

Managing UTIs and “UTIs” in LTC Residents

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Objectives

Define asymptomatic bacteriuria and how to best manage it

Describe use of antibiogram for empiric treatment selection

Identify shortest effective duration of treatment for UTIs

Explain risks and benefits of UTI prophylaxis

Discuss benefits of documenting antibiotic indication on prescription

Patient Scenario 1

- 84 year old female Y.E. with two day history of increasing confusion
- Medical History: hypertension, diabetes
- Medications: ramipril, metformin, linagliptin
- Allergies: penicillin (unknown reaction)
- On examination: her temperature was 36.8°C, her heart rate was 67 beats per minute, and her blood pressure was 135/70 mm Hg.
- Y.E. was unable to provide a clear history, but her daughter mentioned that she was not usually confused.
- She appeared dehydrated and was noted to be incontinent of dark, offensive smelling urine in diaper. Her daughter was worried she might have a urinary tract infection.

Patient Scenario 1

How would you address this case of Ms. Y.E.?

- A. Collect urine for culture, initiate antibiotics
- B. Collect urine for culture, give fluids
- C. Do not collect urine for culture, give fluids
- D. Initiate empiric antibiotics, give fluids

Antibiotic Overuse is a Growing Concern



30 to 50% of antibiotic use is inappropriate or unnecessary¹



45% of antibiotic courses are longer than 7 days²



Antibiotic use is the primary driver of antibiotic resistance³



Older population is at greater risk of infection but also greater risk of antibiotic associated harm⁴

1. Dellit TH et al, *Clinical Infectious Diseases*, 2017; 44: 159–177.
2. Daneman N et al. *JAMA internal medicine*. 2013;173(8):673-82.

3. Holmes AH, et al. *The Lancet*. 2016;387(10014):176-87.
4. Katz MJ, Roghmann MC. *Current opinion in infectious diseases*. 2016;29(4):388.

Antimicrobial Stewardship

- Appropriate use of antibiotics to maximize:
 - current effects and
 - chances of their being available for future generations



4 Moments of Antimicrobial Stewardship



Tamma PD, et al. Rethinking how antibiotics are prescribed: incorporating the 4 moments of antibiotic decision making into clinical practice. JAMA. 2019 Jan 15;321(2):139-40.

Asymptomatic Bacteriuria

Symptom Free Pee... Let it Be!



Definition of Asymptomatic Bacteriuria

- “Asymptomatic bacteriuria (ASB) is the presence of **1 or more species of bacteria** growing in the urine at specified quantitative counts ($\geq 10^5$ colony-forming units [CFU]/mL or $\geq 10^8$ CFU/L), irrespective of the presence of pyuria, **in the absence of signs or symptoms attributable to urinary tract infection (UTI).**”

Nicolle LE, Gupta K, Bradley SF, Colgan R, DeMuri GP, Drekonja D, Eckert LO, Geerlings SE, Köves B, Hooton TM, Juthani-Mehta M. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*. 2019 Mar 21;68(10):e83-110.

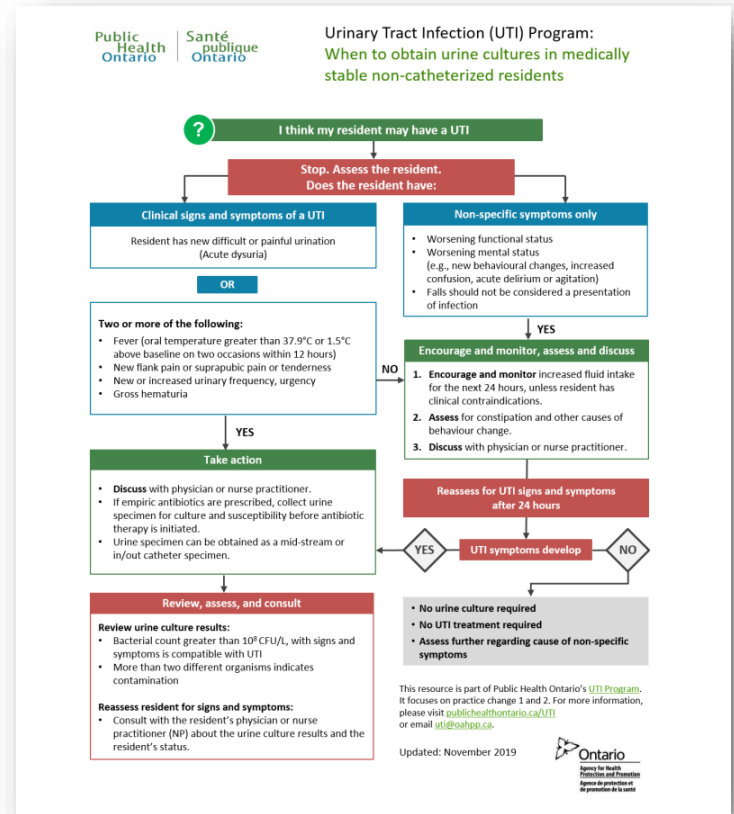
When to Send a Urine Culture

- Dysuria

OR

Two or more of:

- Fever
- New flank pain or suprapubic pain/tenderness
- New or increased frequency
- Gross hematuria



Asymptomatic Bacteriuria is Common in LTC



Up to **40%** of Men



Up to **50%** of Women



Up to **100%** of
catheterized patients

Biggel M, et al. BMC geriatrics. 2019 Dec;19(1):170.

Avoiding Testing and Treatment for Asymptomatic Bacteriuria

Not beneficial

- Catheterized patients
- Diabetes mellitus
- Post menopausal women
- Older institutionalized patients
- Renal transplantation



Beneficial

- Prior to transurethral resection
- Pregnancy



Köves B, et al. European Urology. 2017 Dec 1;72(6):865-8.

Asymptomatic bacteriuria (ASB) in non-pregnant adults:

- Six prospective trials showing no benefit

Study	Population
Nicolle LE et al, NEJM, 1983	Elderly non-catheterized men
Nicolle LE et al, <i>Am J Med</i> , 1987	Women in long-term care facilities
Boscia et al, JAMA, 1987	Elderly ambulatory women
Abrutyn et al, <i>Ann Intern Med</i> , 1994	Elderly ambulatory women
Harding et al, NEJM, 2002	Women with diabetes
Cai et al, <i>Clin Infect Dis</i> , 2012	Young women with recurrent UTI

Slide c/o Dr. Jerome Leis

Asymptomatic bacteriuria (ASB) in non-pregnant adults:

- Clear harms demonstrated

Study	Population
Nicolle LE et al, <i>Am J Med</i> , 1987	Increased antibiotic-related adverse effects Isolation of increasingly resistant organisms
Harding et al, <i>NEJM</i> , 2002	Increased antibiotic-related adverse effects
Rotjanapan P et al, <i>Arch Intern Med</i> 2011	Increased risk of <i>C. difficile</i> infection
Cai et al, <i>Clin Infect Dis</i> , 2012	Increased incidence of symptomatic infection

Slide c/o Dr. Jerome Leis

Loss of the protective role of asymptomatic bacteriuria

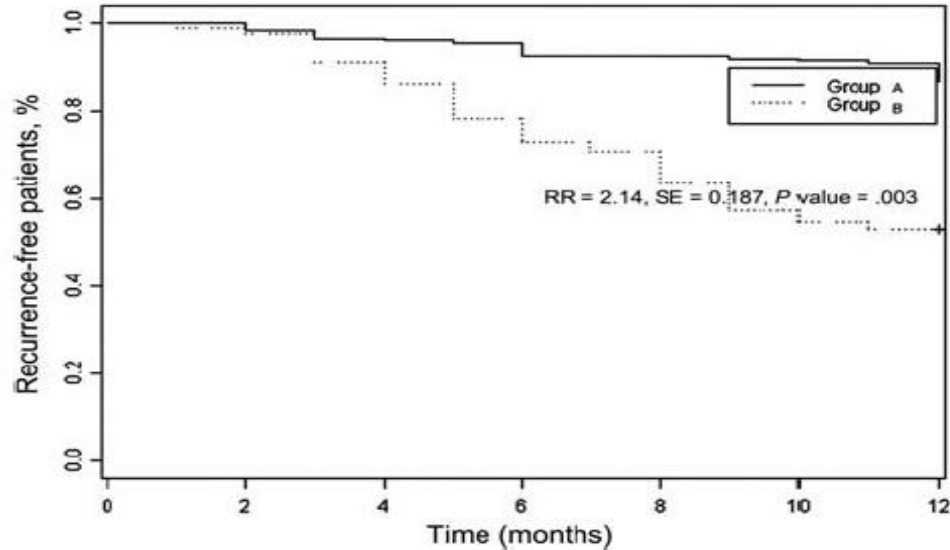


Figure 3. Kaplan-Meier curve analysis performed to calculate the probability of being recurrence-free between the 2 groups. Abbreviations: RR, relative risk; SE, standard error.

**Group A not
treated for ASB**

**Group B treated
for ASB**

Cai T, Mazzoli S, Mondaini N, Meacci F, Nesi G, D'elia C, Malossini G, Boddi V, Bartoletti R. The role of asymptomatic bacteriuria in young women with recurrent urinary tract infections: to treat or not to treat?. *Clinical infectious diseases*. 2012 Jun 7;55(6):771-7.

Cloudy or smelly urine = UTI

True OR False



MYTH

**Cloudy or
smelly urine
= UTI**

TRUTH

Changes in the appearance and/or odour alone should not be used to diagnose a UTI or as an indication for urine culture.

Colour, clarity and smell are often affected by diet, certain medications and hydration status.

Do not send urine for culture unless resident has symptoms of an infection

Fever and bacteriuria always indicates a UTI

True OR False



MYTH

**Fever and
bacteriuria
always
indicates
a UTI**

TRUTH

A fever in a non-catheterized elderly patient, with bacteria in the urine, and with no other signs and symptoms of UTI should be investigated for other sources of infection. The diagnosis of a UTI in this case is a diagnosis of exclusion.

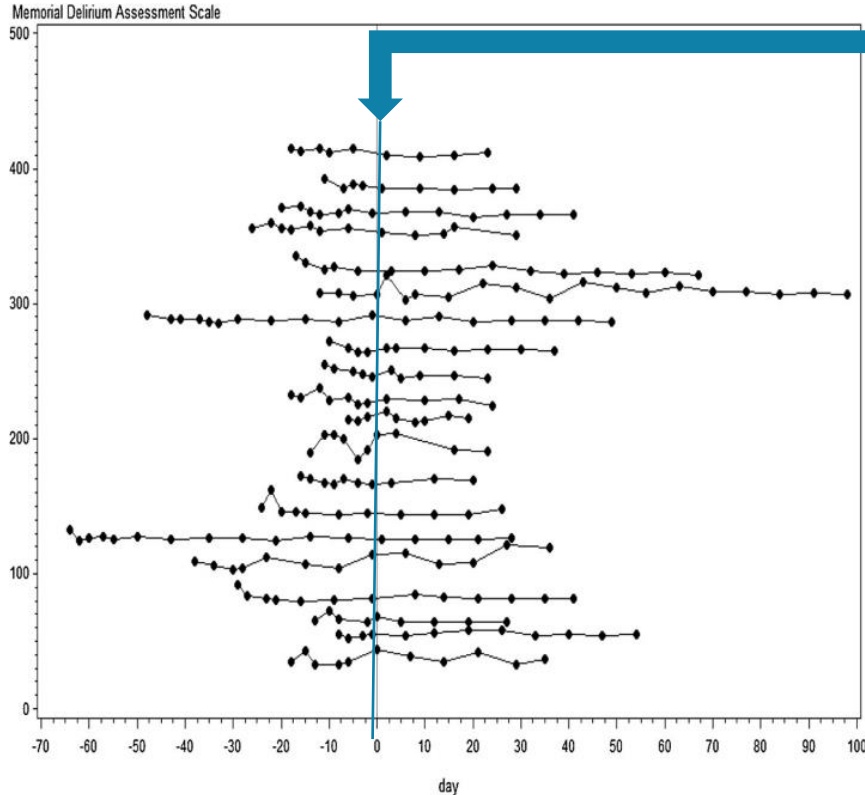
Bacteriuria is common, especially in elderly patients and in residents of long term care facilities.

What About Mental Status Changes?

- In older patients with functional and/or cognitive impairment with **bacteriuria and delirium** (acute mental status change, confusion) and **without local genitourinary symptoms or other systemic signs** of infection (eg, fever or hemodynamic instability), we recommend **assessment for other causes and careful observation rather than antimicrobial treatment** (strong recommendation, low-quality evidence)

Nicolle LE, Gupta K, Bradley SF, Colgan R, DeMuri GP, Drekonja D, Eckert LO, Geerlings SE, Köves B, Hooton TM, Juthani-Mehta M. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*. 2019 Mar 21;68(10):e83-110.

What About Mental Status Changes?



Antibiotic Treatment

Delirium alone is not a sign of UTI.

Antibiotics do not alter delirium scores in patients with bacteriuria.

Dasgupta M, Brymer C, Elsayed S. Treatment of asymptomatic UTI in older delirious medical in-patients: a prospective cohort study. *Archives of Gerontology and Geriatrics*. 2017 Sep 1;72:127-34.

How to Manage Asymptomatic Bacteriuria

- Identify Other Causes
- “**PINCH ME**” Mnemonic

Pain,
Infection,
Constipation,
de**H**ydration,
Medication,
Environment

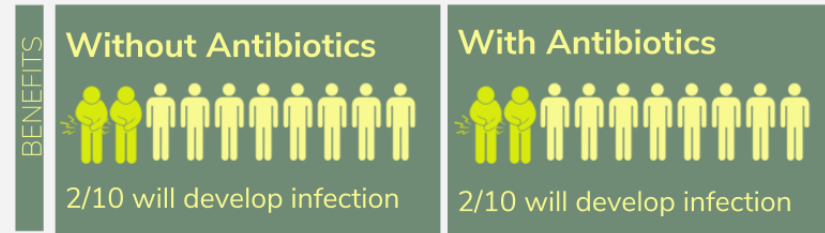
- Document reason for no culture or antibiotics
- Give fluids when necessary
- Monitor for 24-48 hours
- Educate Staff, Patients and Family

Addressing Patient and Family Concerns

- Explain benefits and risks of antibiotic therapy
- Emphasize that antibiotics are not benign
- Reassure that plan is in place, including alternative therapy, monitoring and follow-up

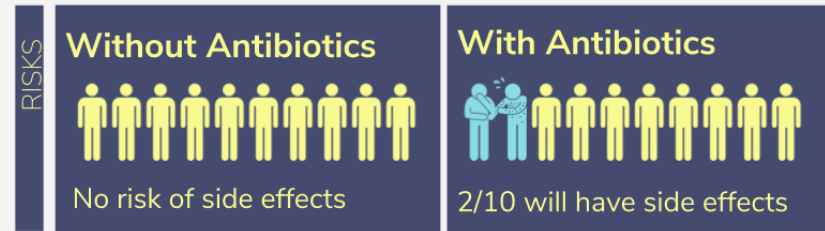
Antibiotics do not help in those without symptoms.

In older people, bacteria in the urine without symptoms is common (symptoms include painful urination, stomach or back pain, and fever). Foul smelling urine, cloudy urine, or confusion alone are not symptoms of infection. Giving these patients antibiotics does not help them improve any faster or prevent infection.



Antibiotics can cause side effects.

Antibiotics come with known risks. Two out of ten patients who receive an antibiotic will have side effects including upset stomach, diarrhea, and rash.



Virtual learning collaboratives reduce urine culturing and antibiotic prescribing in long-term care



Target

Unnecessary antibiotic use in long-term care. A focus on best practices to assess and manage urinary tract infections (UTIs). Targeting unnecessary urine culturing that can drive antibiotic overprescribing.



Intervention

Virtual learning collaborative sessions with 45 long-term care homes to support implementation of [Public Health Ontario's UTI Program](#).



Impact

Compared to 127 matched controls



Rates of **urine cultures** performed
19% lower



Rates of **antibiotic prescriptions**
13% lower



No signs of under treatment of UTIs
(mortality, acute care admissions)

Resources for ASB and UTI

Public Health Ontario UTI Program

- www.publichealthontario.ca/UTI

Association of Medical Microbiology and Infectious Diseases Canada – Symptom Free Pee, Let It Be!

- <https://www.ammi.ca/?ID=127>

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Reflection Question

- What opportunities are there to reduce unnecessary testing and treatment of asymptomatic bacteriuria in your practice setting?
- What strategies could you incorporate into your team's workflow to ensure there is sustainable improvement in this practice?

Using Antibiograms

Tools to select empiric antibiotic treatment



Patient Scenario 2

76 Female with Parkinson's disease reports new pain on urination and frequency x 1 day. No flank pain or fever. Mid stream urine specimen is sent for culture and pending. No recent antibiotics. Last UTI was 2-3 years ago.

What is the most appropriate empiric antibiotic treatment if any?

- A. Cephalexin
- B. Trimethoprim-sulfethoxazole
- C. Nitrofurantoin
- D. Ciprofloxacin

What is an antibiogram?

- Collection of antibiotic susceptibility data for common organisms
- Can be stratified by healthcare setting, specimen type, etc.
- There are standardized recommendations for their development

	isolate #	Antibiotic A	Antibiotic B	Antibiotic C
Organism A	100	0%	60%	80%
Organism B	50	80%		25%
Organism C	30	10%	30%	90%

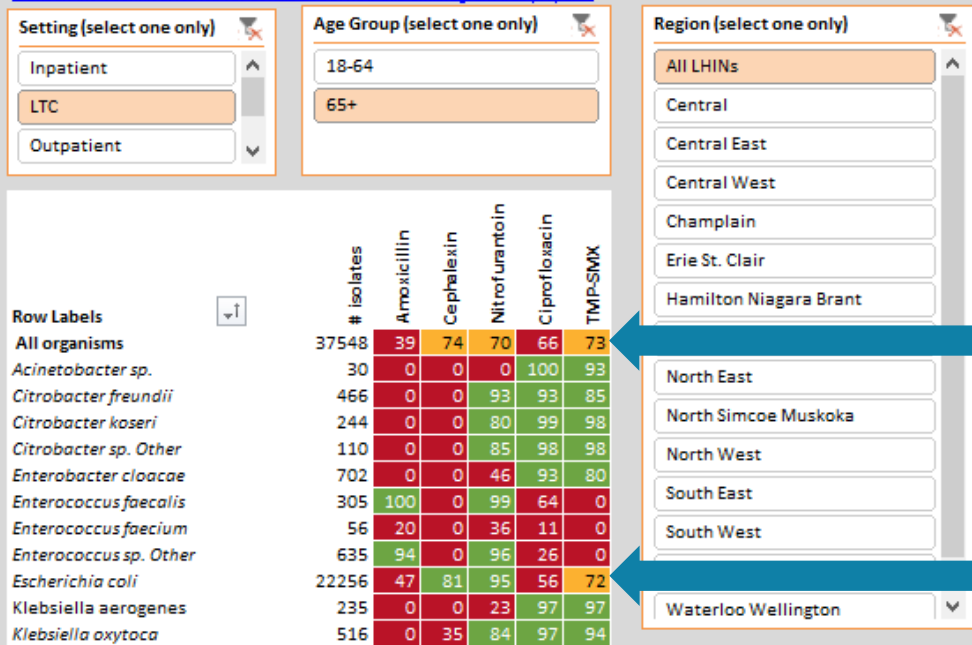
Truong WR, Hidayat L, Bolaris MA, Nguyen L, Yamaki J. The antibiogram: key considerations for its development and utilization. JAC-antimicrobial resistance. 2021 Jun;3(2):dlab060.

Ontario Urinary Antibiogram

Ontario Urinary Antibiogram

% Susceptible, 2016-2017 Data

[Consult the Technical Notes for details about how this antibiogram was prepared](#)



cephalexin, trimethoprim-sulfamethoxazole, nitrofurantoin have greatest activity against all urinary organisms

nitrofurantoin has greatest activity against *E. coli*

Ontario Agency for Health Protection and Promotion. Ontario antibiogram. Toronto, ON: Queen's Printer for Ontario; 2022.

Antibiogram Information in Ontario

- Public Health Ontario
 - <https://www.publichealthontario.ca/en/Health-Topics/Antimicrobial-Stewardship/ASP-Comparison-Tool?tab=antibiograms>
- LifeLabs
 - <https://www.lifelabs.com/healthcare-providers/reports/antibiograms/>
- Check with your laboratory for facility-level data

Duration of Treatment

Use the shortest, most effective duration – shorter is smarter!



Differentiating Types of UTI

Cystitis	Complicated Cystitis	Pyelonephritis
Bladder Infection	Bladder Infection with complicating factors (male, immunocompromised, urinary catheter, structural abnormality, stones)	Kidney infection (if urological abnormality related to kidney, or immunocompromised, can be considered complicated)
<ul style="list-style-type: none"> •Dysuria •Frequency •Urgency •Oliguria •Suprapubic Pain •Gross hematuria 	<ul style="list-style-type: none"> •Dysuria •Frequency •Urgency •Oliguria •Suprapubic Pain* •Gross hematuria* 	<ul style="list-style-type: none"> •Cystitis symptoms may or may not be present •Fever •Flank Pain

*catheterized patients may only exhibit these symptoms

UTI Duration of Therapy Quick Reference

Infection	Duration	Comments	Reference
Urinary Tract Infection			
Uncomplicated Cystitis (female, no urological abnormalities or catheter)	3-5 days	Nitrofurantoin and beta-lactams 5 d Fluoroquinolones and TMP-SMX 3d	Lutters M, Vogt-Ferrier NB. Cochrane Database of Systematic Reviews. 2008(3).
Complicated Cystitis (male, catheter, urological abnormalities)	7 days	Applies to all drugs	Drekonja DM, Rector TS, Cutting A, Johnson JR. <i>JAMA Intern Med</i> 2013; 173:62-8 Hooton TM, Bradley SF, Cardenas DD, et al. <i>Clin Infect Dis</i> 2010, vol. 50 (pg. 625-663)
Pyelonephritis	7-10 days	Does not include patients with stones or other urological abnormalities	Kyriakidou KG, Rafailidis P, Matthaïou DK, Athanasiou S, Falagas ME. <i>Clinical therapeutics</i> . 2008 Oct 1;30(10):1859-68.

Antibiotic Duration Myth

- No evidence that stopping antibiotics early leads to resistance
- In fact, longer courses are associated with higher rates of resistance (and side effects)

www.publichealthontario.ca/ASP

SHORTER IS SMARTER Public Health Ontario | Santé publique Ontario

Prescribers/Clinicians:
Reducing duration of antibiotic therapy in long-term care

Antibiotic use drives selective pressure

Selective pressure kills susceptible bacteria and allows resistant organisms to thrive and multiply.

Shorter courses are as effective as longer courses

Uncomplicated cystitis		Pneumonia	
Short 3-6 days	Long 7-14 days	Short 5 days	Long 7-10 days

Cellulitis	
Short 5 days	Long 10 days

Based on studies in hospitalized and ambulatory patients for common infections seen in long-term care.


Shorter courses have a lower risk of harm


For more information, see [Reducing Duration of Antibiotic Treatment for Common Infections in Long-Term Care](#) or visit publichealthontario.ca/ASPInLTC.


Ontario
Santé publique Ontario

Estimating Daily Antibiotic Harms

Umbrella Review and Meta-Analysis

 **35** Systematic Reviews

 **71** Short vs. Long Antibiotic Duration Trials

 **92%** studies evaluated respiratory tract and urinary tract infections

 **23,174** patients evaluated



Adverse Events

N=20,345

4%↑

odds ratio/day



Antibiotic Resistance

N=2,330

3%↑*

odds ratio/day



Super-infections

N=5,776

2%↓*

odds ratio/day

Each Additional Day Can Cause Harm

5 vs 3

Days



9%↑ odds ratio

Of adverse events

7 vs 3

Days



19%↑ odds ratio

Of adverse events

* Non-statistically significant difference

Patient Scenario 3

65 year old male with Alzheimer's disease and new suprapubic pain and pain on urination. He has no fever, no flank pain, and is hemodynamically stable. Urine culture is positive for ESBL-producing *E. coli* susceptible to Septra (TMP-SMX) and ertapenem.

What is the most appropriate duration?

- A. 3 days
- B. 7 days
- C. 10 days
- D. 14 days

UTI Prophylaxis

Consider both benefits and risks of long term antibiotic therapy



Patient Scenario 3

66 year old female early onset dementia and recurrent UTI (3 times in previous year).

Symptoms are typically increased urgency +/- dysuria.

What are the potential risks of initiating long-term antibiotic prophylaxis?

- A. Antibiotic Resistance
- B. Side effects
- C. Increased risk of hospitalization for UTI
- D. A and B
- E. All of the above

Risks may outweigh benefits for urinary tract infection (UTI) prophylaxis in older adults



Antibiotic prophylaxis

was defined as at least 30 days of antibiotics after a positive urine culture for presumed prevention of UTI in adults over 66 years

1.7%

of patients received antibiotic prophylaxis

Antibiotic prophylaxis recipients experienced more harm

compared to patients without antibiotic prophylaxis



1.3x risk of hospital visit



1.6x risk of *C. difficile* diarrhea



1.3x risk of antibiotic resistance



1.6x risk of side effects

Langford BJ, Brown KA, Diong C, Marchand-Austin A, Adomako K, Saedi A, Schwartz KL, Johnstone J, MacFadden DR, Matukas LM, Patel SN, Garber G, Daneman N. The Benefits and Harms of Antibiotic Prophylaxis for Urinary Tract Infection in Older Adults. *Clinical Infectious Diseases*. 2021



Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

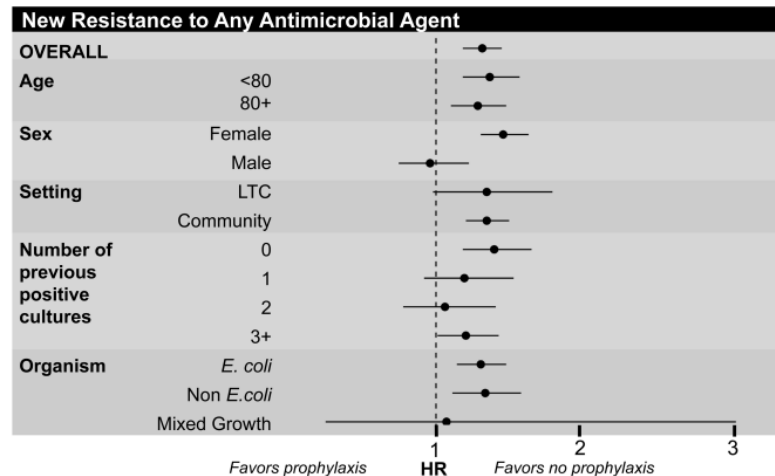
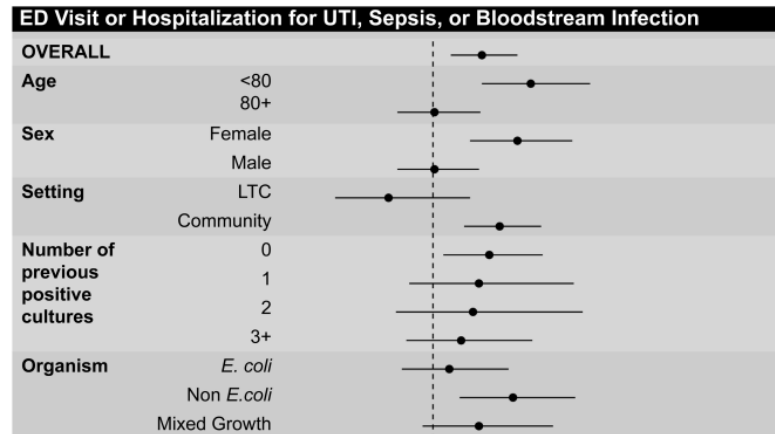
Public Health Ontario

Santé publique Ontario

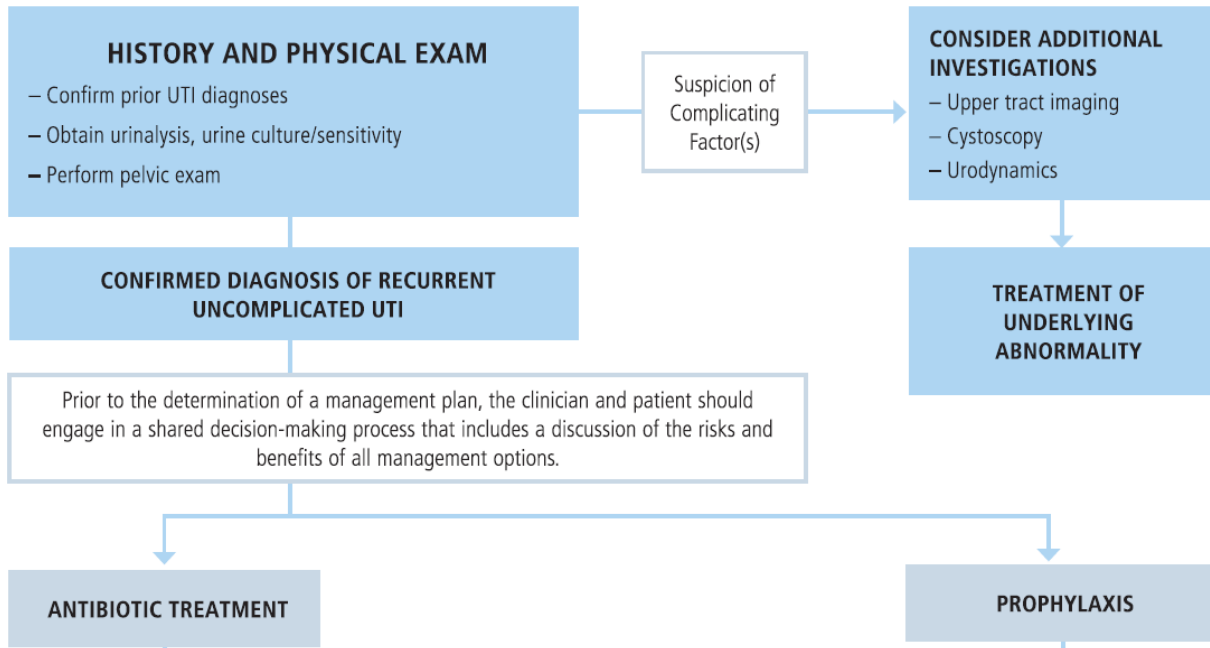


Long-term antibiotic prophylaxis is associated with lower efficacy and safety overall, but particularly notable in female, patients <80, living in the community

Langford BJ, Brown KA, Diong C, Marchand-Austin A, Adomako K, Saedi A, Schwartz KL, Johnstone J, MacFadden DR, Matukas LM, Patel SN. The benefits and harms of antibiotic prophylaxis for urinary tract infection in older adults. *Clinical Infectious Diseases*. 2021 Aug 1;73(3):e782-91.



Guidelines on Recurrent UTI in Females

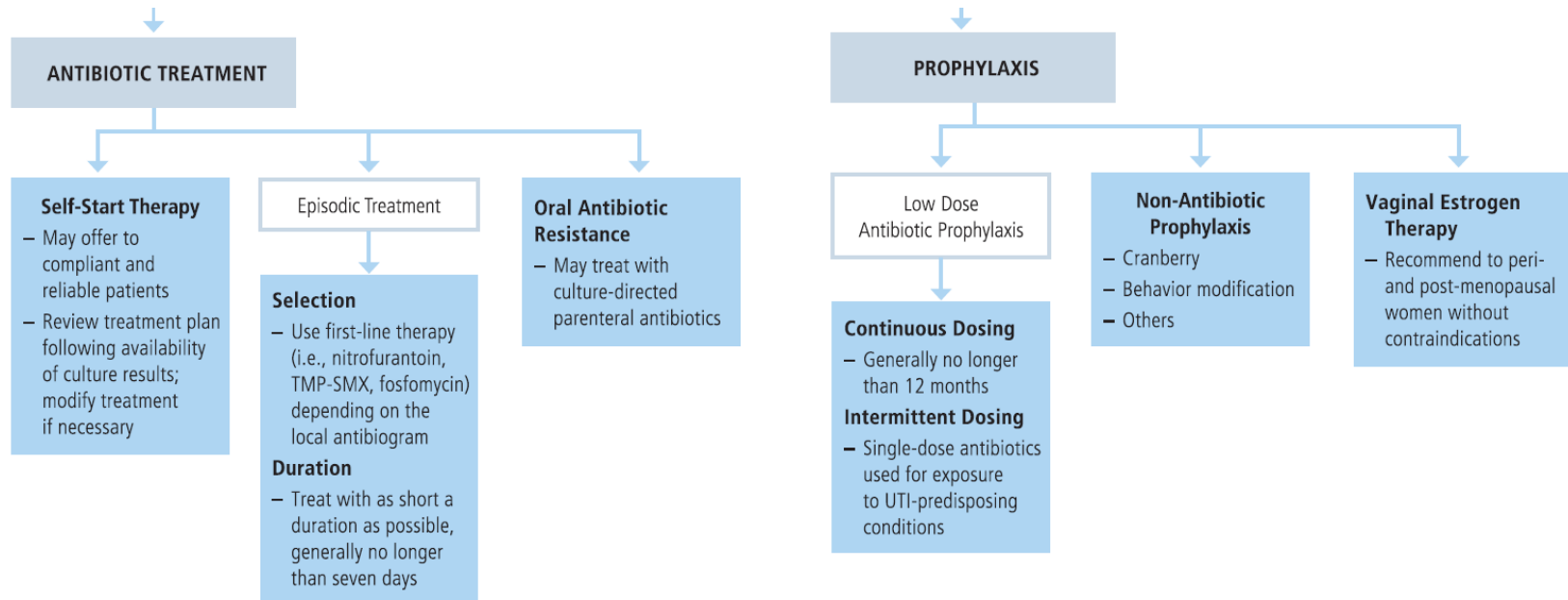


The Index Patient is an otherwise healthy adult female with a recurrent uncomplicated UTI. Patients with complicating factors such as the following are outside the scope of this document:

- Anatomic or functional abnormality of the urinary tract
- Immunocompromised host
- Multi-drug resistant bacteria

Anger J, Lee U, Ackerman AL, Chou R, Chughtai B, Clemens JQ, Hickling D, Kapoor A, Kenton KS, Kaufman MR, Rondanina MA. Recurrent uncomplicated urinary tract infections in women: AUA/CUA/SUFU guideline. The Journal of urology. 2019 Aug;202(2):282-9.

Guidelines on Recurrent UTI in Females



Anger J, Lee U, Ackerman AL, Chou R, Chughtai B, Clemens JQ, Hickling D, Kapoor A, Kenton KS, Kaufman MR, Rondanina MA. Recurrent uncomplicated urinary tract infections in women: AUA/CUA/SUFU guideline. The Journal of urology. 2019 Aug;202(2):282-9.

Patient Scenario 4

65 year old male with Alzheimer's disease and complicated cystitis caused by ESBL E. coli. His MRP prescribes TMP-SMX 1 DS tablet PO BID x 7 days. **Besides the patient name, prescriber information, and regimen above, what else should be included on the prescription?**

- A. Patient Age
- B. Diagnosis
- C. Urine culture results
- D. Brand name of drug

Antibiotic Indication

All antibiotic prescriptions should include a specific reason for use



Why should all antibiotic prescriptions have a reason for use?

1

Meets Standards

Documenting indication is a recommended best practice according to CDC, ISMP, and Health Standards Organization.

2

Improves Communication

Relays information between HCPs and to patients and families so everyone knows why patient is receiving the antibiotic.

3

Reduces Risk of Errors

Decreases risk of misinterpreting or misreading a prescription, especially when handwritten.

4

Prompts Re-Assessment

Ensures clinicians re-assess appropriateness of medication especially at transitions of care or changes in service.

5

Improves Quality

Facilitates audits and point prevalence evaluation to assess impact of stewardship initiatives and provide prescriber feedback.



- Patient
- Drug
- Dose
- Route
- Duration
- Indication

A stylized, handwritten signature in black ink.

1. Recommendations to enhance accuracy of prescription/medication order writing, National Coordinating Council for Medication Error Reporting and Prevention, NCCMERP 2014.

2. Is an Indication-Based Prescribing System in Our Future? 2016. Institute for Safe Medication Practices.

3. Pollack LA, Srinivasan A. Core elements of hospital antibiotic stewardship programs from the Centers for Disease Control and Prevention. Clinical Infectious Diseases. 2014 Oct 15;59(suppl_3):597-100.

Scoping Review on Documenting Antibiotic Indication



Documentation is highly variable

- 4 to 100% of antibiotic orders have indication documented



Indication documentation can be improved

- Use of EMR, feedback, education



Indication documentation improves quality

- Associated with more appropriate antibiotic prescribing

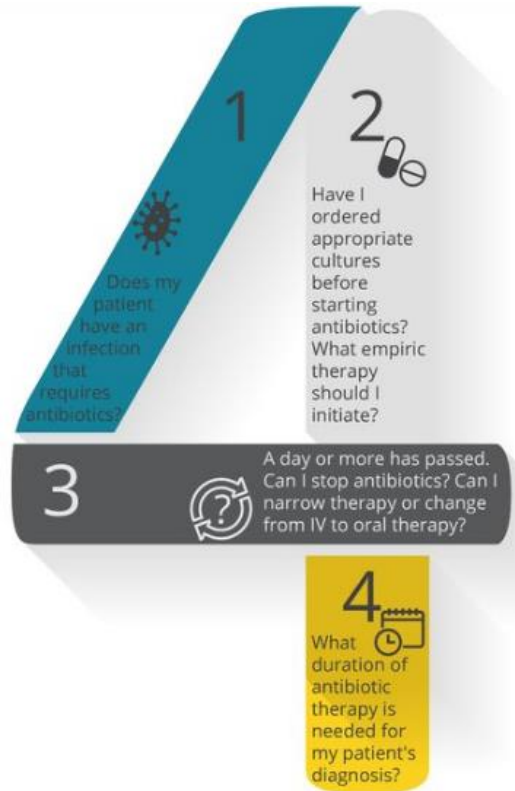
Saini S, et al. Documenting the indication for antimicrobial prescribing: a scoping review. *BMJ Quality & Safety*. 2022.

Summary

Don't test for ASB or treat ASB

Avoid testing and treatment based on non-specific symptoms

Re-assess based on urine culture results



Always include a specific reason for antibiotic use

Antibiogram can help select empiric therapy for symptomatic infection

Duration

Uncomplicated cystitis

minimum 3 d

Complicated Cystitis

minimum 7 d

Pyelonephritis

Minimum 7 d

Reflection Question

- How can you and your team embed the 4 moments of antimicrobial stewardship into your home's practice?

For More Information About This Presentation, Contact:

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Kevin.Schwartz@oahpp.ca

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Additional Slides

Asymptomatic Bacteriuria for Nurses

How nurses can help prevent overtreatment of asymptomatic bacteriuria

What is Asymptomatic Bacteriuria (ASB)?

ASB refers to the presence of bacteria in the urine without specific urinary tract symptoms. It is often mistaken for UTI and should not be treated with antibiotics.

How common is ASB?

Many older patients have bacteria in urine without symptoms. It is much more common than UTI.

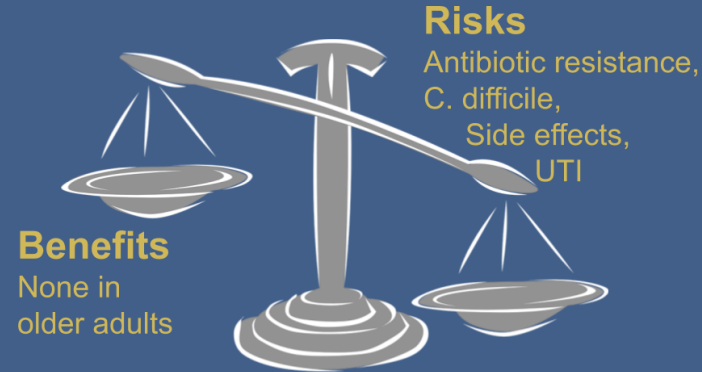
 Up to **40%** of Men

 Up to **50%** of Women

 Up to **100%** of catheterized patients

Since ASB is so common, any non-specific symptoms thought to be associated with the urine are likely a coincidence.

Risks of Treatment Outweigh Benefits



Symptoms of True UTI

- Acute dysuria and/or
- *Two or more of:*
 - Fever
 - suprapubic/flank pain
 - New urgency
 - new urinary incontinence
 - New frequency
 - gross hematuria

Send Urine culture



Symptoms Alone NOT Suggestive of True UTI

- Change in urine colour
- Change in urine odour
- Dizziness
- Falls
- Altered behaviour or delirium

consider other causes:

PINCH ME (Pain, INfection, Constipation, deHydration, Medication, Environment)

Avoid sending culture



How You Can Help

1. Remember it is hard to ignore a positive culture - send wisely!
2. Consider other causes for delirium
3. Send urine culture only if symptoms of true UTI

Bactériurie asymptomatique pour tous

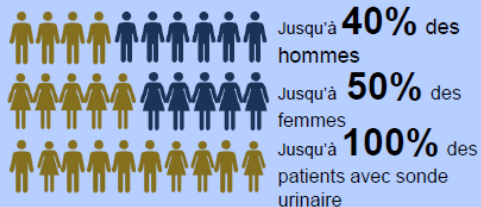
Comment vous pouvez aider à prévenir les traitements inutiles lors de bactériurie asymptomatique chez la personne âgée

Qu'est-ce que la bactériurie asymptomatique?

Présence de bactéries dans l'urine sans symptôme spécifique d'infection. Elle est souvent confondue avec une infection urinaire et ne devrait pas être traitée avec des antibiotiques.

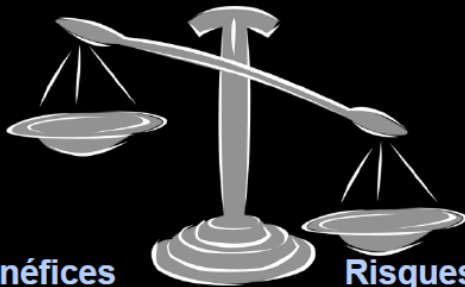
Quelle est sa prévalence?

Plusieurs patients âgés présentent des bactéries dans l'urine sans avoir de symptôme. Cela survient beaucoup plus fréquemment que les réelles infections urinaires.



Comme la bactériurie asymptomatique est très fréquente, tout symptôme urinaire non spécifique n'est probablement que le fruit du hasard.

Les risques de traiter dépassent les bénéfices



Bénéfices
Aucun chez les patients âgés

Risques
Résistance aux antibiotiques, *C. diff.*, effets secondaires, infections urinaires

Symptômes d'infection urinaire réelle

- Dysurie aigue et/ou
- *Au moins deux des signes suivants:*
 - Fièvre
 - Douleur suppubienne/douleur au flanc
 - Urgence mictionnelle nouvelle
 - Incontinence urinaire nouvelle
 - Pollakiurie nouvelle
 - Hématurie macroscopique



Culture d'urine OK

Symptômes isolés NON suggestifs d'une réelle infection urinaire

- Changement de couleur de l'urine
- Changement d'odeur de l'urine
- Étourdissements
- Chutes
- Comportement modifié/délirium

Considérer une autre cause: (MICDED) Médication, Infection, Constipation, Déshydratation, Environnement, Douleur.

Éviter d'envoyer une culture



Comment vous pouvez aider

- C'est difficile d'ignorer une culture positive – prélevez seulement si nécessaire!
- Considérez les autres causes possibles du délirium
- Envoyez une culture d'urine seulement lorsqu'il y a des symptômes de réelle infection urinaire

Urinalysis

Pyuria: WBC>10 or positive leukocyte esterase test

- Does NOT rule IN a urinary tract infection, false positive >40%
- False positives in asymptomatic bacteriuria, catheter use, inflammatory conditions (e.g., interstitial nephritis)
- Does help to rule OUT a urinary tract infection. Sensitivity > 95%.

Nitrites

- Suggest the presence of certain Gram-negative bacteria (e.g., E. coli, but not Pseudomonas) in urine
- Does NOT distinguish urinary tract infection from asymptomatic bacteriuria

Overall - a positive urinalysis **does NOT help diagnose a UTI**, but a negative urinalysis can be **helpful to rule OUT UTI**

Shimoni Z, Glick J, Hermush V, From P. Sensitivity of the dipstick in detecting bacteremic urinary tract infections in elderly hospitalized patients. PloS one. 2017 Oct 31;12(10):e0187381.

Empiric Treatment for UTIs

Cystitis / Uncomplicated UTI

Oral Treatment ⁵	
1 st line	nitrofurantoin ² macrocrystals 100 mg bid x 5 days
	<small>OK for CrCl > 30 mL/min</small>
2 nd line	cephalexin ⁹ 500 mg qid x 5-7 days ⁶
3 rd line	amoxicillin-clavulanate 875/125 mg bid x 5-7 days ⁶
4 th line	trimethoprim-sulfamethoxazole (TMP-SMX) 1 DS bid x 3 days
5 th line	ciprofloxacin 500 mg bid x 3 days

Pyelonephritis / Complicated UTI

Oral Treatment	
1 st line	amoxicillin-clavulanate 875/125 mg bid x 7*-10 days ⁶
2 nd line	ciprofloxacin 500 mg bid x 7 days*
Initial IV Treatment (reassess within 24h) ³	
1 st line	gentamicin or tobramycin 5 mg/kg x 1 dose ⁴ +/- ampicillin [†] 2 g q6h
2 nd line	ceftriaxone 1 g q24h +/- ampicillin [†] 2 g q6h
3 rd line	ciprofloxacin 400mg q12h or levofloxacin 750 mg q24h +/- ampicillin [†] 2g q6h

*7 days of beta-lactam is appropriate for complicated cystitis

Use narrowest spectrum when culture results available. Count empiric therapy in total duration

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Selecting the Right Antibiotic

Guide to Selecting Antimicrobials Used to Treat Urinary Tract Infections

Antimicrobial	Pro	Con
nitrofurantoin	<ul style="list-style-type: none"> • Lower rates of resistance • Generally well tolerated • Limited effects on resistance to other antimicrobials 	<ul style="list-style-type: none"> • Cannot use in pyelonephritis • Unsafe with impaired creatinine clearance < 30 mL/min • More expensive than alternatives
TMP-SMX	<ul style="list-style-type: none"> • Lower rates of <i>C. difficile</i> than fluoroquinolones or amoxicillin-clavulanate • Inexpensive 	<ul style="list-style-type: none"> • Increasing resistance rates with <i>E. coli</i> • Many potential adverse effects • Potential for drug-drug interactions • Not recommended in pregnancy
amoxicillin-clavulanate	<ul style="list-style-type: none"> • Lower rates of resistance 	<ul style="list-style-type: none"> • Longer courses needed • Relatively broad-spectrum activity • Diarrhea and other GI upset common
cephalexin	<ul style="list-style-type: none"> • Generally well tolerated 	<ul style="list-style-type: none"> • QID dosing
ciprofloxacin	<ul style="list-style-type: none"> • Reasonable resistance rate with <i>E. coli</i> • Highly efficacious • Generally well-tolerated • Allows for shorter course of therapy (especially pyelonephritis) 	<ul style="list-style-type: none"> • Induces resistance to fluoroquinolones and other antimicrobials • Increased risk of <i>C. difficile</i> • Potential for drug-drug interactions • Risk of QT-prolongation • Multiple black box warnings

No difference in cure rates or adverse events using cutoff of 50 mL/min (modified Cockcroft-Gault)

Bains A et al. Can Pharm J 2009;142:248-52

Review found lack of evidence to support higher cutoffs, reasonable to use 40 mL/min

Oplinger M and Andrews CO. Ann Pharmacother 2013;47:106-111

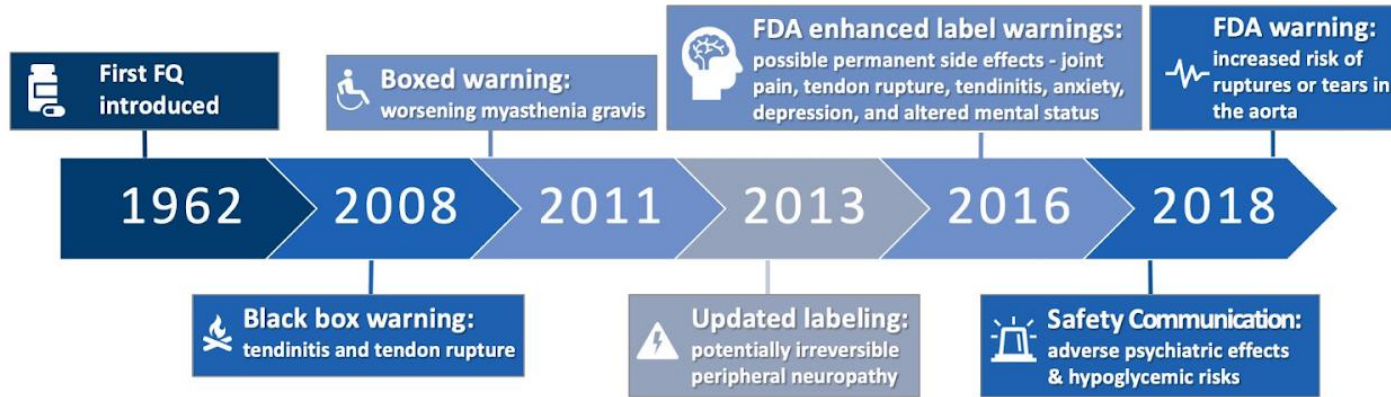
Low (median 38 mL/min) vs. higher (median 69 mL/min) no difference in treatment failure

Singh N et al. Can Med Assoc J 2015;187:648-56

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Fluoroquinolones have Fallen out of Favour

The HISTORY of Fluoroquinolones



<https://www.fda.gov/downloads/Drugs/DrugSafety/UCM513019.pdf>. Accessed August 2, 2018.

<https://www.fda.gov/downloads/Drugs/DrugSafety/UCM612834.pdf>. Accessed August 2, 2018.

Patient Scenario 2

- 66 year old female (initials: AG) new lower abdominal pain
- **Medical History:** MS w/ neurogenic bladder, foley catheter in situ (last insertion 3 w ago), CHF
- **Medications:** ramipril, spironolactone, tolterodine
- **Allergies:** seasonal
- **On examination:** her temperature was 37.6°C, her heart rate was 76 beats per minute, and her blood pressure was 125/73 mm Hg. She is experiencing **suprapubic pain and tenderness** on palpation.
- She has received antibiotics 2 years ago for a similar problem, and tells you that it ended in “-oxacin” and worked really well

Patient Scenario 2

- 66 year old female (initials: AG) new lower abdominal pain
- Urine culture from catheter port was collected. Result as follows:
 - E. coli $>10^8/L$
 - Ampicillin R
 - Amoxicillin-Clavulanate S
 - Cephalexin S
 - Ciprofloxacin S
 - Nitrofurantoin S
 - Trimethoprim-Sulfa S

Patient Scenario

What would be your pharmacotherapeutic recommendation for Ms. A.G.?

- A. TMP-SMX for 3 days
- B. Amoxicillin-Clavulanate for 7 days
- C. Ciprofloxacin for 7 days
- D. Nitrofurantoin for 5 days
- E. No antibiotics at this time