Thank you for joining the webinar!

Challenges in UTI Surveillance, Diagnosis, and Management in Long-term Care

Presented by:
Denise Cooper, DNP, RN, ANP-BC
Lynn Spalding, MEd, RDN, CSG, FAND

For Call-in information, go to ‘Event Info’ tab in the upper left corner of your screen.

The webinar will begin shortly.
Challenges in UTI Surveillance, Diagnosis, and Management in Long-term Care

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About our speakers

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Challenges in UTI Surveillance, Diagnosis, and Management in Long-term Care

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Disclaimer

Opinions and positions expressed by the speaker are solely those of the speaker and do not necessarily reflect the views, opinions or positions of Nutricia North America or any employee thereof.
Let’s Get to Know You – Participant Poll

What is your profession?

A. Registered Dietitian
B. Registered Nurse
C. Director of Nursing
D. Provider (MD, PA, NP)
E. Other
Objectives

• Identify challenges and strategies to monitor patients for symptoms associated with urinary tract infection.
• Differentiate urinary tract infection from asymptomatic bacteriuria in the long-term care population.
• Discuss evidence surrounding UTI diagnosis and current issues with antibiotic resistance.
• Identify nutrition-related strategies for UTI management including the use of cranberry and hydration.
• Apply knowledge gained about UTI surveillance, diagnosis, and management to a clinical scenario.
UTIs are a common infection in the long-term care setting.

What does this mean for our residents?

Case Study

Mary Frank an 82-year-old resident in your LTC facility with a recent functional status change.

**PMH:** IDDM, Alzheimer dementia-moderate, Anemia, HTN.

**VS:** 98.7, 98, 20, 124/88

Her health was stable until a week ago when she seemed to lose interest. Her food acceptance has been about 25-50% per meal over the last week. The nurse reports that her BS have been ranging from 58-390 over the last week which normally run 100-250, and her urine is dark in color. Ms. Frank's daughter states "I want her tested for a UTI". Ms. Frank states, I just don't feel well but denies any specific pain or complaints. Her PE is negative except hypoactive BS. If clean-catch urine testing is done, which of the following proves that Ms. Frank has a UTI?

A. Urinalysis with 100,000 CFU bacteria
B. Urine dipstick with positive Nitrates and RBC
C. Urinalysis with 100,000 CFU bacteria and dark urine and abnormal BS
D. Urine dipstick with positive Nitrates, dark urine, and functional status change
E. None of the above
Infections in LTC by Type

- Respiratory Infection
- Urinary Tract Infection
- Skin & Soft Tissue
- Other
- Undocumented

UTI or ASB?

**UTI**

- >100,000 cfu bacteria
- 2-3 signs/symptoms

= ABX

**ASB** (bacteriuria)

- >100,000 cfu bacteria
- Insufficient OR NO signs/symptoms

= NO ABX

Community vs. Long-term Care

**ASB incidence in LTC**
- 25-50% Women
- 15-40% Men
- ~100% Catheterized residents

**ASB in the Community Dwelling Older Adults**
- 11-16% Women
- 4-19% Men

CDC, 2012; Nicolle, 2005.
ASB/UTI in LTC

- Increased incidence due to
  - Reduced estrogen/vaginal atrophy & short urethra in women
  - Decreased immune response and malnutrition
  - Benign prostatic hypertrophy in men
  - Increased incidents of HC acquired infections
  - Decreased mobility
  - Increased incontinence
  - Increased co-morbidities
  - Drug resistance & polypharmacy

Problem

Inappropriate Antibiotic Treatments for UTI

- Lack of Assessment tools
- Inadequate Knowledge
- Inappropriate Urine testing

Factors:
- ASB or UTI??
- Expert Consensus
- Fear of Failure to Treat
- High Nursing Home Staff Turnover
- Prevention Measures
- Dipsticks/Urinalysis
- Mental/Functional Status Change
- TX by Off-site Providers

Inappropriate Antibiotic Treatments for UTI

- Adverse Effects
- C-diff
- ABX Resistance
- Cost

References:
Causes of Mental Status Changes

- Worsening of dementia
- Older age
- Metabolic abnormalities
- Psychoactive drugs
- Polypharmacy
- Severe illness
  - Anemia
  - Malignancy
  - Malnutrition
  - Dehydration
  - Infection
  - Stroke

Causes of Functional Status Changes

- Change in cognitive status
- Reduced mobility secondary to:
  - Advancing age
  - Cerebral vascular accident
  - Parkinson’s disease
  - Dementia

UTI Diagnosis:

A resident has at least:
- 3 S/S for non-catheterized OR
- 2 S/S for catheterized

Positive UA
 (>100,000 cfu/ml bacteria present w/ less than 3 organisms)

Cooper Urinary Surveillance Tool ©

Chart VS and S/S Q shift (Resolve after 72 hours if pt. does not meet criteria)

Resident Name________________Room_____Date Initiated_______Baseline Temp_______

NO Catheter-Must have 3 NEW/ACUTELEY WORSE S/S simultaneously to progress through algorithm

Please CHECK/DATE ALL that apply Q SHIFT

☐ Fever (>2 degrees F above baseline OR >100 degrees)
☐ Dysuria OR □ frequency OR □ Urgency
☐ New flank or suprapubic or testicular pain or tenderness
☐ Change in character of urine
☐ Change in mental status per MDS (E.G. confusion, lethargy)
☐ Change in functional status per MDS (E.G. appetite, falls, incontinence of recent onset, decreased activity)

*Urostomy & Suprapubic Catheters are NOT Indwelling Catheters*

Indwelling Catheter-Must have 2 NEW/ACUTELEY WORSE S/S simultaneously to progress through algorithm

Please CHECK/DATE ALL that apply Q SHIFT

☐ Fever (>2 degrees F above baseline OR >100 degrees
☐ OR Chills or New onset Hypotension
☐ New flank or suprapubic or testicular pain or tenderness
☐ Change in urine character OR Purulent D/C at insertion site
☐ Change in mental status per MDS (E.G. confusion, lethargy)
☐ Change in functional status per MDS (e.g., appetite, falls, decreased activity)

MEETS criteria:
Write order & do urine dip (IF Cath >14 days old, replace 1st)
+ for Leukocytes □ Date
done________
+ for Nitrates □
IF – for both then NO UTI-IF + for either Call MD/DO/NP/PA for orders-DATE_______

Does NOT MEET criteria:
- Contact MD/DO/NP/PA w/CURRENT S/S for any orders
- May encourage fluids (if no restriction)
- Continue to monitor and report S/S per facility protocol

• UA ordered? □ Call MD/DO/NP/PA with S/S & results
• UA + □ OR if UA = □ Resolve No UTI
C&S ordered □
• Encourage fluids (if no restriction)

• Continue to eval resident UTI: YES □ NO □
• Was ABX ordered? DATE______________________
• Adverse Effects?____________________________
• Recurrent UTI (2/in 6 mo.)? □ YES □ NO
• If recurrent UTI start 4 oz. 27% Cranberry juice TID

Resolved Date:______
Nurse Initials_____
Differences are statistically significant (Chi-square=9.812, Fisher’s Exact p-value=0.004)
UTI Rates

UTI Rates per 1000 Resident Days

February  March  April  Total

N=27

N=7

Statistically significant using Pearson Chi-square (14.957) and Fisher exact test P<.001

Why Not JUST Treat?

- Resistance
- Reduced kidney function
- Poly-pharmacy
- Drug allergies
- Adverse drug reactions
- Increased risk of hospitalization
- Cost

Total Number of New Antibacterial Agents

- 1983-1987
- 1988-1992
- 1993-1997
- 1998-2002
- 2003-2007
- 2008-2012

Antibiotic development is dwindling

Source: The Epidemic of Antibiotic-Resistant Infections, CID 2008:46 (15 January)
Nutritional Issues with Antibiotics

- Increased risk of dehydration
- Poor appetite and weight loss
- Deplete beneficial microbiota
- Nausea and GI upset
- Allergic reactions
- Food-drug interactions
UTI Impact on Nutritional Status

- Increased metabolic rate
- Decreased appetite
- Increased fluid needs
- Risk of unintended weight loss
Participant Poll

What type of nutrition interventions are you currently using in your facility for UTI management?

A. Cranberry
B. Hydration
C. Vitamin C
D. Other
Nutrition and UTI Management

CAUTION: Not intended for treatment of existing UTI

- CRANBERRY
- PRE/PROBIOTICS
- HYDRATION
Cranberry Use Over the Centuries

- Native Americans used it as management for bladder & kidney diseases
- The 1st research on use of cranberries for urinary health occurred during the 18th century
- Antifungal & antibacterial properties were observed w/ its compounds
Cranberries Contain:
Proanthocyanidins (PACs)
Cranberry’s PACs contain a unique A-type structure, while most other foods contain only the more common B-type PACs.
PACs May Have Anti-Adhesion Effect on E.coli

1. Change the shape from rods to spheres
2. Compress fimbriae
3. Alter the cell membranes
How Many PACs are Needed?

Amount for anti-adhesion effect:

- Several studies have shown that 36 mg of PACs are required for beneficial effect
- 10 fl oz of cranberry juice (27-33% cranberry)
- 3,750 mg of cranberry powder
- <1 fl oz cranberry concentrate

Variation in Cranberry Products

Cranberry Juice:

- High acidity, polyphenolic content, limited solubility of cranberries limits % (< 27%) in juice

Juice Blends:

- Added juice from other fruits to increase % juice

Products <100%:

- Must contain the words “beverage”, “cocktail”, or “drink” on the label
Cranberry Formulations

- Liquid cranberry concentrate
- 100% cranberry juice
- Cranberry capsules
- Cranberry juice cocktail, beverage, drink
- Tablets

*Amount of PACs may vary
Cranberry products beneficial effect on urinary tract health may start within 2 hrs of consumption & last up to 10 hrs.

### 2012 Meta-Analysis: RTC on UTI Prevention with Cranberry Products

![Image of a forest plot](image)

**Figure 4.** Forest plot: summary effect of cranberry in prevention of urinary tract infection, expressed as risk ratio (RR). W(fixed) indicates weights in fixed-effect Mantel-Haenszel model.


<table>
<thead>
<tr>
<th>Study</th>
<th>No. of Events</th>
<th>Total No</th>
<th>No. of Events</th>
<th>Total No</th>
<th>RR (95% CI)</th>
<th>W(fixed), %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schlager et al, 17 1999</td>
<td>2</td>
<td>15</td>
<td>3</td>
<td>15</td>
<td>0.67 (0.13-3.44)</td>
<td>2.5</td>
</tr>
<tr>
<td>Kontiokari et al, 18 2001</td>
<td>8</td>
<td>50</td>
<td>18</td>
<td>50</td>
<td>0.44 (0.21-0.93)</td>
<td>14.8</td>
</tr>
<tr>
<td>McGuinness et al, 10 2002</td>
<td>21</td>
<td>62</td>
<td>24</td>
<td>73</td>
<td>1.03 (0.64-1.66)</td>
<td>18.1</td>
</tr>
<tr>
<td>Stothers et al, 20 2002</td>
<td>19</td>
<td>100</td>
<td>16</td>
<td>50</td>
<td>0.59 (0.34-1.05)</td>
<td>17.5</td>
</tr>
<tr>
<td>Waites et al, 21 2004</td>
<td>10</td>
<td>26</td>
<td>8</td>
<td>22</td>
<td>1.06 (0.51-2.21)</td>
<td>7.1</td>
</tr>
<tr>
<td>McMurdo et al, 22 2005</td>
<td>7</td>
<td>187</td>
<td>14</td>
<td>189</td>
<td>0.51 (0.21-1.22)</td>
<td>11.4</td>
</tr>
<tr>
<td>Hess et al, 22 2008</td>
<td>6</td>
<td>47</td>
<td>16</td>
<td>47</td>
<td>0.38 (0.16-0.87)</td>
<td>13.2</td>
</tr>
<tr>
<td>Wing et al, 24 2008</td>
<td>4</td>
<td>125</td>
<td>0</td>
<td>63</td>
<td>4.55 (0.25-83.27)</td>
<td>0.5</td>
</tr>
<tr>
<td>Ferrara et al, 25 2009</td>
<td>5</td>
<td>27</td>
<td>18</td>
<td>27</td>
<td>0.28 (0.12-0.64)</td>
<td>14.8</td>
</tr>
</tbody>
</table>

**Fixed-effect model**

**Heterogeneity: $I^2 = 43\%$, $P = .08$**
2004:
• Cranberry had favorable effect

2008:
• Cranberry had favorable effect

2012:
• Low compliance with study, high drop-out rate likely d/t palatability and acceptability of cranberry juice
• Variety of settings were used (when looking at just the LTC residents...)
• Most studies did not report how much PACs or “active” ingredient was studied
• Therefore, cannot currently recommend cranberry juice
Conclusion: Cranberries may be helpful in managing urinary tract health for adults at risk for UTIs. Study limitations: product used, drop-out rate.

Recommendations for research:
- Form
- Dose
- Dose frequency
- Administration

Title: Cranberries and urinary tract infections: How can the same evidence lead to conflicting advice?

Cochrane:
- Weighted for physiological concerns

Wang:
- Weighted equally across UTI populations
- FDA published guidance for research
- Distinguish complicated from uncomplicated UTIs

Conclusion: Women with recurrent UTIs, cranberries seem to be promising, especially with antimicrobial resistance

Liska, Kern & Maki, 2016.
Sorting Out the Research...

• Due to antibiotic resistance, non-antibiotic options for UTI management will continue to be researched.

• Tips for evaluating research:
  – Look at study basics, researchers, demographics, methods, participants (N number), limitations, need for future research
  – Consider how research applies to your clinical setting
Intestinal Health Can Impact Urinary Tract Health

Colon Health Contributes to Urinary Tract Health

Prebiotics

Probiotics
Aging Changes Microbiota

Mitsuoka, 1990.

The graph illustrates the changes in bacterial populations in the human gut throughout life stages, from birth to old age. Key changes include:

- **At birth**: High levels of *Lactobacilli* and *Clostridium perfringens*.
- **Weaning**: Increase in *Bacteroides*, *Eubacterium*, and anaerobic streptococci, with a decrease in *Lactobacilli*.
- **Adulthood**: Predominance of *Bifidobacteria* and *Enterococci*.
- **Old Age**: Further increase in *Bacteroides*, *Eubacterium*, and anaerobic streptococci.
### Age-Related Changes & Conditions Leading to the Need for Prebiotics and/or Probiotics

<table>
<thead>
<tr>
<th>Change/Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease in beneficial intestinal bacteria</td>
</tr>
<tr>
<td>Weakening of mucosa allowing bacteria to adhere</td>
</tr>
<tr>
<td>Increase in pH allowing bacteria to proliferate</td>
</tr>
<tr>
<td>Hormonal changes with aging</td>
</tr>
<tr>
<td>Reduced gastric acid</td>
</tr>
<tr>
<td>Impaired intestinal membrane integrity</td>
</tr>
<tr>
<td>Reduced gastric acid and GI upset</td>
</tr>
</tbody>
</table>

Hays & Roberts, 2006; DiFrancesco, 2007; Beerpoot & Geerings, 2016.
Factors Disturbing Intestinal Microbiota

A disturbed microbiota makes residents extremely susceptible & vulnerable to infection & disease

Medications (Antibiotics)

- Aging
- Stress
- Intestinal Infection
- Tube feeding
- Food Intake
- Chronic diarrhea
- Poor Hygiene
- Surgery
Prebiotics

• Classified as a functional fiber:
  • Non-digestible food ingredients that stimulate the growth and/or activity of beneficial bacteria in the digestive system
• Food for probiotics, proliferating their growth
• Common food grade commercial prebiotics:
  • Fructo-oligosaccharides (FOS)
  • Galacto-oligosaccharides (GOS)
  • Lactulose
  • Inulin
  • Polydextrose

# Prebiotics Beneficial Effects in Older Adults

<table>
<thead>
<tr>
<th>Target</th>
<th>Age (yrs)</th>
<th>Prebiotic</th>
<th>Outcome</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbiota composition</td>
<td>69 ± 2</td>
<td>FOS</td>
<td>– bifidobacteria</td>
<td>Bouhnik et al, 2007</td>
</tr>
<tr>
<td></td>
<td>77-97</td>
<td>FOS</td>
<td>– bifidobacteria</td>
<td>Guigoz et al, 2002</td>
</tr>
<tr>
<td>Immune function</td>
<td>84 ± 7</td>
<td>FOS</td>
<td>↓ markers of inflammation</td>
<td>Schiffrin et al, 2007</td>
</tr>
</tbody>
</table>

Adapted from Tiihonen et al, Ageing Res Rev 2009.
Functions of Prebiotics

- Selectively Promote Probiotics (e.g. Lactobacillus & Bifidobacteria)
- Produce SCFA
- Lowers Colonic pH
  - Make colonic environment less favorable for pathogens
  - Provide food for colon cells maintaining integrity
Probiotics

• Probiotics are **live microorganisms** that have been shown to confer a health benefit

• Most Common
  • *Lactobacillus* (*bacteria*)
  • *Bifidobacterium* (*bacteria*)
  • *Saccharomyces* (*a nonpathogenic yeast*)

Lactobacillus effective when combined with immune therapy and estrogen (Bauer & Bessler, 2016)

Systematic Review:
Favorable results with lactobacillus for urogenital infections (Hansen, et al, 2016)
Hydration status identified in MDS 3.0 and nutrition assessment

Dehydration:

- Active diagnosis triggers Nutritional Status CAA
- CAA triggered by infection (UTI), factor in delirium, falls, mood and behavior CAAs
Hydration and UTI Management

French study:
• Primary rate of UTI
• Uncomplicated of 5.3%
• Recurrence rate of 30%

Impact of adequate hydration:
• Risk reduction of 45% for primary rate and 33% for recurrence
• Significant cost savings by preventing 27 million UTIs

(Bruyere, et al, 2015)
Hydration

Key Preventive Measure

• Recommended by SHEA/APIC as preventive intervention

• Estimated fluid needs
  • Normal needs = 30 mL/kg
  • Minimum 1500 mL/day
  • 1 mL H2O per Calorie
  • NCM: up to 2 L/day
Urologists may order supplemental vitamin C theory

- Acidify urine
- Decrease bacterial growth
- Studies are mixed (Beerepoot & Geerlings, 2016)
- Be aware of potential GI upset of vitamin C at high doses
WHAT IS YOUR NEXT STEP?
Next Steps:

• Be a *Change Champion*!

• Changes in healthcare practices
  • Require commitment

• Educate staff, residents and families
  • Appropriate use of antibiotics
  • ASB treatment may cause:
    • Antibiotic resistance
    • Adverse effects, such as C. diff infections and weight loss
    • Increased cost
Next Steps:

• Education
  • Importance of hygiene
    • Staff and residents
    • Environment
  • Importance of nutrition and hydration
    • Nutrition risk tracking and infections
    • Hydration programs
• Evaluate and implement UTI management and antibiotic stewardship program
• Use QAPI program: (Refer to F441, F329, and F428)
Evidence-Based Practice

• Agency for Healthcare Research Quality

• Definition: Evidence-Based Decision-making

• Evidence-based practice is the use of the best available evidence together with a clinician's expertise and a patient's values and preferences in making health care decisions.

Case Study

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References

References - continued

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• Avorn, et al. Reduction in bacteriuria and pyuria after ingestion of cranberry juice. JAMA 1994, Mar 9 27 (10).


References - continued


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