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## Improving Advanced Practice Provider Knowledge of Urinary Tract Infection in Geriatric Populations

Ashley Denise Lang  
*Walden University*

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# Walden University

College of Nursing

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Ashley Lang

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Sue Subocz, Ph.D.

Walden University  
2026

Executive Summary: Staff Education Project  
Improving Advanced Practice Provider Knowledge of Urinary Tract Infection in  
Geriatric Populations

by

Ashley Lang

MS, Walden University, 2018

BS, King University, 2015

Executive Summary Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
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## Summary

This Doctor of Nursing Practice (DNP) staff educational project was implemented to address a gap in staff knowledge in urinary tract infection (UTI) management in the geriatric population. Geriatric populations are a vulnerable population that require special consideration as improper classification and management of UTIs can lead to comorbid health exacerbations, increased risks for hospitalizations, and increased mortality. The project question was, Does education to advanced practice providers (APP) regarding complicated versus uncomplicated UTIs in the geriatric population improve nursing knowledge as compared pre to post education? The purpose of the project was to evaluate the effectiveness of a targeted education intervention to improve APP knowledge of complicated versus uncomplicated UTIs in the geriatric population. Evidence synthesis for this project was guided by John Hopkins nursing evidence-based practice model. An initial search for articles yielded more than 10,000 articles and 20 peer-reviewed articles were selected. The articles included experimental studies, clinical practice guidelines, qualitative studies, literature reviews, and quasi experimental studies, representing evidence Level I-V and overall quality ratings strong to good. Eighteen APPs participated in this project. The average pretest score was 44%, and the average posttest score was 90%, reflecting a 46% improvement in knowledge. This project has implications for nursing practice in promoting positive social change since improving APP knowledge supports evidence-based decision-making to maximize patient outcomes. This project advances nursing practice by actively promoting equitable, evidence-based clinical decision-making, structuring continuing education, and reducing variability in diagnosing to advance social change.

## **Background**

In the United States, the geriatric population is projected to expand from 58 million to 82 million by 2050 (Jones & Dolsten, 2024). Many of these geriatric patients will continue to live independently; it is therefore imperative to delve into a clinical assessment of geriatric UTIs. In the geriatric population, 37.6% of patients are diagnosed with lower UTIs, 13.9% with upper UTIs, 31.9% with asymptomatic bacteriuria, 10.2% with urosepsis, and 6.4% with prostatitis (Akhtar et al., 2021). The purpose of this project is to improve APP knowledge of complicated versus uncomplicated UTIs in the geriatric population. Improved APP competence in classifying UTIs in the geriatric population can reduce misdiagnosis, improve antibiotic stewardship, prevent hospitalizations, and reduce morbidity (Grigoryan & Trautner, 2024).

Enhancing APP knowledge is fundamental to developing clinical competence and improving patient outcomes. Healthcare, in all its modalities, must be evidence-based and adapt to current socioeconomic changes to remain equitable (Kim et al., 2025). Nursing professional development is a critical component in expanding the scope of practice for nurses. Expanding the scope of nursing practice addresses the growing demand for healthcare services in underserved communities. The primary goal of staff education in nursing is to ensure that healthcare professionals are equipped with the knowledge, skills, and competencies to provide safe, evidence-based, patient-centered care (Kim et al., 2025).

This project question was, Does education to APP regarding complicated versus uncomplicated UTIs in the geriatric population improve nursing knowledge as compared to pre and post education? The purpose of the project was to evaluate the effectiveness of

a targeted education intervention to improve APP knowledge of complicated versus uncomplicated UTIs in the geriatric population. The importance of this question is that it seeks to improve or expand APPs' evidence-based knowledge. The project aims to determine whether an educational tool could improve APP knowledge of UTIs in the geriatric population.

In the United States, it is estimated that \$2-3 billion/year is spent on UTI Treatment (Ganidađli et al., 2023). Clinical decision-making must be balanced as overtreatment of UTIs poses financial risks to the patient and health care facility. In elderly patients with a diagnosis of UTI in primary care, deferring antibiotics were associated with a significant increase in septicemia or bloodstream infection which increased mortality compared to those who received antibiotics (Gharbi et al. 2019). Antibiotic resistance in elderly patients is a complex and growing concern within this population (Theodorakis et al., 2024). Delaying care can lead to increased morbidity and mortality.

Providers must balance overtreatment versus under treatment particularly in vulnerable populations. Diagnostic testing ensures accurate diagnosis, targets treatment, and improved patient safety (Nazarko, 2023). The goal of care is to optimize patient's health and enhance their quality of life. The types of infectious organisms in elderly patients may influence overall mortality and survival time (Baran et al., 2023). Age-related immunosenescence, multimorbidity, and atypical symptom presentation in the geriatric population can delay recognition of clinical deterioration (Gajdács et al., 2021). These findings underscore the potential consequences of delayed care. Patients, caregivers, and providers play an integral part in the patient's outcome.

Assessments by caregivers, patients, and providers can also drive diagnostic needs. Recurrent UTIs are defined as three UTIs in 1 year or two UTIs within a 6-month period (Gajdács et al., 2021). A UTI is considered complicated in males, those who are immunocompromised, have a diagnosis of diabetes, a history of reoccurring UTIs, use of urinary tract instruments such as catheters or stents, genitourinary structural abnormalities, and any patient with impaired renal function (Gajdács et al., 2021). An uncomplicated UTI is defined as acute dysuria, new or increased urinary urgency/frequency, suprapubic discomfort (Gajdács et al., 2021). Uncomplicated UTIs can also be defined in a patient that does not have a history of serious chronic comorbidities, no use of urinary tract instruments, and no use of antibiotic use in the last 3 months (Ganidağlı et al., 2023). Complicated versus uncomplicated then becomes UTI classifications that necessitate the development of treatment plans.

Overall, the ability to prescribe the correct treatment depends on the providers assessment skills and the patient/caregiver communications skills (Hartman et al., 2022). By integrating clinical judgement, patient centered care, antibiotic stewardship, and nonpharmacological adjunct therapy, professionals can work with patients and caregivers. Integrating sound clinical judgement with patient-centered care further strengthens outcomes. The objective is to reduce complications, improve outcomes, and mitigate the substantial financial and public health burden associated with UTIs.

The John Hopkins evidence-based practice for nursing and healthcare professionals level of evidence gives credibility to the project. While over 10,000 articles were found on geriatric UTIs, the decision was made to select 20 high quality articles that supported improving APP knowledge of complicated versus uncomplicated UTIs. The

evidence supporting this staff education project therefore included these 20 articles mainly within the past 5 years. They were comprised of six experimental studies, one clinical practice guidelines, two qualitative studies, five literature reviews, and six quasi experimental studies. The greatest strength was from experimental studies although there were consistent and supportive evidence within Level I, II, III, and V. This indicates strong to good quality evidence supporting this project. Although Level IV guideline evidence was rated low, it did not contradict higher-level findings. The Level I studies emphasized early diagnosis and treatment, the use of an antibiogram for improved empiric antibiotic selection, denotes the negative consequences of delayed treatment, reinforces nonpharmacological adjunct therapy, and considering comorbid health concerns in care. The Level II studies discuss antibiotic stewardship, geriatric patients in long term facility antibiotic plan of care, the patient's health outcome after receiving intravenous antibiotics versus oral antibiotics and reiterating the significance of considering patient's comorbid health concerns in their plan of care. Interestingly, the Level III studies reiterated the necessity to use the antibiogram to guide therapy, introduced the caregiver as an integral part in disease prevention and education, and emphasized the necessity of a thorough assessment of the patient. Level IV studies reviewed adjunct therapies and strategies to help promote long term prevention strategies from expert consensus. Lastly, the Level V studies strengthen the need for patient-centered antibiotic stewardship, assessment rigor by the provider as well as the patient/caregiver, and a plan that individualizes care. The predominance of Level I and II studies combined with similar and supportive evidence across all levels of evidence supports and overall rating of strong to good.

The evidence for the educational program was collected from scholarly peer-reviewed articles that defined clinical practice guidelines, completed experiments in patient care, and standards of clinical stewardship. The range of articles were needed to impact the dimensions of caring for geriatric patients with comorbid health diagnoses. While the quasi-experimental research method does not establish causality, it can assess whether the level of education improved by comparing pre- and post-test scores (Kim et al., 2025). The pre- and post-tests are the dependent variables that reinforce the need for the educational tool, which is the independent variable.

### **Staff Education Project Development**

Effective staff education is essential to project development as it provides evidence-based practices that can be consistently referenced and applied in patient care. Ongoing professional education serves as the foundation of this quality improvement project. The project was implemented with APPs who provide home care for a geriatric population in-person and via telehealth. The participant sample consisted of 18 APPs that work at the project facility. Their certification specialties include family practice and adult/gerontology care. There were fourteen APPs with 0-5 years of experience, three with 6-10 years of experience, and one with > 15 years of experience. APPs were chosen for the focus of this project as they are the largest sector of healthcare drivers within the project facility. Seventeen participants were native English speakers, and one participant's second language was English. These APPs provide patient care via telehealth to patients living within a 60-mile radius of the APP's home. Participation was voluntary and was supported by the facility, as it could encourage an educational department to be formed within the facility. Currently, managers are responsible for

ensuring their staff are up to date with policies and clinical practice changes, and this educational program could be incorporated into an educational department.

The process of creating the educational program and tool was informed by reviewing evidence-based practice evidence from literature and national organizations. Two content experts guided the creation and assessment of the staff educational project and tool. The first content expert was a medical doctor with thirty years of experience. They practiced as a hospitalist for 20 years and for the last 10 years have been caring for geriatric patients in various home settings. The second content expert is an APP with 18 years of experience, including geriatric, emergency care, and APP leadership experience. The content validity index 4-point grading scale exceeded 0.80 indicating good content validity. The Likert scale assessment of the education project 4-point score >4.0 which represented a positive perception of the project.

A thorough urologic assessment by the APP can greatly inform the plan of care (Søndergaard, Andersen, & Frederiksen, 2024). The project facility cares largely for geriatric patients who are homebound. The APP has a hybrid schedule of in-home and telehealth appointments to meet patient needs. Scenario-based questions were chosen to demonstrate comprehensive assessment knowledge, critical thinking skills, and understanding of real-world concepts (Hobbs & Wilson, 2025). The educational format was suited for adult learners with advanced degrees who have practiced for less than 5 years as well as for those with more experience. The evidence was collected through a pretest and a posttest to improve APP knowledge of complicated versus uncomplicated UTIs. A pretest was sent electronically via email to all participants. After allotting a week to complete, I delivered the educational PowerPoint presentation via zoom. The posttest

was sent via the initial response email and returned via email. Descriptive statistics were used to compare pre-and post-intervention results. Analysis focused on overall score improvement.

The evaluation process consisted of analyzing electronically submitted data to ensure standardized results. The process aspires to improve APP knowledge and clinical decision-making. The results were reviewed after pre- and post-testing were complete to evaluate the APP's baseline knowledge and after the educational tool was presented. Evaluating results with consistent improvements supports the reliability of the educational tool's impact (de Almeida Lima et al., 2025). The strength of this project relies heavily on its standardized testing, educational program, and results-collection method.

## **Results**

The DNP staff education project was completed at the project facility with eighteen APP participants. In Figure 1, the pretest median was 44% and the posttest median score was 90%. This resulted in a 46% increase in knowledge. The standard deviation on both scores indicated moderate variability in the results. While the results were not identical, the grade range did not vary significantly. The overall performance was formidable. The results demonstrate that the staff education was successful. The results show that the project facility can use this success to standardize education and support APP's continued education. APPs can now apply the knowledge they have gained to the care they provide daily. The impact of improving APP knowledge of complicated versus uncomplicated UTIs beyond the local site underscores the broader need for consistent, evidence-based decision-making support within the first 5 years of practice. In

the geriatric population, the diagnosis of UTIs expands across all health care settings and can inform practice, policy, and future initiatives. With the educational tool, competent provider assessments can continue to impact patients' plan of care and outcomes. APPs can assist supportive staff in education and development by clarifying and teaching how to recognize key signs and symptoms to properly escalate care needs.

This project had a positive impact on the organization. The positive organizational implications include improved clinical decision making, quality and safety outcomes, standardization of care, and professional development infrastructure. Enhanced knowledge supports more differentiation in UTIs and antimicrobial stewardship. More consistent provider assessments may decrease overtreatment and preventable complications. The staff education project serves as the foundation for implementing evidence-based clinical pathways within the telehealth platform. APPs who participated are now able to serve as peer- mentors and clinical champions to support long-term sustainability of high-quality telehealth services. Limitations in this study include small sample size, single site testing, and email distribution of pre- and post-test. A small sample size of 18 is clinically significant for the facility but reduces generalizability. The project may not fully translate into in-person visits due to the differences in workflow variability between telehealth and in-person visits. The project would need a larger participant group to impart generalizability. A significant limitation was that the tests were emailed. The concerns include participant's possible use of reference materials, lack of control over testing conditions, and it was not possible to capture independent knowledge retention with immediate post-test. The importance of the project beyond the clinical site includes structured educational support for APPs, a nationally addressed gap

that expands across all levels of healthcare, and the impact to the geriatric population by providing early assessment and appropriate intervention. Continued implementation and expansion of structured evidence-based educational interventions have the potential to influence policy, workflow, and patient outcomes across diverse healthcare settings.

### **Figure 1**

*Pretest and Posttest Scores*



### **Conclusions**

Staff educational programs are derived from a gap in practice that impacts care delivery. The impact of an APP staff educational program on complicated versus uncomplicated UTIs in the geriatric population includes improving care by improved knowledge of the APP. The impact of an educational project on the organization may be to improve APP knowledge of complicated versus uncomplicated UTIs in the geriatric population, ensure that the facility is translating evidence to practice and embed inclusive practices into the organizational culture, and value-based resource utilization. Overall, it may also impact health care resources in care delivery by reducing unnecessary diagnostic testing, improving reimbursement alignment, and decreasing liability and risk

exposure. A sample size of  $N=18$  is small and would need a larger sample size to impact the statistical soundness. Implementing this project on a larger scale may improve the accuracy and precision of the results. Further recommendations include interdisciplinary training for support staff, standardization of clinical protocols, and informing future patient education initiatives. The potential implications of standardizing clinical knowledge for APP practice include increasing the likelihood of correct diagnosis, deriving a concise treatment plan, and improving patient education and outcomes (Kim et al., 2025). The implications for nursing practice and positive social change include improved consistency with assessment and management of geriatric patients presenting with UTI symptoms, reduction in avoidable hospitalizations, strengthened clinical judgement, and advanced clinical antimicrobial stewardship. This educational program promotes representation in training material, incorporates patient-centered practices that considers the individual, prepares APPs to understand the plight of the aging person, and trains APPs to recognize and reduce gaps in care that affect geriatric healthcare delivery. Collectively, this education project strengthens nursing practice, operational optimization, and patient-centered individualized care that promotes equitable and efficient treatment for all patients.

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solutions. *Microorganisms*, *12*(10), 1978. <https://doi.org/10.3390/microorganisms>

Appendix A: Educational Program



## OBJECTIVES

- Describe the anatomical systems and distinguishing features of upper vs lower urinary tract infections (UTIs)
- Differentiate between complicated vs uncomplicated UTI
- Define UTIs in the geriatric population
- Assess for urinary tract plan of care

## GERIATRICS

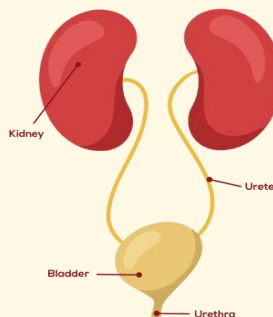
- The geriatric population > 65 years and older <sup>1</sup>
- Geriatric population expansion.
  - 58 million to 82 million by 2050 <sup>1</sup>
  - Independent living
- Call to action on UTIs



## URINARY TRACT INFECTION

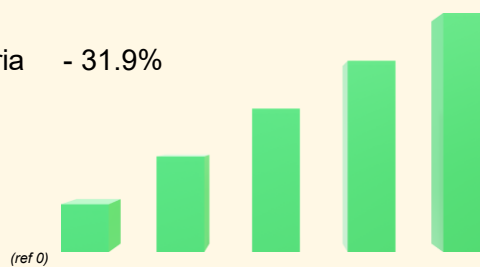
### What is it?

- An infection in any part of the genitourinary system
  - kidneys, ureters, bladder, or urethra
- Lower UTI
  - bladder and urethra
- Upper UTI
  - ureters and kidneys



## UTI percentage in Geriatric Population

- Lower UTI - 37.6%
- Upper UTI - 13.9%
- Asymptomatic bacteriuria - 31.9%
- Urosepsis - 10.2%
- Prostatitis - 6.4%



## URINARY TRACT INFECTION

### Typical symptoms:

- Dysuria
- urinary frequency
- suprapubic pain
- flank pain
- gross hematuria
- malodorous urine
- fever T>101F. 2

### Atypical Symptoms:

- Acute onset urinary incontinence
- functional decline
- fatigue
- falls
- confusion/delirium. 2

### Laboratory evidence:

- positive urine culture with a bacterial count >100,000 CFU/mL ( 5)
- Pyuria (WBC>10) with associated symptoms. 2



## ACUTE CYSTITIS

- Bladder infection (lower UTI)
- Risk factors
  - incomplete bladder emptying
  - catheter use
  - Fragility
  - post -menopausal women
  - diagnosed (dx) with diabetes.
- Escherichia Coli (E. Coli) is most commonly found
- Requires prompt treatment

(ref 4)

## PYELONEPHRITIS

- Kidney Infection (upper UTI)
- Risk factors
  - structural and functional changes
  - co-morbid heal conditions
  - neurological disorders
- Increased risk for morbidity and mortality.
- Men with Pyelonephritis treat as COMPLICATED.

(ref 4)

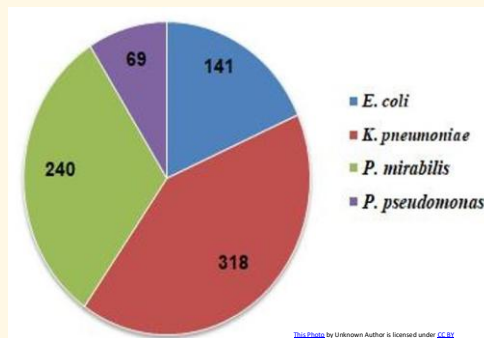
## URINE CULTURE Colonization

### Most common bacteria:

- E. Coli
- Klebsiella
- Enterococcus faecalis

### Most common contaminants:

- Lactobacilli
- Enterococci
- Group B Strep



(ref 7)

## UTI CRITERIA Complicated

### Risk factors:

- Male sex
- Immunocompromised
- dx of diabetes
- history of reoccurring UTIs
- use of catheters or stents
- genitourinary structural abnormalities
- history of Multi Drug Resistant Organism (MDRO)
- impaired renal function (dialysis patients) <sup>(1),7</sup>

### INFECTION CHARACTERISTICS



Chills/Fever



Flank Pain



Nausea/  
Vomiting

## UTI CRITERIA Uncomplicated

### Risk factors:

- Acute dysuria
- new or increased urinary urgency/frequency
- suprapubic discomfort
- No history of serious comorbidities
- No use of urinary tract instruments
- No use of antibiotics in the last 3 months. <sup>(ref 3)</sup>

### Note:

*Age , Urine color, or odor alone is not defining criteria*

# BACTERIURIA

(Bacteria in urine)

## Asymptomatic bacteriuria

- 4-19% in “healthy” elderly individuals <sup>(7)</sup>
- 15-50% in institutionalized elderly individuals <sup>(7)</sup>
- treatment is generally not recommended. <sup>(7)</sup>

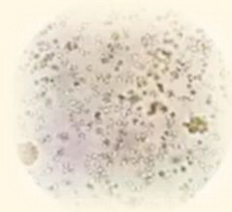
# PYURIA

(Pus or WBC in urine)

- Bacteriuria and Pyuria occur frequently in adults.
- Pyuria plus bacteriuria are key indicators for UTI
- Urine WBC >10 is not always inclusive of a UTI.

### Risk factors:

- comorbid health concerns
- post-menopausal women
- Dehydration
- Prostatitis
- incomplete bladder emptying



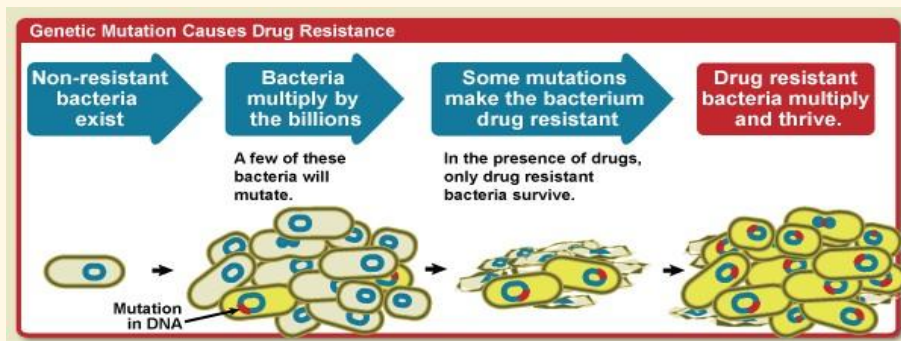
## MULTI-DRUG-RESISTANT ORGANISMS (MDRO)

### Risk factors:

- Inpatient stay in a health facility
- Use of fluoroquinolone, Bactrim, or broad -spectrum beta -lactam abx
- Multi drug resistant gram -negative urinary isolate
- Recent travel to India, South Africa, Mexico or Brazil

Ref(8)

## MULTI-DRUG-RESISTANT ORGANISMS (MDRO) cont'd



## Assessment

### Every Patient Every TIME, ASSESS!!!!

- presenting symptoms
- vital signs
- Critical or Fragile

### Recurrent UTI

- 3 UTIs in 1 year or 2 UTIs in 6 months. 3

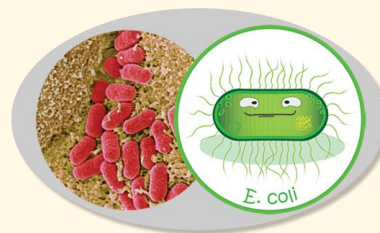
### Create the plan of care:

- Assess, Test, and Treat vs Assess, Treat, Test



## ANTIBIOTIC LENGTH AND TREATMENT


- Uncomplicated UTI abx treatment 3 -5 days. 4
- Complicated UTI abx treatment 7 -14 days. 4
- Abx selection based on culture or assessment of causative agent





## Questions/Observations?

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## Appendix B: Pre- and Post-Test Questions

### Urinary Tract Infections-Geriatrics

Directions: Please select the best answer that describes you. Select one answer per question

#### Demographic Questions

Age: 25-35, 36-46, 47-57, 58-68, > 68

Years of experience in current role: 0-5, 6-10, 11-15, > 15 years

Is your primary language English? Yes/No

ID Number \_\_\_\_\_

Circle One: Pretest Post test

Directions: Read each case carefully then answer the question by selecting a,b,c,d. For each question there is only one answer

#### Questions

1. A 65-year-old female came into your office complaining of dysuria. Upon check of urinalysis: blood, nitrates, and WBC were present. She was treated with Nitrofurantoin 100mg BID x 7 days. The patient is without any further concerns post antibiotic treatment. What should the next plan of action be?

- a. Tell her to call back with any concerns.
- b. Repeat UA
- c. Refer to Urology
- d. Extend antibiotic

2. A 92-year-old female client with Dx of incontinence, recurrent UTI, and has type 2 diabetes. She calls your office to c/o dysuria, frequency, a foul-smelling urinary output, and Tmax 101F. She was assessed and suspected of having a UTI. What other diagnosis is the patient at risk for? Should this patient be treated immediately without prior test confirmation?

- a. Pneumonia, Yes
- b. Bladder Cancer, No
- c. Pyelonephritis, Yes
- d. Chronic cognitive decline, No

3. 55-year-old female with hypertension, osteoarthritis, depression and obesity comes into your office with c/o lower abdominal pain x 5 days and urinary frequency. Tmax 99.8F. No recent sexual contact or travel outside of the US. UA completed and shows Pyuria. Culture resulted in Pseudomonas Aeruginosa. This patient would be treated as having a/an UTI?

- a. Uncomplicated
- b. Recurrent
- c. Complicated
- d. Asymptomatic

4. 99-year-old female client with recent history of hypertension and left femur fracture without surgical intervention complains of urgency, frequency, and “dark urine”. She is positive for a UTI should you consider her UTI complicated or uncomplicated.
- Complicated and treat for 7 days
  - Uncomplicated and treat for 3-5 days
  - Complicated and treat for 10 days
  - Uncomplicated and treat for 5-7 days
5. An 88-year-old male patient arrived to your clinic with PMHx of COPD, HTN, Neurogenic bladder and self-cath 3x/day. He completed yearly labs a urinalysis with culture and sensitivity. Testing positive for E. Coli with a colony count > 100,000 CFU/ml. This patient has a/an \_\_\_\_\_ UTI?
- Asymptomatic
  - Uncomplicated
  - Fungal
  - Complicated
6. You have a new patient 72-year-old female with recent travel to Brazil, in your office complaining of bilateral flank pain. Upon assessment, their temperature is 100.1 F, BP 105/68, R 19, P 99. UA is positive for nitrates, protein, and WBCs. This patient has a/an \_\_\_\_\_ UTI?
- Recurrent
  - Asymptomatic
  - Complicated
  - Uncomplicated
7. You have an 86-year-old female patient with Dx of T2DM, HTN, Incontinence, and UTI x 1 in the past 12 months. She is at risk for \_\_\_\_\_ from cystitis.
- Pyelonephritis
  - Genitourinary blockage
  - Resistant Hypertension
  - Fragility
8. 69-year-old male patient complains of dark and malodorous urine. UA collected and culture results with Enterococci species. What is the plan of care?
- Immediately repeat UA
  - Start oral abx and repeat UA upon completion.
  - Specimen was likely contaminated. Educate on hydration and probiotics. “Call back with increased concerns”
  - Send patient to ER for IV antibiotics
9. You have an 84-year-old female patient with routine labs. UA with C&S ordered and asymptomatic bacteriuria found. Patients without any reported symptoms. Within 5 days patient calls back and complains of dark urine, urinary hesitancy, incomplete bladder emptying and vaginal pain. What is the initial plan of care?

- a. Repeat UA
- b. Get more pertinent history and physical
- c. Refer to Urology
- d. Refer Patient to ER for evaluation

10. There is a 79-year-old male patient with recent 3-day hospitalization dx COPD exacerbation. During hospitalization patients received steroids, duo neb treatments, and Levofloxacin. Once stable patient was transferred to rehab for 14days and now home. He complains of flank pain, cloudy urine, hesitancy, and acute confusion. Upon collecting UA with C&S you would suspect this patient of having.

- a. Asymptomatic Bacteriuria. No treatment need
- b. Uncomplicated UTI treat to 3-5 days
- c. Prostatitis. Treat for 5 days
- d. A urinary culture with an MDRO Isolate. Treat for 7-14 days