Top Ten Strategies for Reducing CAUTIs

by Kathleen Vollman, MSN, RN, CCNS, FCCM, FAAN
Advancing Nursing, LLC
In 1859 Florence Nightingale in *Notes on Hospital* wrote, “It may seem a strange principle to enunciate, as the very first requirement in the hospital is to do the sick no harm.”

Until earlier this year, no single U.S. surveillance system could provide estimates of the burden of healthcare-associated infections (HAIs) across acute care patient populations. In 2009, the Centers for Disease Control and Prevention (CDC) began a three-phase effort to address this knowledge gap. In March 2014, an article in the *New England Journal of Medicine* presented a national surveillance study involving 183 hospitals in 10 geographically diverse states to determine the prevalence of HAIs in acute care hospitals and generate updated estimates of the national burden of such infections. Highlights from this study include:

- There were an estimated 722,000 HAIs per year
- HAI-related deaths total approximately 75,000 per year
- 1 out of 25 patients develop HAIs
- HAIs cost the U.S. about $45 billion in preventable injury

This study found reductions in central line-associated bloodstream infections (CLABSIs), surgical site infections, methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (C.diff). Unfortunately, the one area that increased was catheter-associated urinary tract infections (CAUTI).

<table>
<thead>
<tr>
<th>HAI: By the Numbers</th>
</tr>
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<tbody>
<tr>
<td>44% reduction in CLABSI between 2008-2012</td>
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<tr>
<td>20% reduction in 10 of the major surgical procedures between 2008-2012</td>
</tr>
<tr>
<td>4% reduction in MRSA between 2011-2012</td>
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<tr>
<td>2% reduction in C. diff infections between 2011-2012</td>
</tr>
<tr>
<td>3% increase in CAUTIs between 2009-2012</td>
</tr>
</tbody>
</table>

Top Ten Strategies for Reducing CAUTIs

Below are some evidence-based fundamental strategies to help reduce CAUTIs at your facility.

1. Develop a Comprehensive Unit of Safety Program

A Comprehensive Unit of Safety Program (CUSP) is designed to change an organization’s workplace culture – and in so doing bring about significant safety improvements – by empowering staff to assume responsibility for safety in their environment. A resource to help an organization get started is OntheCUSPStopHAI.org, the website of the National Implementation of Comprehensive Unit-based Safety Program to eliminate HAIs. This website offers resources on not only the technical component of improving care – using aseptic technique, securing the catheter, maintaining sterility of the system, etc. – but on changing the culture of an organization so it is more focused on a culture of safety.

The website also includes the On the CUSP: Stop CAUTI initiative in which state organizations and hospitals across the country implemented CUSP and CAUTI reduction practices in hospital units. More than 900 hospital units in 41 states across the country participated. The hospitals that participated saw a 16 percent reduction in their CAUTIs.

What is the lesson learned from this initiative? Overall the U.S. is seeing an increase in CAUTIs, but the places that applied both the science and the adaptive cultural component experienced a reduction.

2. Reduce the Load

Part of CAUTI reduction is reducing the load. One way to do that is by not using the catheter. The use of catheters increases the risk for infection – so if you eliminate the catheter, you eliminate the risk of infection. Daily acquisition risk is roughly between 3 to 7 percent.

3. Utilize CAUTI “Bladder Bundle”

The concept of a “bundle” approach – the integrated and ideally synergistic effect of a group of straightforward, evidence-based practices – was introduced by the Institute for Healthcare Improvement (IHI) in 2001 and first applied for CLABSI prevention. Since then, the approach has been applied to CAUTI. The bundle approach includes the following: avoid unnecessary urinary catheters, insert urinary catheters using aseptic technique, maintain urinary catheters based on the guidelines, determine urinary catheter necessity on a daily basis and remove as soon as possible.

### Appropriate Urinary Catheter Use

<table>
<thead>
<tr>
<th>Key</th>
<th>Category IA</th>
<th>Category IB</th>
<th>Category IC</th>
<th>Category II</th>
<th>No Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A strong recommendation supported by high to moderate quality evidence suggesting net clinical benefits or harm.</td>
<td>A strong recommendation supported by low quality evidence suggesting net clinical benefits or harm, or an accepted practice [e.g. aseptic technique] supported by low to very low quality evidence.</td>
<td>A strong recommendation required by state or federal regulation.</td>
<td>A weak recommendation supported by any quality evidence suggesting a trade-off between clinical benefits and harm.</td>
<td>An unresolved issue for which there is low to very low quality evidence with uncertain trade-offs between benefits and harm.</td>
<td></td>
</tr>
</tbody>
</table>

### Category IA

- Insert catheters only for appropriate indications and leave in place only as long as needed (IB)
- Avoid use of urinary catheters in patients and nursing home residents for management of incontinence (IB)
- Use urinary catheters in operative patients only as necessary, rather than routinely (IB)
- Consider using alternatives to indwelling urethral catheterization in selected patients when appropriate (II)
4. **Determine Appropriate Urinary Catheter Use**

The Healthcare Infection Control Practices Advisory Committee (HICPAC) is a federal advisory committee assembled to provide advice and guidance to the CDC and the Secretary of the Department of Health and Human Services (HHS) regarding the practice of infection control and strategies for surveillance, prevention and control of HAIs, antimicrobial resistance and related events in U.S. healthcare settings. The HICPAC created guidelines to help organizations develop, implement and evaluate infection prevention and control programs.

5. **Enforce Hand Hygiene Protocols**

Hands are lethal weapons for infection. Maintaining proper hand hygiene protocol is the single most important means to prevent transmission of infectious agents.

6. **Utilize Proper Technique for Urinary Catheter Insertion**

Ensure that only properly trained individuals are inserting catheters using the correct technique. Insert the catheter using the aseptic technique and sterile equipment, and properly secure the indwelling catheter after insertion to prevent movement and urethral traction. If you’re using a Velcro-type device you’re not going to be successful. Velcro moves and that sliding in and out can potentially cause irritation at the meatus, as well as transmission of microorganisms. When reviewing different types of securement, consider the skin because you don’t want to follow the evidence that supports securement and cause skin breakdown. Take into account the material, specifically hydrocolloid or other material that prevents the skin from breaking down.

- **Prepping for Skin Protection and Adhesiveness**
  
  One of the most superior types of adhesive has Gum Mastic in it. Also, as a practice to protect the skin, you should also remove anything that is tactile with an adhesive remover. It will detach the stickiness to prevent skin tears.

- **Maintain a Sterile, Continuously Closed Drainage System**

Evidence-based science supports maintaining a closed drainage system. If your patient is expected to go to the ICU from an OR and ED, placement of a catheter connected to a urine meter drainage bag is critical. If your goal is to never have the seal broken, consider switching to urine meter hospital wide. The bag should be below the level of the bladder and whenever the seal is broken, understand that the patient is at risk and consider changing the device.

7. **Implement Basinless Bathing**

Published studies prove the basin is contaminated with bacteria and can contribute to the development of infections. In a study presented at the Association for Professionals in Infection Control and Epidemiology (APIC) in 2010, within 6 to 7 months of the researchers moving to basinless bathing, the CAUTI rates decreased from 4.46 to 0.46 per 1,000 catheter days.

8. **Select Catheter Materials Carefully**

If your organization’s CAUTI rate is not decreasing with a comprehensive strategy, consider using antimicrobial/antiseptic impregnated catheters. Silicone may be preferable to other catheter materials to reduce the risk of encrustation in long-term catheterized patients who have frequent obstruction.

9. **Reinforce Nurse Ownership**

Evidence-based science supports the use of reminder systems, as well as stop orders. In a 2013 issue of the American Journal of Infection Control, a 300-bed, community teaching hospital in Connecticut participated in a study of a nurse-directed urinary catheter removal protocol. This protocol was linked to the physician’s catheter insertion order. Three additional elements included physician documentation of catheter insertion criteria, a device-specific charting module added to physician electronic progress notes, and biweekly unit-specific feedback on catheter use rates and CAUTI rates in a multidisciplinary forum. As soon as the catheter order was initiated, it launched the nurse-directed urinary removal protocol. In a 36-month period there was a 50 percent hospital-wide reduction in catheter use and a 70 percent reduction in CAUTIs. It is important prior to launching an aggressive catheter removal program to assess the rate of incontinence-associated dermatitis. Without before and after data on potential moisture-related skin damage it is difficult to determine the cost benefit to the patient and organization.

10. **Become an Advocate**

Determine which groups within your organization are engaged and get everyone involved. CAUTI prevention should be a high-profile priority level. There should be active, visible champions at all levels of your organization.
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About the Author

Kathleen Vollman, is a Critical Care Clinical Nurse Specialist, Educator and Consultant. She has published and lectured nationally and internationally on a variety of pulmonary, critical care, prevention of healthcare-acquired skin injuries, work culture and professional nursing topics. From 1989 to 2003 she functioned in the role of Clinical Nurse Specialist for the Medical ICUs at Henry Ford Hospital in Detroit, Michigan. Currently, her company, Advancing Nursing, LLC, is focused on creating empowered work environments for nurses through the acquisition of greater skills and knowledge.

In 2004 Kathleen was inducted into the College of Critical Care Medicine. In 2009 she was inducted into the American Academy of Nurses. And in 2012 Kathleen was appointed to serve as an honorary ambassador to the World Federation of Critical Care Nurses.

References


Contact Amerinet Customer Service at 877-711-5600 or info@amerinet-gpo.com

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Amerinet, Inc.
Two CityPlace Drive, Suite 400
St. Louis, MO 63141
877-711-5700
www.amerinet-gpo.com
Reduce Antibiotics: Implement a UTI Reduction Protocol

by Mary Ellen Posthauer, RDN, CD, LD

From: Dietetics in Healthcare Communities. A dietetic practice group of the Academy of Nutrition & Dietetics.
Implementing a UTI Reduction Protocol

The long-term care landscape continues to shift, tying provider reimbursement to quality of care. Decreases in Medicare funding are predicted while quality of care is expected to improve, essentially doing more with less. There are several national initiatives focused on quality of care and how it is delivered to individuals who impact long-term care.

**National Action Plan to Prevent Healthcare-Associated Infections**

The U.S. Department of Health and Human Services implemented a National Action Plan to Prevent Healthcare-Associated Infections (HAIs), which are responsible for $28 to $33 billion in preventable healthcare expenditures annually. The Centers for Disease Control (CDC) executive summary states that HAIs are largely preventable and can be drastically reduced to save lives and avoid excess costs. HAIs are defined as infections that individuals develop while they are receiving treatment for medical or surgical conditions in a healthcare setting. They can be acquired anywhere healthcare is delivered. Priority areas included catheter acquired urinary tract infections (UTIs), Clostridium difficile, skin and wound infections, lower respiratory infections, and influenza and influenza-like infections. HAIs are among the leading causes of death in the United States and at any given time; about one in every 20 inpatients has an infection related to their hospital care.

The urinary tract is one of the most common sites of HAIs, accounting for 20-30% of infections reported by long-term care facilities (LTCF), representing 8% of the total cost of care. Urinary tract infections (UTIs) are the second most common infection in the body accounting for 8.1 million physician visits annually. In 2008, the Centers for Medicare and Medicaid Services (CMS) stopped payment for hospital acquired UTIs citing the high cost of treating a preventable complication. UTI event reporting is available for certified skilled nursing facilities/nursing homes, and intermediate/chronic care facilities for the developmentally disabled. The CDC document states: “If a resident is transferred from an acute care facility and develops signs/symptoms of a UTI within 2 calendar days of admission (date of admission = day 1) to the LTCF, it would be considered present at the time of transfer to the LTCF.” An event present at the time of transfer should be reported back to the transferring facility, and not reported as a LTCF UTI event. Only UTI events presenting > 2 calendar days after admission (where date of admission = day 1) are considered facility onset events.
Hospital Readmission
One of the goals of the Affordable Care Act (ACA) is promoting high quality integrated care thus reducing hospital readmissions and the cost of care. Researchers from the University of California-San Francisco studied 2001-2010 data from the National Hospital Ambulatory Medical Care Survey. The survey noted the rate of emergency room admissions for elderly nursing home residents increased nearly 13% during that time frame. The total number of emergency room admissions for this population reached 2.1 million in 2010; chronic obstructive pulmonary disease, congestive heart failure, kidney/UTIs and dehydration were all associated with high odds of readmission.

In addition to resistant organisms, the use of antibiotics also contributes to adverse drug reactions. In fact, of geriatric residents admitted to the hospital, 5% to 28% of admissions were because of or involved an adverse drug reaction. Adverse drug reactions occur in 13% of residents receiving two medications and 82% on six or more medicines. Studies indicate an increase in mortality in individuals taking six or more medications, with the highest risk in those taking 10 or more. Frail elderly with increasing comorbidities are more likely to experience poly-pharmacy than their healthier counterparts, but are less likely to benefit from the medications because of their multiple comorbidities. A cost analysis in LTCF found that for every dollar spent on medications, $1.33 was spent on treating adverse drug reaction.

Antibiotic Reduction Program
The CDC has embarked on a major Antibiotic Reduction Program based on the increase of antibiotic resistant infections that claim 23,000 deaths annually. This is a serious threat especially for the frail elderly whose immune systems are compromised. The Get Smart for Healthcare CDC campaign began with hospitals and will expand to LTCF. The campaign states that 50% of antimicrobial use in hospitals is both inappropriate and unnecessary. Controlling the use of antibiotics not only improves clinical outcomes but is appropriate in the current cost control climate and rationing of resources. The CDC’s National Safety Healthcare Network 2013 report, Antibiotic Resistance Treats in the United States, outlines bacteria defined as a serious threat, in terms of their antibiotic (ATB) resistance and includes Enterococcus and multi-drug resistant goals of the antibiotic reduction campaign. The report encourages healthcare organizations to enforce strict infection control procedures and urges physicians to prescribe antibiotics judiciously. UTIs are the most common infectious disease in LTCFs accounting for an estimated 32-66% of antibiotics prescribed. Estimates are that 49%-70% of all LTCF residents take at least one ATB in any given year and 25-75% of antibiotic use is inappropriate, for example treating asymptomatic UTIs. Nicholle’s study noted that older people in the community, long-term care facilities, or acute care facilities have an increased occurrence of resistant bacteria isolated from UTIs. Nursing home residents are treated with antibiotics for longer duration leading to adverse drug reactions and retreatment compared to community dwelling residents. Frequently even in the absence of specific (e.g., dysuria) or non-specific (e.g., fever) signs or symptoms, residents receive an antibiotic for a suspected infection. A study by Phillips ET. Al noted that 50% of antibiotics prescribed for UTIs were given to asymptomatic individuals.

Nursing Home Quality Initiative/ Quality Assurance and Performance Improvement
The Nursing Home Quality Initiative (NHQI), released by CMS for all Medicare- and Medicaid-certified nursing homes, formulated Quality Measures derived from data which nursing homes routinely collect, such as on the Resident Assessment Instrument /Minimum Data Set (MDS) 3.0. These measures are valid and reliable and provide facilities with statistics for their quality improvement projects. The quality measures assess the resident’s physical, clinical conditions and abilities, plus their preferences and life care wishes. UTIs can affect several of these Quality Measures:

- One or More Falls with Major Injury
- Self-Report Moderate to Severe Pain
- Urinary Tract Infection
- Lose Control of their Bladder
- Need for Help with Activities of Daily Living Has Increased
- Lose Too Much Weight
- Have Depressive Symptoms
Reduce Antibiotics: Implement a UTI Reduction Protocol

The Affordable Care Act introduced Quality Assurance Performance Improvement (QAPI) for LTCFs, which is a systematic, comprehensive, data-driven, proactive approach to performance management and improvement. The goal is to improve care and health for individuals while reducing expenditures in the health delivery system. These national initiatives are all compelling reasons for initiating a practical, cost effective protocol to lower the incidence and prevalence of UTIs and reduce antibiotic treatment.

Defining Urinary Tract Infections

UTIs are defined as bacterial infections of the kidney, ureter, bladder or urethra. They can be classified by location or by the presence or lack of symptoms. Upper urinary tract infections include the kidneys (pyelonephritis) and ureters (ureteritis). Lower urinary tract infections are more common affecting the urethra (urethritis) and bladder (cystitis). See Figure 1, Front View of Urinary Tract.

Urine is normally sterile, so in order for an infection to occur, pathogenic bacteria from a fecal or vaginal source must migrate up, enter the urethra, attach, and begin to multiply. Uropathogenic E. coli (UPEC) produces 90% of infections in anatomically normal, unobstructed urinary tracts. As bacteria multiply, they ascend up the urethra into the bladder where they invade the lining of the bladder wall and replicate, creating intracellular bacterial communities with Velcro-like properties. E. coli has fingerlike projections called fimbriae on their cell surface allowing them to attach to receptors on epithelial cell walls with an adhesive effect. This adhesive effect resists the cleansing action of urine flow. Since pathogenic microorganisms are living, they continue moving after adherence, irritating the bladder wall causing an inflammatory effect. UPEC’s resistance to normal host response promotes the recurrence of infection.

Classic symptoms for UTIs include urinary frequency, urgency, pain, burning, straining, flank pain, fever and altered mental status, which frequently leads to falls in the elderly. Anatomical reasons cause women to be especially prone to UTIs and their lifetime risk of contracting a UTI is greater than 50 percent. A woman’s urethra is shorter, providing bacteria quicker access to the bladder. In addition, a woman’s ureteral opening is near sources of bacteria from the anus and vagina, therefore personal hygiene is a prevention strategy for this infection. Individuals with a urinary tract abnormality that obstructs the flow of urine (kidney stone, enlarged prostate, catheters or those with diabetes or other diseases that suppress the immune system) are at risk for developing a UTI. Older adults’ decreasing ability to concentrate urine and an aging immune system, all decreases the antibody response to pathogens. Additional risk factors for the elderly include; immobility leading to incomplete bladder emptying, poor hygiene, and age-associated physiologic changes including estrogen deficiency.

Urinary Tract Infection Classification

UTIs can be classified by the presence or absence of symptoms. Symptomatic Bacteriuria is characterized by >100,000 colony-forming units (cfu)/mL in women, 1,000 cfu/mL in men and ≥ 100 cfu/mL in catherized individuals in the presence of symptoms. Symptoms include dysuria, frequency, urgency and flank pain.

Asymptomatic bacteriuria is characterized by two positive urine cultures from clean-catch specimens, without the presence of symptoms associated with a UTI. Only about 70% of asymptomatic individuals with high cfu in a single urine sample have true bacteriuria, as confirmed by the second sample. Dipsticks that change color when an infection is present are one method to detect infection when there are no classic symptoms. The strips detect nitrate, which is formed when bacteria changes nitrate in the urine to nitrite.

The American Medical Directors Association’s (AMDA) Choosing Wisely document delineates five things physicians and patients should question in long-term care. One recommendation is not to obtain a urine culture unless there are clear signs and symptoms that localize it to the urinary tract. They note that a positive culture in the absence of symptoms is a common problem that contributes to the increased prescribing of ATB, leading to an increased risk of diarrhea, resistant organisms and
infection due to *Clostridium difficile*. An additional concern is the assumption that the asymptomatic bacteriuria is the cause of the older individual’s sudden status change; therefore the physician may delay identifying a more serious problem. Treatment of asymptomatic bacteriuria with antibiotics has not been successful and is not recommended by the Infectious Disease Society of America.\(^{30}\)

If a UTI progresses, bacteria travel through the ureters and kidneys and into the bloodstream causing bacteremia, or urosepsis. This bacterial spread into the bloodstream can lead to fever, reduced blood pressure, altered mental status and deprivation of oxygen to the major organs. If left untreated or if prompt treatment is not initiated, bacteremia can potentially be fatal. The goal of treating a UTI is control or preventing the development of urosepsis.

**Antimicrobial Therapy**

In addition to antibiotic therapy, individuals are encouraged to rest and increase their fluids. The choice of antibiotic and length of treatment depends on the urinalysis, which classifies the bacteria, and the sensitivity test, which identifies the most effective antibiotic. A 7-10 day treatment of antibiotics resolves most UTIs and some newer antibiotics treat uncomplicated lower urinary tract infections in three days. The majority of antibiotics used to attack UTIs are sulfa-based drugs, nitrofurantoin, quinolones, and amoxicillin or ampicillin drugs. Oral antibiotic treatment cures 94% of uncomplicated urinary tract infections in three days. However after 4-6 weeks, 50-70% of individuals treated will have positive urine culture and some will receive an additional round of antibiotics.\(^{31,32}\) The increased use of antibiotics correlates with a consistent increase in the emergence of antibiotic-resistant strains of UTIs. Bacterial resistance to antimicrobials, as noted by *E. coli*’s 40-50% resistance to ampicillin, and a 20% resistance to trimethoprim-sulfamethoxazole, reduces treatment options and increases treatment costs.\(^{33}\) Use of antibiotics is associated with many side effects such as diarrhea, stomach cramps, yeast overgrowth, loss of the intestinal bacterial flora, decreased appetite, unintended weight loss and *Clostridium difficile*.

Low dose long-term antibiotic prophylaxis administered to individuals with recurrent UTI infections places them at increased risk for adverse drug reactions and re-infection with increasingly resistant microorganisms.

**Natural Host Defense Mechanisms**

A bacterium in the bladder does not inevitably lead to sustained infection. The bladder is proficient of clearing itself of organisms within 2-3 days of their introduction. The body’s natural defense system assists in preventing UTIs from occurring including:

- Acidic vaginal environment and normal flora in females – acidity pH<5.5 discourages growth
- Prostatic secretion in males
- Elimination of bacteria through urine flow
- Antibiotic properties of urine and its constituents inhibit bacterial growth such as low pH, high or low osmolality, high urea and organic acid concentrations
- Inflammatory response, antibodies, leukocytes, phagocytes which remove bacteria
- Bladder mucosa’s antibacterial properties destroys bacteria in the urine remaining on the walls

When all of the natural defenses are down, the ability of bacteria to adhere increases, thus leading to a UTI. There are age-related changes that affect the increased UTIs in the elderly including:

- Weakening of urethral mucosa increasing the ability of pathogenic bacteria to adhere
- Increased vaginal pH, allowing colonization of bacteria
- Decrease in beneficial intestinal bacteria allowing harmful bacteria to grow
- Increased inflammatory state
- Difficulty consuming large volumes of fluids
- Increased glucose intolerance and diabetes

**Dietary Treatment Modalities for UTI Management**

The focus of UTI prevention is to reduce their incidence and recurrence, decrease antibiotic use and the cost of treatment, plus improve the individual’s quality of life. Because of antibiotic resistance and their adverse effects on the normal microbiota, there is increased interest in the role of medical foods, such as cranberry products and prebiotics. Medical food, as defined by the Food and Drug Administration, is “a food which is formulated to be consumed or administered enterally under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles, are established by medical evaluation.”\(^{34}\) Medical foods are not dietary supplements that are intended to enhance the diet.
The research on the merits of cranberry products and prebiotics studied for their effects on UTI prevention is increasing. Colon health contributes to urinary tract health and antibiotics frequently eliminate lactobacilli, the protective bacteria in the colon, along with the harmful bacteria thus causing an overgrowth of E coli. Prebiotics, non-digestible food ingredient classified as a functional food, stimulate the growth and/or activity of beneficial bacteria in the digestive tract. They are found in foods such as bananas, onions, garlic and Jerusalem artichokes, but consuming large amounts from food is difficult, therefore they are extracted from these foods and added to medical foods or supplements. Table 1 lists commercial prebiotics. Table 2 Prebiotics Beneficial Effects on Older Adults notes the clinical studies demonstrating the effect of prebiotics on microbiota composition and immune function. Fructooligosaccharides (FOS) advantages include selectively promoting Lactobacillus and Bifidobacteria, lowering the pH thus making the colonic environment less favorable for pathogens to grow. Another positive feature of FOS is the production of short chain fatty acids, the main fermentation products of colonic microbes, which maintain the cells integrity.

### Table 1: Food Grade Prebiotics

<table>
<thead>
<tr>
<th>Prebiotic</th>
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<tbody>
<tr>
<td>Fructooligosaccharides (FOS)</td>
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<tr>
<td>Galactooligosaccharides (GOS)</td>
</tr>
<tr>
<td>Lactulose</td>
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<tr>
<td>Inulin</td>
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<tr>
<td>Polydextrose</td>
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<tr>
<td>Isomalto-oligosccharides</td>
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<tr>
<td>Lacto-sucrose</td>
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<tr>
<td>Gentio-oligosccharides</td>
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<td>Xyloooligosaccharides</td>
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</table>

### Table 2: Prebiotics Beneficial Effect on Older Adults

<table>
<thead>
<tr>
<th>Target</th>
<th>Age (yrs)</th>
<th>Prebiotic</th>
<th>Outcome</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>Microbiota composition</td>
<td>69 ± 2</td>
<td>FOS</td>
<td>FOS</td>
<td>Bouhnik et al., 2007</td>
</tr>
<tr>
<td></td>
<td>77-97</td>
<td>FOS</td>
<td>Inulin</td>
<td>Guigoz et al., 2002</td>
</tr>
<tr>
<td></td>
<td>68-89</td>
<td></td>
<td></td>
<td>Kleesen et al., 1997</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>

Table adapted with permission: Nutricia North America, Inc

The health promoting properties of cranberries have been promoted for centuries. Native Americans used cranberries for bladder and kidney diseases and the first research on cranberry use for urinary health occurred in the 18th century. Cranberries are rich in polyphenols, including proanthocyanidins (PACs). The unique alpha-proanthocyanidins found in cranberries is absorbed rapidly from the gastrointestinal tract and excreted in the urine. PACs from cranberries affect the E coli cells in three ways. They alter the E coli membranes, compress the fimbriae reducing E coli’s ability to launch an infection and change the shape of the E coli bacteria from rods to spheres. All of these actions inhibit the bacteria’s ability to attach to their receptor sites on the uroepithelium, which prevents colonization. The higher the concentration of PACs, the greater their impact is on uropathogenic bacteria.

The amount of PACs needed to reduce the adhesion of E coli is 36 mg, which is found in a 10 oz. cup of cranberry juice or 3,750 mg of cranberry powder. There are many cranberry products available, including cranberry cocktail which is 10-25% juice, 100% cranberry juice, cranberry capsules, cranberry tablets, and liquid cranberry concentrate medical food.

Approximate equivalence of PACs to a 10 oz. glass of 27% cranberry juice cocktail is; 1½c fresh cranberries, 1/3 cup dried cranberries, ½c cranberry sauce, or 2oz. of 100% cranberry juice. The consumption of any of these products on a daily basis is unlikely. There are many variations in the amount of cranberry juice in beverages. The high acidity and polyphenolic content of cranberries limits manufacturers’ formulations from producing products that are palatable. Polyphenols characteristically have limited water solubility, which leads to sedimentation. To prevent sedimentation, manufacturers typically add no more than 27% cranberries and add high-fructose corn syrup to improve the taste. Some beverages are 27% cranberry juice plus 73% apple or grape juice, which improves the nutrient content of the cocktail vs. the 27% cranberry plus high-fructose corn syrup. Beverages containing less than 100% of the primary labeled ingredient must
Data Supporting Efficacy of Cranberry Products

A recent meta-analysis of ten randomized controlled trials (RCT), including 1,494 participants, comparing prevention of UTIs in users of cranberry-containing products vs. placebo or non-placebo controls concluded that cranberry-containing products are associated with protective effect against UTIs. The focus of one twelve-month RCT determined whether recurrence of UTIs can be prevented with cranberry-lingonberry juice (Lingonberries are members of the same genus as cranberries) compared with a probiotic Lactobacillus GG drink. One hundred-fifty women were randomly assigned to one of three groups; (1) drank 50mL/day of cranberry-lingonberry juice, (2) drank 100mL of probiotic Lactobacillus GG drink five days a week, and (3) control group. After six months, 16% in the cranberry-lingonberry group, 39% in the Lactobacillus GG group, and 36% in the control had at least one UTI recurrence. After twelve months, there was a 20% absolute risk reduction of infection in the group receiving cranberry-lingonberry vs. no effect in the probiotic-supplementation and the control group.

McMurdo's RCT of 137 women (mean age 63) with ≥ two antibiotic treated UTIs in the previous years were randomized to receive with 500 mg of cranberry extract for six months or 100 mg capsule of trimethoprim (antibiotic prophylaxis). The cranberry capsules ingested were both accepted and tolerated without any adverse effects. Twenty-five women in the cranberry group and 14 in the trimethoprim group had an antibiotic treated UTI. This first RCT comparing cranberry extract versus antibiotic prophylaxis found trimethoprim had a limited advantage over cranberry extract in the prevention of recurrent UTIs. Depending on the brand, the source of the cranberry power in the tablets comes from a variety of sources (freeze-dried cranberries, cranberry juice, whole cranberries, etc.) all with varying amounts of PACs. Cranberry tablets range from 300-500 mg, cranberry concentrates per tablet with a recommended dosage of two tablets taken three times per day. Powdered cranberry concentrates require mixing with eight ounces of fluid, can decrease compliance.

The purpose of another twelve-month, randomized, double blind trial of 150 women aged 21-72 years was to determine the effectiveness of cranberry juice versus concentrated cranberry tablets, versus a placebo used as prophylaxis against UTIs. The women were randomized into three groups; (1) received placebo juice and placebo tablets BID, (2) received placebo juice and cranberry tablets BID and (3) placebo tablet and 250 mL of pure unsweetened cranberry juice TID. Both cranberry juice and cranberry extract tablets decreased the number of women having at least one symptomatic UTI /year (to 20% and 18% respectively) compared with the placebo to 32%. Total number of antibiotics prescribed were less in both groups compared to the placebo group. Following the consumption of cranberry juice, the adhesion activity of PACs is evident in the urine within two hours and lasts for up to ten hours. However, the prophylactic benefit from cranberry products is achieved only if they are consumed daily. The high acidic taste, caloric intake, cost, and daily volume required was challenging for participants in several studies. Cranberry cocktails contain relatively large amounts of sugar, which is a concern for individuals with diabetes or glucose intolerances.

Consumers often fail to recognize the nutrient variations in these beverages and assume the lower priced item will confer the same health benefits as the one with the higher percentage of cranberries.

Reduce Antibiotics: Implement a UTI Reduction Protocol
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Implement a UTI Reduction Protocol

Why Consider Cranberry Products?
There are several age-related conditions and changes that lead to the consideration of medical foods such as cranberry products. As we age, the mucosa in the urinary and intestinal tracts becomes thin and weak allowing bacteria to adhere. There is also an increase in urinary pH creating a favorable environment for bacteria to proliferate. The decrease in beneficial bacteria allows harmful bacteria such as E coli to proliferate. Older adults have difficulty consuming the large volume of fluid necessary to flush out bacteria. Many individuals have an increase in glucose intolerance and diabetes, which causes increased glucose in the urine fostering bacterial growth, along with a decrease in overall immunity. All of these reasons lead to the consideration of incorporating cranberry products in a protocol designed to reduce the recurrence of UTIs and antibiotic use. Key product considerations include:
• Clinically proven to reduce UTIs
• Contains high concentration of PACs – cranberry extract, concentrate or pure cranberry juice
• Ease of consumption/tolerability
• Low volume and acceptable taste
• Low sugar content
• Additional nutrients for urinary tract health such as Vitamin C, D-Mannose, Prebiotics

Once you have decided to include cranberry products as part of urinary tract prevention protocol, the next step is identifying individuals at high risk for UTIs. Consider older adults with these conditions:
• Two or more UTIs in the past six months
• Incontinence
• Urinary retention
• Immobile
• Catheterized
• Orders for prophylactic antibiotics
• Fluid intake < 1000mL/day, risk of dehydration
• Medical conditions: diabetes, kidney problems, neurogenic bladder, sickle cell anemia, immunocomprised, urinary tract abnormalities, benign prostatic hyperplasia

Care should be taken when recommending cranberry products for long-term use for individuals who are known urinary oxalate stone formers. Ascorbic acid is metabolized to oxalic acid, and high-dose vitamin C can be a risk factor for the development of calcium oxalate stones. Frequent questions arise concerning the safety of consuming cranberry products while on warfarin therapy. Peer reviewed interaction studies report there is no evidence of risk of a clinically relevant interaction between warfarin and cranberry products when they are consumed in moderation (two 8 oz. glasses/day).46-49 The U.S. Food and Drug Administration approved an update to the Warfarin Medication Guide that removes the warning against cranberry consumption while taking the drug. However, physicians and pharmacists closely monitor the drug for possible interaction between warfarin and antibiotics.

Summary
UTIs are common in older adults especially those residing in long-term care settings. They are a frequent reason for both hospital-acquired infections and hospital readmissions. Traditional antibiotic treatment also has detrimental side effects, such as gastrointestinal distress, appetite decline and weight loss leading to an increased risk of diarrhea, resistant organisms and infection due to Clostridium difficile.

Implementing a UTI reduction plan that incorporates the inclusion of medical food, such as cranberry containing products, can effectively lower the number of recurring UTIs, reduce the number of antibiotics prescribed, decrease direct and indirect cost associated with treating UTIs, reduce hospital readmission costs and improve the quality of life for older adults.

Contact Amerinet Customer Service at 877-711-5600 or info@amerinet-gpo.com

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Amerinet, Inc.
Two CityPlace Drive, Suite 400
St. Louis, MO 63141
877-711-5700
www.amerinet-gpo.com
Reduce Antibiotics: Implement a UTI Reduction Protocol

References

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