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STANDARD GUIDELINE SUBJECT:

Diagnosis and Management of Urinary Tract Infections in Long Term Care

Diagnosis of urinary tract infections (UTIs) in older adults relies on clinical judgement. Non-specific and non-localizing signs and symptoms are seldom due to a UTI in the non-catheterized resident. Asymptomatic bacteriuria does not require treatment and routine screening for UTIs is not necessary.

PURPOSE:

Long-term care residents diagnosed with symptomatic UTI will receive consistent care to improve client outcomes. Evidence-based guidelines will be followed:

- To increase the accuracy of clinical diagnosis of UTIs for residents in LTC.
- To improve resident outcomes through decreased morbidity and mortality.
- To optimize the use of testing and laboratory services.
- To reduce inappropriate prescribing of antibiotics for residents with asymptomatic bacteriuria.
- To optimize antibiotic therapy for residents with UTIs.

DEFINITIONS:

Asymptomatic Bacteriuria

- The presence of bacteria in the urine of residents who do not have dysuria, increased urinary frequency or urgency, fever, flank pain, or other symptoms related to irritation of the urethra, bladder or kidney.
- Identified by urine cultures on two (2) clean catch specimens that are positive in a resident who has no urinary tract infection symptoms.

Complicated UTIs

- UTIs in elderly men are always considered complicated.
- UTIs in women are considered complicated if associated with:
  - Structural abnormalities
  - Urinary catheters
  - Kidney Stones
  - Diabetes
  - Urinary retention
  - Renal and perinephric abscess formation

Long Term Care

Any congregate residential setting for older or disabled adults that have high personal and professional care needs.

Pyuria

Presence of leukocytes in the urine.

Recurrent UTIs

- More than 3 culture confirmed UTIs in 1 year with the same or different organisms, **or**
- More than 2 culture confirmed UTIs in six (6) months with the same or different organisms.

Relapse

Repeat infection with the same infecting organism, usually occurring within four (4) weeks of previous UTI.

Urinary Tract Infection

Significant bacterial count (10^8 cfu/L) present in a clean-catch or midstream urine specimen accompanied by symptoms of UTI (Table 1) and confirmed by urine culture and sensitivity (C&S).

PROCEDURE:

1. Confirm resident has either:
   1.1. Typical symptoms of UTI without indwelling catheter indicated by:
      1.1.1. Acute dysuria

   OR

      1.1.2. Fever (greater than or equal to 38^0C), or an increase of 1.1^0C above baseline on two (2) consecutive occasions, or chills

      PLUS any of the following:

      1.1.1.1 New or increased urinary frequency, urinary urgency, incontinence

      1.1.1.2 New flank / costo-vertebral angle (CVA) or suprapubic pain or tenderness

      1.1.1.3 Hematuria

   OR

   1.2 Typical symptoms of UTI with indwelling catheter indicated by one (1) of the following criteria:

1.2.1 Fever (greater than or equal to 38^0C), or an increase of 1.1^0C above baseline on two (2) consecutive occasions.
1.2.2 New flank / costo-vertebral angle (CVA) or suprapubic pain or tenderness
1.2.3 Rigors
1.2.4 New onset delirium

2. Initiate Clinical Care Map CLI.8011.SG.001.SD.01:
   2.1. Stamp top left corner with resident addressograph
   2.2. Place a checkmark (√) next to all symptoms that apply and steps as they are completed
   2.3. Date, time and initial entries chronologically as Care Map is followed and steps are completed

3. Follow Clinical Care Map including:
   3.1. Push fluids unless on fluid restriction;
   3.2. Discuss typical symptoms (see Table 1 Typical Signs & Symptoms of UTI, and Table 2 Signs & Symptoms NOT Specific for UTI) with physician or nurse practitioner or physician assistant (as applicable).
      3.2.1. Alternate diagnosis may be considered in which case continue to monitor resident status.
   3.3. Obtain order for urine culture and sensitivity (C&S). If empiric antibiotic therapy is indicated, collect the specimen before any antibiotics are given.
      3.3.1. Antibiotic therapy may or may not be ordered at this time depending on the medical status and/or extended anticipated time to receive urine C&S results.
      3.3.2. A recent calculated creatinine clearance (CrCl) is needed for the appropriate dosing of antibiotics, as decreased renal function is common in the elderly.
   3.4. Review urine C&S results received (see Table 4: Common Pathogens in LTC)
      3.4.1. STOP or do not initiate antibiotics if C&S results are not significant
      3.4.2. If results are significant and antibiotic initiated prior to receiving C&S results, confirm organism is susceptible to the prescribed antibiotic
   3.5. Discuss findings with physician or physician assistant or nurse practitioner
   3.6. Confirm antibiotic order is consistent with Table 5: Recommended Treatment Regimens
      3.6.1. Consult Pharmacist if required

IMPORTANT POINTS TO CONSIDER:

1. The following are NOT considered signs and symptoms specific for a UTI
   1.1. Any of the following indicate a change in medical status. They do not indicate a UTI unless typical symptoms develop:
      - Worsening of functional status
      - Worsening of mental status, increased confusion, delirium or agitation
      - Increased falls
   1.2. Unless there is a rapid decline in medical status, push fluids for 24 hours for residents with non-specific signs and symptoms and reassess. If typical symptoms develop, treat as for UTI. If non-specific symptoms continue without evidence of a UTI, consider other diagnoses. If symptoms resolve, no further intervention is required.

PRACTICE POINT

For medically stable residents with non-specific signs and symptoms, there is no evidence of increased morbidity or mortality associated with waiting 24 hours before initiating antibiotic therapy. With good hydration, symptoms often resolve. Please refer to the Urine Trouble document CLI.8011.SG.001.SD.02

2. Asymptomatic bacteriuria does not indicate infection or the need for treatment with antibiotics.
   2.1. Asymptomatic bacteriuria is common in the elderly. Age related changes that are associated with asymptomatic bacteriuria are listed in Table 3.
   2.2. The presence of bacteria in the urine without other symptoms of a UTI does not indicate infection.
   2.3. Routine screening for asymptomatic bacteriuria not needed.
   2.4. Antibiotic therapy for the treatment of asymptomatic bacteriuria not needed.
   2.5. Elderly individuals with asymptomatic bacteriuria should receive pre-procedure prophylaxis only if they are to undergo traumatic genitourinary procedures.
   2.6. Asymptomatic bacteriuria is not associated with short or long-term negative outcomes, including hypertension, impaired renal function or decreased survival.

Table 1: Typical UTI Signs & Symptoms

Sign / Symptom	Comments
New or increased urinary urgency, urinary frequency, dysuria	Chronic genitourinary symptoms are common in LTC facilities and only acute changes in genitourinary symptoms are relevant for the diagnosis of symptomatic UTI.
Incontinence	Functional incontinence is common in LTC but new onset or exacerbation of incontinence may be a symptom of a UTI.
Elevated temperature, rigors	Studies indicate that fever is a marker for serious infection and is the most important clinical indicator for antibiotics. Elderly require longer time to present with fever, may not have an increase in temperature or may even be hypothermic. A temperature of 38^0 C or an increase of 1.1^0 C above baseline is significant. Elderly adults often take medications that lower baseline temperature. *Caution: Lack of identifying fever may delay diagnosis. Compare temperature with baseline*.
New flank / costo-vertebral angle (CVA) or suprapubic pain or tenderness	Localized pain can indicate UTI.
Hematuria	Blood in the urine is not always indicative of infection, but is an indication of a UTI if other signs and symptoms are present.
Delirium	In the catheterized resident, new onset of delirium may indicate a UTI.

Table 2: Signs and Symptoms Not Specific for UTI

Sign / Symptom	Comments
Cloudy, milky, or turbid urine	Cloudiness can occur in normal urine and is not an indicator of UTI or for antibiotic treatment.
Malodorous urine	Smelly urine is not a valid indicator of UTI and may be caused by diet or poor hygiene.
Worsening or decline in mental status or functional status	Acute confusional states may be associated with any significant infection including UTI. A diagnosis of UTI depends on the presence of typical symptoms.
Increased behavioral and psychological symptoms of dementia (BPSD)	BPSD is unlikely to be attributable to UTI in the absence of localizing genitourinary signs or symptoms. Delirium may impair the ability to report or observe genitourinary signs or symptoms.
Increased falls	Falls indicate a change in functional status and are not a specific indicator of infection including UTI.

Table 3: Age Related Factors Associated with Asymptomatic Bacteriuria

Anatomical	Pelvic prolapse/cystocele; benign prostatic hypertrophy; urinary tract obstruction; fecal incontinence/impaction; vaginal atrophy; estrogen deficiency; bladder or prostate cancer
Functional	Incomplete bladder emptying or neurogenic bladder; CNS disorders (i.e., Parkinson's Disease, dementia); spinal cord injury; insufficient fluid intake/dehydration
Metabolic	Diabetes; immunosuppression
Instrumental	Indwelling Foley catheter or urinary catheterization or instrumentation procedures
Gender	In women, a prior history of UTI at a younger age

3. A positive dipstick test for leukocyte esterase or nitrite is not diagnostic for a UTI.
   3.1. Asymptomatic bacteriuria and pyuria are common in the elderly and do not indicate infection or the need to treat with antibiotics.
   3.2. Pyuria is not sufficient for a diagnosis of a UTI as it does not differentiate between symptomatic UTI and asymptomatic bacteriuria.
   3.3. Pyuria is found in >90% of cases of asymptomatic bacteriuria and 100% of symptomatic UTIs. If pyuria is absent, urinary infection can be ruled out.

4. A urine culture and sensitivity (C&S) should be obtained whenever typical signs and symptoms suggest a UTI (see Table 1).
   4.1. Repeat C&S after antibiotic therapy is NOT necessary unless typical UTI signs and symptoms persist.

PRACTICE POINT

A clean catch or midstream urine sample is the preferred method for collection of urine specimens. When a voided specimen cannot be collected, it is acceptable to use:

- A freshly applied condom catheter for men if measures are taken to limit contamination.
- In and out catheterization for women.

For residents with short term indwelling catheters e.g. in situ less than 2 weeks, specimens should be obtained by aspiration of the catheter tubing port. Do not collect the specimen from the drainage bag where contamination is likely.

For long term catheterized residents e.g. in situ more than 2 weeks, replace the catheter, and then collect the urine specimen through the freshly placed catheter.

Information to be included on laboratory requisition: clinical symptoms, drug allergies, name of antibiotic if empiric treatment to be initiated before C&S result is available.

5. Recommended treatment regimens for acute UTI's in the elderly include the following considerations:
   - 5.1. See Tables 4 & 5 and Clinical Care Map CLI.8011.SG.001.SD.01.
   - 5.2. Asymptomatic bacteriuria DOES NOT require treatment. NOTE: Inappropriate use of antibiotics may adversely affect resident outcomes and promote antimicrobial resistance in bacteria.
   - 5.3. Empiric antibiotic selection should be based on local resistance patterns.
   - 5.4. Select narrow spectrum antibiotics as a first-line to minimize promotion of resistant organisms.
   - 5.5. Empiric antimicrobial therapy should be reviewed and altered, if indicated, to specific therapy once C&S results are available. STOP ANTIBIOTICS if no infection is identified in C&S results.
   - 5.6. A recent serum creatinine (SCr) (within 12 months) is needed to assess renal function, via estimated creatinine clearance, and need for antimicrobial dose adjustments.
     - 5.6.1. Estimated Creatine Clearance (CrCl) = [(140-age) ÷ SCr] x 90 (x 0.85 for females)
   - 5.7. Nitrofurantoin has limited usefulness in this population because most elderly residents have reduced renal function. There is lack of antibiotic efficacy with CrCl less than 40 – 60 mL/mn due to inadequate drug concentration in the urine. Nitrofurantoin should therefore not be used if CrCl is less than 60 mL/min.
   - 5.8. Consider alternative causes for symptoms if there is no improvement in 48 hours.
   - 5.9. Referral to acute care in consultation with physician, Nurse Practitioner or Physician Assistant (as applicable) should be considered if:
     The resident demonstrates any of the following:
     - Respiratory distress, e.g. respiratory rate over 40
     - Tachycardia (pulse over 125)
     - Congestive Heart Failure

- Systolic BP less than 90mmHg
- Signs of impending hemodynamic instability
- Signs of respiratory failure
- Reduced level of consciousness
- Clinical judgement of the attending physician at any time
- Level of acuity that cannot be managed at the facility
- Limited capacity to support the illness at the facility, e.g. oxygen not available

AND/OR

The resident requires IV antibiotic administration.

Table 4: Common UTI Pathogens in LTC

Escherichia coli	*Klebsiella* spp.
Proteus mirabilis	*Enterobacter* spp.
Providencia stuartii	*Enterococcus* spp.
Pseudomonas aeruginosa	Group B *Streptococcus*
Citrobacter spp.	Coagulase negative *Staphylococci*

Table 5: Recommended Treatment Regimens for Acute UTIs in the Elderly

1. Uncomplicated and Complicated UTIs (men, diabetics, symptoms greater than seven days)			
TMP / SMX Or Nitrofurantoin* <u>Alternative</u> Ciprofloxacin	1 DS tab PO BID **CrCl 15-30 mL/min:** 1/2 dose **CrCl < 15 mL/min:** avoid 50 – 100mg PO QID **CrCl < 40-60 mL/min:** avoid 250mg (uncomplicated) 500mg (complicated) PO BID **CrCl ≤ 30 mL/min:** max 500mg/day	7 days 7 days 7 days	Pre-treatment urine cultures are recommended. TMP /SMX has no activity against *Enterococcusi* spp or Group B *Streptococci.* Residents with diabetes are predisposed to UTI with Group B *Streptococci.* *Nitrofurantoin should not be used if CrCl is less than 60 mL/min.
2. Chronic Catheterization: Asymptomatic			
➢ Antibiotic therapy is not beneficial in this population, may adversely affect resident outcomes, and may promote the emergence of organisms of increased resistance. Only treat symptomatic episodes of UTI in this resident population. See Table 5, Section 4.			

3. Abnormality of the Urinary Tract			
➢ Anatomical ➢ Functional ➢ Metabolic			
Ciprofloxacin <u>Alternative</u> Ampicillin PLUS Gentamicin	500mg PO BID 1g IV q 6h PLUS 2mg/kg IV q 12h*	10-14 days 10-14 days 10-14 days	Pre-treatment urine cultures are recommended. Post-treatment cultures are not recommended unless symptoms persist or recur. Note: administration of IV antibiotics may require transfer to an acute care facility. Because of potential for resistant organisms, it is important to modify empiric therapy to most narrow spectrum option based on C&S results. ** Dosing interval needs to be adjusted based on renal function. Consult with Pharmacy recommended*
4. Chronic Catheterization: Symptomatic			
➢ Catheter should be changed and urine specimen should be obtained through the newly placed catheter before starting antibiotics.			
Ciprofloxacin Or Amoxicillin-clavulanate	500mg PO bid 500mg PO tid	10-14 days 10-14 days	Ciprofloxacin has unreliable activity against *Enterococcus spp.* Amoxicillin-clavulanate has no activity again *Pseudomonas.*
5. Pyelonephritis: Complicated			
➢ In residents with indwelling catheters, 7 days of treatment is recommended if there is a prompt response following initiation of antimicrobial therapy.			
Ciprofloxacin <u>Alternative</u> Amoxicillin-clavulanate Or Ampicillin PLUS	500mg PO bid 500mg PO tid 1g IV q 6h PLUS	10-14 days 10-14 days 10-14 days	Pre-treatment urine cultures are recommended. Post-treatment cultures are not recommended unless symptoms persist or recur. Amoxicillin-clavulanate has no activity against *Pseudomonas.* Note: administration of IV antibiotics may require transfer to an acute care

Gentamicin	2mg/kg IV q 12h*	10-14 days	facility. If enterococcal bacteremia use ampicillin + gentamicin. **Dosing interval needs to be adjusted based on renal function.* ***Consult with Pharmacy recommended***

6. Recommended guidelines for the prevention of catheter associated UTI's have been published by the Centres for Disease Control and Prevention (CDC) shown in Table 6.

Table 6: Prevention of Catheter Associated Urinary Tract infections (CAUTI)

- Insert catheters only for appropriate indications.
- Minimize urinary catheter use and duration of use.
- Avoid the use of urinary catheters in residents for the management of incontinence.
- Perform hand hygiene immediately before and after insertion or any manipulation of the catheter device or site.
- Ensure proper training of personnel in the correct technique of aseptic catheter insertion and maintenance.
- Insert urinary catheters using aseptic techniques and sterile equipment:
  - Use sterile gloves, drapes, sponges, an appropriate antiseptic or sterile solution for periurethral cleaning, and a single-use packet of lubricant jelly for insertion.
  - Routine use of antiseptic lubricants is not necessary.
- Properly secure indwelling catheters after insertion to prevent movement and urethral traction.
- Unless otherwise clinically indicated, consider using the smallest bore catheter possible, consistent with good drainage, to minimize bladder neck and urethral trauma.
- If intermittent catheterization is used, perform it at regular intervals to prevent bladder over-distension.
- Following aseptic insertion of the urinary catheter, maintain a closed drainage system:
  - If breaks in aseptic technique, disconnection, or leakage occur, replace the catheter and collecting system using aseptic technique and sterile equipment.
  - Consider using urinary catheter systems with pre-connected, sealed catheter-tubing junctions.
- Maintain unobstructed urine flow:
  - Keep the catheter and collecting tube free from kinking.
  - Keep the collecting bag below the level of the bladder at all times. Do not rest the bag on the floor.
  - Empty the collecting bag regularly using a separate, clean collecting container for each patient; avoid splashing, and prevent contact of the drainage spigot with the non-sterile collecting container.
- Use routine practices, including use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system.

- Complex urinary drainage systems are not necessary for routine use.
- Changing in-dwelling catheters or drainage bags at routine, fixed intervals is not recommended. Rather it is suggested to change catheters and drainage bags based on clinical indications such as infection, obstruction, or when the closed system is compromised.
- Unless clinical indications exist, do not use systemic antimicrobials routinely.
- Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place. Routine hygiene is appropriate.
- Unless obstruction is anticipated, bladder irrigation is not recommended:
  - If obstruction is anticipated, closed continuous irrigation is suggested to prevent obstruction.
  - Routine irrigation of the bladder with antimicrobials is not recommended.
- Routine instillation of antiseptic or antimicrobial solutions into urinary drainage bags is not recommended.
- Clamping indwelling catheters prior to removal is not necessary.

SUPPORTING DOCUMENTS:

CLI.8011.SG.001.SD.01 Clinical Care Map
CLI.8011.SG.001.SD.02 Urine Trouble

REFERENCES:

Barabas, G., & Molstad, S. (2005). No association between elevated post void residual volume and bacteriuria in residents of nursing homes. *Scand J Prim Health Care, 23*, pp. 52-56.

Beier. (1999, May). Management of urinary tract infection in the nursing home elderly: a proposed algorithmic approach. *Int J Antimicrob Agents, 11* (3-4), pp. 275-284.

Berman, P., Hogan, D. B., & Fox, R. A. (1987). The atypical presentation of infection in old age. *Age Ageing, 16*, pp. 201-207.

Blondel-Hill, E., & Frters, S. *Bugs and Drugs 2006.* Edmonton (AB): Capital Health.

Dairiki-Shortcliffe, L., & McCue, J. (2002). Urinary tract infection at the age of extremes: pediatrics and geriatrics. *Am J Med, 113*, pp. 55-66.

Foxman, B. (2003). Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. *Dis Mon, 49* (2), pp. 53-70.

Kamel, H. (2004). Managing Urinary Tract Infections in the Nursing Home: Myths, Mysteries and Realities. *The Internet Journal of Geriatrics and Gerontology, 1* (2).

Liu, H., & Mulholland, S. G. (2005). Appropriate antibiotic treatment of genitourinary infections in hospitalized patients. *Am J Med, 118* (suppl 7A), pp. 14S-20S.

Loeb, M., & etal. (2002). Optimizing antibiotics in residents of nursing homes: protocol of a randomized trial. *BMC Health Services research, 2*, 17.

Loeb, M., Bentley, D. W., Bradley, S., & etal. (2002). Development of minimum criteria for the initiation of antibiotics in residents of long-term facilities: Results of a consensus conference. *Infect Control Hosp Epidemiol, 22* (2), pp. 120-124.

McGeer, A., Campbel, l. B., Emori, T., & etal. (1991). Definitions of infection surveillance in long term care facilities. *Am J. Infect Control, 19*, pp. 1-7.

Nicole, N. (2001). Epidemiology of urinary tract infection. *Infect Med, 18*, pp. 153-162.

Nicolle, L. (1997). Asymptomatic bacteriruia in the elderly. *Infect Dis Clin North Am, 11*, pp. 647-662.

Nicolle, L. E. (2002). Urinary tract infection in geriatric and institutionalized patients. *Current Opinion in Urology, 12*, pp. 51-55.

Nicolle, L. E. (2000). Urinary tract infection in long-term care facilitiy residents. *Clin Infect Dis, 31*, pp. 757-761.

Nicolle, L. E., Bjornson, J., Harding, G. K., & etal. (1983). Bacteriuria in elderly institutionalized men. *New Engl J Med, 309*, pp. 1420-1425.

Nicolle, L. E., Bradley, S., Colgan, R., & etal. (2005). Infectious Diseases Society ofAmerica guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis, 40*, p. 64354.

Nicolle, L. E., Mayhew, W. J., & Bryan, L. (1987). Prospective, randomized comparison of therapy and no therapy for symptomatic bacteriuria in institutionalized elderly women. *Am J Med, 83*, pp. 27-33.

Nicolle, L. (2002). Urinary tract infections: How to manage nursing home patients with or without chronic catheterization. *Current Opinion in Urology, 12*, pp. 51-55.

Nicolle, L., Bentley, D., Garibaldi, R., Neuhaus, E., Smith, P., SHEA Long Term Care Committee. (1996). Antimicrobial use in long term care facilities. *Infection control and Hospital Epidemiology, 17* (2), pp. 119-128.

Nicolle, L., SHEA Long Term Care Committee. (2001). Urinary tract infections in long term care facilities. *Infection Control and Hospital Epidemiology , 2293*, pp. 167-175.

O'Donnel, J. A., & Hofman, M. T. (2002). Urinary tract infections. How to manage nursing home patients without chronic catheterization. *Geriatrics, 57*, pp. 45, 49-52, 55-56.

Pfisterer, M., Griffiths, D., Schafer, W., & etal. (2006). The effect of age on lower urinary tract function: a study in women. *J Am Geriatr Soc, 54* (3), pp. 405-412.

PRODIGY guidance – urinary tract infections (lower) – women. (Last revised January 2004).

Raz, R. (2003). Asymptomatic bacteriuria. Clinical significance and management. *Int J Antimicrob Agents, Suppl 2*, pp. 45-47.

Richards, C. L. (2004). Urinary tract infections in the frail elderly: issues for diagnosis, treatment and prevention. *Int Urol Nephrol , 33* (11), pp. 753-758.

Richardson, J. P. (1993). Bacteraemia in the Elderly. *Journal of General Internal Medicine, 8*, pp. 89-92.

Shortliffe, L., & McCue, J. (2002). Urinary tract infection at age extremes: pediatrics and geriatrics. *Am J Med, 113* (suppl 1A), pp. 555-665.

Sobel, J. D., & Kaye, D. (2006). Urinary Tract Infections. In G. L. Mandel, D. A. Bennett, & R. Dolin (Eds.), *Principles and Practice of Infectious Diseases* (pp. 875-905). New York: Churchill Livingstone.

Swart, W., Soler, C., & Holman, J. (2004). Uncomplicated UTIs in elderly patients: How best to treat. *Consultant, 44* (14), pp. 1805-1809.

Takahashi, P., Trang, N., Cutka, D., & etal. (2004). Antibiotic prescribing and outcomes following treatment of symptomatic urinary tract infections in older women. *J Am Med Dir Assoc, 5* (2 Suppl), pp. S11-S15.

Wageniehner, Naber, & Weidner. (2005). Asymptomatic bacteriuria in elderly patients: Significance and implications for treatment. *Drugs & Aging , 22* (10), pp. 801-807.

Windsor, A. (1983). Bacteraemia in a geriatric unit. *Gerontology, 29* (2), pp. 125-130.

Wong, E., & Hooton, T. (Date last modified: April 1 2005). *Guideline for Prevention of Catheter-associated Urinary Tract Infections.* Division of Healthcare Quality Promotion (DHQP), National Center for Preparedness, Detection, and Control of Infectious Diseases.

Yates, M. (1999). A study of infection in elderly nursing/residential home and community-based residents. *Aust J Hosp Pharmacy, 29*, pp. 166-170.

Adapted from Alberta Health Services Seniors Health. (2010, March). *Toward Optimizing Practice: Urinary tract infections in long term care pathway.*