectal exam reveals no palpable stool and no prostatic tenderness. Because of the suprapubic tenderness, you deem urine investigations indicated, as well as an infectious and metabolic work-up. Lab results reveal an elevated white blood cell count with normal electrolytes and renal function and an INR of 2.1. His indwelling catheter has been in place for 6 weeks, so you change it prior to sending off urine investigations [3]. The urinalysis is positive for leukocytes, nitrites, and blood. His records show a history of *E. coli* urinary tract infection that was pan-sensitive. After ruling out other causes for his delirium, you diagnose the patient with a Catheter-acquired urinary tract infection and provide a prescription for Cefixime for 10 days [3]. His family is motivated for him to return home, has been educated on non-pharmacologic delirium management, and will support him appropriately. Discharging a patient with delirium carries with it an increased risk of mortality [7], but so too does hospitalization [8], and upon discharge, it is undiagnosed delirium which carries the highest risk [7]. It is unclear if the risk of discharging a patient with an identified and treated source of delirium outweighs the risk of hospital admission. In these cases, careful consideration of patient and caregiver preferences, risks, and benefits in a shared decision-making approach is required. Given that you have identified the cause of decline and delirium and he has excellent home supports, contrasted with the risks of hospitalization, together you decide for discharge home.

You provide written discharge instructions, a requisition for an INR in 5 days, and send his family physician a letter for follow-up of his INR, his delirium and the family's ability to care for him safely.

Declaration

Conflict of interest The authors have no conflicts of interest to declare.

References

1. Nicolle LE, Gupta K, Bradley SF, et al. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. *Clin Infect Dis*. 2019;68(10):e83–110.
2. Are you using antibiotics wisely? Choosing wisely. <https://choosingwiselycanada.org/campaign/antibiotics-ltc/>. Accessed 9 Dec 2020.
3. Nicholle LE. Urinary catheter-associated infection. *Infect Dis Clin N Am*. 2012;26:13–27.
4. GeriRx Files 3rd Edition. [rxfiles.ca/geri](https://www.rxfiles.ca/geri). 2019. <https://www.rxfiles.ca/RxFiles/uploads/documents/GeriRxFiles-UTI.pdf>. Accessed 9 Dec 2020.
5. Hamid M, Lashair B, Ahsan I, Micaily I, Sarwar U, Crocetti J. A deadly prescription: combination of methotrexate and trimethoprim-sulfamethoxazole. *J Community Hosp Intern Med Perspect*. 2018;8(3):149–51. <https://doi.org/10.1010/200096666.2018.1466598>.
6. Kalra OP, Raizada A. Approach to a patient with urosepsis. *J Glob Infect Dis*. 2009;1(1):57–63. <https://doi.org/10.4103/0974-777X.52984>.
7. Kakuma R, du Fort GG, Arsenault L, Perrault A. Delirium in older emergency department patients discharged home: effect on survival. *J Am Geriatr Soc*. 2003;51(4):443–50. <https://doi.org/10.1046/j.1532-5415.2003.51151.x>.
8. Quinn KL, Stall NM, Yao Z, et al. The risk of death within 5 years of first hospital admission in older adults. *CMAJ*. 2019;191(50):E1369–77. <https://doi.org/10.1503/cmaj.190770>.