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UTI Management in Long Term Care: Implementing an Effective UTI Protocol

Presented by:
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Objectives

✓ Recognize factors that contribute to UTIs in the long term care setting.

✓ Review relevant & recent data on UTI Management.

✓ Understand important factors to consider when choosing cranberry-containing medical foods for UTI management.

✓ Learn tactics on how to effectively implement a UTI protocol in your facility while improving quality of care.

Prevalence & Cost of Treating UTI

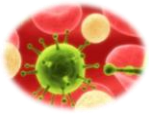
- **Most prevalent infection in LTC**
  - Accounts for ~40% of all infections & over 8% of total costs in nursing home care
- Most prevalent source of bacteremia
- Most common reason for hospital transfer
- Costs to treat a UTI is ~$691, not including costs associated with complications

Hooton & Stamm. 1997. Infect. Dis. Clin. North Am; Ikaheimo, R. et al. 1996.Clin. Infect. Dis. 22, 91–99; Nicolle LE, Asymptomatic bacteriuria in the elderly. Inf Dis Clin North Am 1997;11:647-62

Healthcare Associated Conditions (HAI) are the Leading Cause of Deaths

- **1.6 - 3.8M infections** occur per year in LTC
  - ~400,000 deaths
- Most frequent cause of **hospital transfer & readmissions**
- USDHHS National Action Plan to prevent HAI

5 priority areas:
1. **Urinary tract infections**
2. C. diff
3. Skin & wound infections
4. Lower respiratory tract infection
5. Influenza & influenza-like illness



Koch et al, (2009) 71, 269-274
Strausbaugh et al, 2000; 21: 674-679
Teresi JA et al. Dec 1991; 31(6):795-806
Ouslander JG et al, J Am Med Dir Assoc 2011; 12: 95–203
CMS, LTC MDS, Resident profile table as of 05/02/2005. Baltimore. MD

National Initiatives

Affordable Care Act
- Integrated care
- Preventing readmissions

CDC Campaign
- Get Smart for Healthcare
- Starting from hospitals, moving to LTC
- Antibiotic Resistance

Infections Increase Antibiotic Use

- Constitutes up to 40% of all prescribed medications
- 70% of residents are on at least 1 antibiotic treatment within a yr
- **25-75% of the antibiotic use in LTC is inappropriate**
- **27,000 nursing home residents have antibiotic resistant infections**

Koch et al, (2009) 71, 269-274
Strausbaugh et al, 2000; 21: 674-679
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Ouslander JG et al, J Am Med Dir Assoc 2011; 12: 95–203
CMS, LTC MDS, Resident profile table as of 05/02/2005. Baltimore. MD

Antibiotics Contribute to Adverse Drug Reactions (ADR)

- **5-28%** of hospital admissions involved an (ADR).
- **82%** of residents taking ≥ 6 medications develop an ADR.
- Taking ≥ 6 medications increases mortality rate.

In LTC, for every **$1 spent on medications, $1.33 was spent on treating ADRs**

Päntiöri J, Edlund BJ. J Gerontol Nurs 2010;36:9-12.
Jyrkka J, Enlund H, Korhonen MJ, et al. Drugs Aging 2009;26:1039-1048.
Beer C, Hyde Z, Almeida OP, et al. Br J Clin Pharmacol 2011;71:592-599.
Field TS, Gurwitz JH, Harrold LR, et al.J Am Geriatr Soc 2004;52:1349-1354.
Bootman JL, Harrison DL, Cox E. Arch Intern Med 1997;157:2089-2096.

Diagnosing a UTI

Challenges:

- Recent data: Nace et al 2014
- "No gold standard"
- No uniformly accepted/applied UTI definition

"Choose Wisely" campaign cautionary statement

- No criteria will be perfect in the debilitated elderly so that follow-up and judgment will always be needed
- Monitoring is not "doing nothing"

UTI Classification

- **Asymptomatic UTI (no symptoms)**
- **Symptomatic UTI (symptoms)**
- Minimal criteria for initiating antimicrobials
  - Positive urine culture (>10^5 CFU/ml) **and** dysuria with 2 or more of symptoms below:

•**Fever**	•**Shaking Chills**
•**Urgency**	•**Frequency**
•**Flank Pain**	•**Gross hematuria**
•**Urinary Incontinence**	•**Suprapubic pain**

Loeb et al, 2005

UTIs Treated with Antibiotics

High Incidence of Reoccurrence!

By 4–6 weeks, 50%–70% of individuals treated for a UTI will again have positive urine cultures.

Nicolle LE. Asymptomatic bacteriuria in the elderly. Infect Dis Clin North Am 1997;11:647-62.

Antibiotic use for Asymptomatic UTI

- Associated with recurrent infections
- Multidrug resistant (MDR) bacteria
- Does not change survival or chronic symptoms
- **NOT RECOMMENDED** *(Infectious Diseases Society of America)*

UTI Development

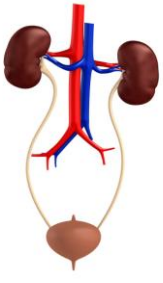
Pathogenic microorganisms originate from fecal or vaginal sources & migrate upward

↓

Enter the urethra, attach, proliferate and cause symptoms

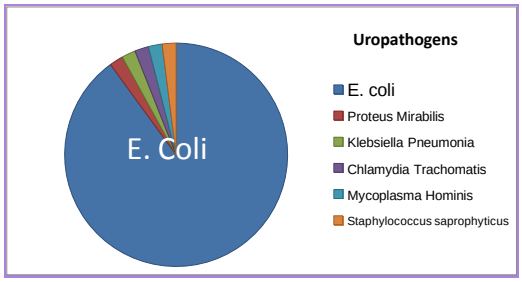
↓

Irritating the bladder wall causing an inflammatory effect



Gross L (2006) Bacterial Fimbriae Designed to Stay with the Flow. PLoS Biol 4(9): e314 doi:10.1371/journal.pbio.0040314

UTI Development - Trouble Makers

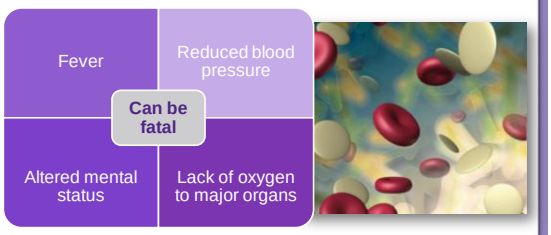


UTIs Can Result in:

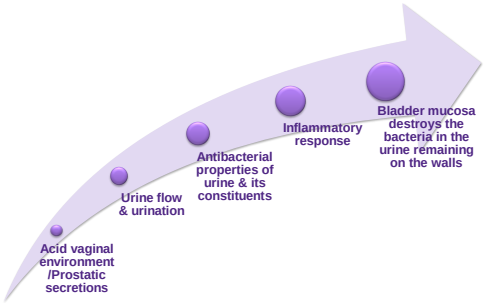
- Urgency, **Incontinence**
- Confusion and **falls**
- **Pain & depression**
- **Decrease in daily activity** due to fatigue, **pain**, & urgency
- Increases metabolic rate, decreases appetite**, decreases albumin levels,** negatively impacting **nutritional status**
- **Antibiotic use**
- **Further infections** & MDRO
- **Skin breakdown** & skin infection
- Account for almost 30% of **hospitalizations**

Items in **BOLD** are Quality Measures

UTI Left Untreated



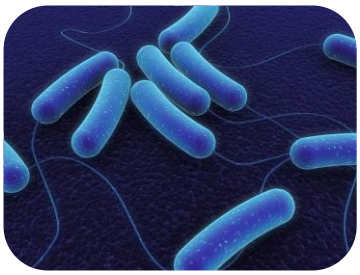
Natural Host Defense Mechanisms



Age Related Changes Increasing UTI Risk

- Weakening of urethral mucosa increasing ability of pathogenic bacteria to adhere
- ↑ vaginal pH, allowing colonization of bacteria
- ↓ in beneficial intestinal bacteria allowing harmful bacteria to grow
- ↑ inflammatory state
- Difficulty consuming large volumes of fluid
- ↑ glucose intolerance & diabetes

Key to UTI Prevention is to Decrease the Adhesion of E.coli to the Urinary Tract Wall



Collaborative Care for Prevention and Treatment

- Eliminate causative agent
- Prevent relapse
- Correct contributing factors, as able

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Dietary factors for UTI MANAGEMENT

Pre & Probiotics

Cranberries

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Dietary Factors for UTI Management

Cranberry containing products are the most promising non-pharmacological option

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Cranberry Extract vs Antibiotic Prophphylaxis

- **137 women (mean age 63) w/ >2 antibiotic-treated UTIs in the previous 12 mo were randomized to receive either:**
  - 500 mg of cranberry extract for 6 mo
  - 100 mg of trimethoprim for 6 mo

No significant difference:
39/137 participants had an antibiotic-treated UTI (25 in the cranberry group & 14 in the trimethoprim group)

Antibiotics had a very limited advantage over cranberry extract in the prevention of recurrent UTIs in older women and had more adverse effects

McMurdo, M. E. T. et al. J. Antimicrob. Chemother. 2009 63:389-395

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Medical Foods Definition

Foods that are specially formulated & processed for the patient/resident who is seriously ill or who requires the product as a major treatment modality

Criteria:

- Oral or tube feeding
- Labeled for the dietary management of a specific medical disorder, disease, or condition for which there are distinctive nutritional requirements
- Intended to be used under medical supervision

http://www.cfsan.fda.gov/~dms/medfguid.html

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Medical Foods can Improve Quality of Care Indicators related to UTIs

Indicators of Quality	
One or More Falls with Major Injury	√
Self-Report Moderate to Severe Pain	√
High-Risk Residents with Pressure Ulcers	
Urinary Tract Infection	√
Lose Control of their Bowels	
Lose Control of their Bladder	√
Need for Help with Activities of Daily Living Has Increased	√
Lose Too Much Weight	√
Have Depressive Symptoms	√
Unnecessary drugs	√
Infection rate	√
Hospital readmission rate	√
Total	10

Starts with Intestinal Tract health

Colon Health contributes to Urinary Tract Health

Prebiotics

- Many prebiotics are 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

Gibson GR, Roberfroid MB. J Nutr. 1995 Jun;125(6):1401-12.

Prebiotics Beneficial Effects in Older Adults

Target	Age (yrs)	Prebiotic	Outcome	Reference
Microbiota composition	69 ± 2	FOS	↑ bifidobacteria	Bouhnik et al., 2007
	77-97	FOS	↑ bifidobacteria	Guigoz et al., 2002
	68-89	Inulin	↑ bifidobacteria	Kleesen et al., 1997
Immune function	84 ± 7	FOS	↓ markers of inflammation	Schiffrin et al., 2007

Adapted from Tiihonen et al.: Ageing Res Rev 2009

Functions of FOS

Selectively promote Probiotics (e.g. *Lactobacillus* & *Bifidobacteria*) → **Produce SCFA**

→ **Lowers colonic pH** → **Make colonic environment less favorable for pathogens**

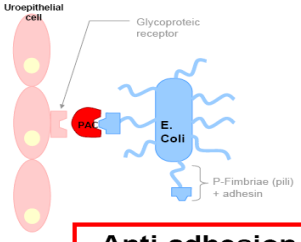
→ **Provide food for colon cells maintaining integrity**

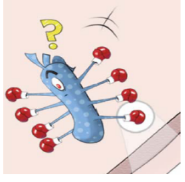
Cranberries Contain:

Proanthocyanidins (PACs)

PACs have an Anti-Adhesion Effect on E.coli

1. Change the shape from rods to spheres
2. Compress fimbriae
3. Alter the cell membranes





Anti-adhesion mechanism

How Long Does it Protect?

Cranberry products beneficial effect on urinary tract health may start within 2hrs of consumption & can last up to 10 hrs

Plethora of Data Supporting Efficacy of Cranberry and Urinary Tract Health

- ✓ > 350 research and review articles
- ✓ cranberryinstitute.org

Academy of Nutrition and Dietetics Nutrition Care Manual Recommendations

Dietary Interventions to assist with reducing the incidence and recurrence of UTIs:

- Encourage adequate fluid intake
- Recommend consumption of cranberry juice
- Recommend consumption of products, such as fermented milk, containing probiotics.

Academy of Nutrition and Dietetics. Nutrition Care Manual. http://www.nutritioncaremanual.org. Renal Conditions. Urinary Tract Infections. Accessed April 6, 2014.

Meta-analysis of RTC on UTI prevention with cranberry products

Study	Cranberry No. of Events	Cranberry Total No.	Control No. of Events	Control Total No.	RR (95% CI)	W(fixed), %
Schlager et al.[17] 1999	2	15	3	15	0.67 (0.13-3.44)	2.5
Kontiokari et al.[18] 2001	8	50	18	50	0.44 (0.21-0.93)	14.8
McGuinness et al.[19] 2002	21	62	24	73	1.03 (0.64-1.66)	18.1
Stothers et al.[20] 2002	19	100	16	50	0.59 (0.34-1.05)	17.5
Waites et al.[21] 2004	10	26	8	22	1.06 (0.51-2.21)	7.1
McMurdo et al.[22] 2005	7	187	14	189	0.51 (0.21-1.22)	11.4
Hess et al.[23] 2008	6	47	16	47	0.38 (0.16-0.87)	13.2
Wing et al.[24] 2008	4	125	0	63	4.55 (0.25-83.27)	0.5
Ferrara et al.[25] 2009	5	27	18	27	0.28 (0.12-0.64)	14.8
Fixed-effect model		639		536	0.62 (0.49-0.80)	100

Heterogeneity: I^2 = 43%, P = .08

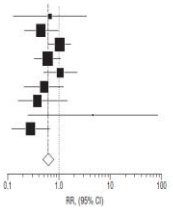


Figure 4. Forest plot: summary effect of cranberry in prevention of urinary tract infection, expressed as risk ratio (RR). W(fixed) indicates weights in fixed-effect Mantel-Haenszel model.

Chih-Hung Wang et al. Cranberry-Containing Products for Prevention of Urinary Tract Infections in Susceptible Populations. *Arch Intern Med. 2012;172(13):988-996*

Cranberry formulations

- **Cranberry juice cocktail**
- **100% cranberry juice**
- **Cranberry capsules**
- **Tablets**
- **Liquid cranberry concentrate**

Only 1 fl oz

Cranberry Juice

Highly variable
High in Volume
High in Calories & Sugar
Low tolerance in elderly

What to look for in a Cranberry Product

- **Clinically shown to manage UTIs**
- **High concentration of cranberry**
  - cranberry extract, concentrate, or pure cranberry juice
- **Ease of consumption/tolerability-**
  - Concentrated cranberry
  - Ready to drink
  - Low volume
  - Taste is acceptable
- **Low sugar content**
- **Other nutrients can help with urinary tract health**
  - Vit C, D-Mannose, FOS, Bromelain

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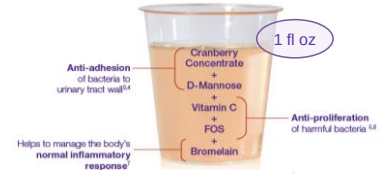
Liquid Cranberry Concentrate Medical Foods

- ✓ Designed for the elderly population and healthcare professionals in this field
- ✓ High concentration of cranberry in **low volumes**
- ✓ May contain **other nutrients** that help with urinary tract health



3. Wang C, et al. *Arch Intern Med. 2012;172(13):988-996.* 4. Otek I, et al. Scand J Infect Dis Suppl. 1982;33:61-7. 5. Carlsson S, et al. Nitric Oxide-Biol Ch. 2001;5(6):580-6. 6. Cummings et al. Am J Clin Nutr. 2001;73(2):415s-420s. 7. Mori S, et al. Acta Obstetrica Et Gynaecologica Japonica.1972;19(3):147-53.

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Cranberry Concentrate Complex Clinically Shown in 2 Studies to Manage UTIs

- Prospective interventional trial
- 88 LTC residents w/ ASB or a history of ≥ 2 UTIs in past 12mo
- 1 fl oz serving of liquid cranberry concentrate complex b.i.d for 12 wks

- 92% remained UTI free
- Empirical evidence showed a reduction in the incidence of falls

Posthauer ME. *The Director.* 2008;16:13-16.

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Cranberry Concentrate Complex Clinically Shown to Manage UTIs

- **23 pre- & postmenopausal female patients with history of UTIs**
- **Ave of 2.78 ± 0.73 UTIs at baseline over 6 months**
- **Administered 15 mL to a maximum dose of 75 mL daily for 12 wks**

- 91% of subjects remained UTI free
- Significant improvement in QOL

Efros M et al. *Urology Gold.* 2010.

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Cranberry is Safe to Consume with warfarin

There is <u>no evidence of risk</u> of a clinically relevant interaction between warfarin & cranberry products from peer-reviewed interaction studies when cranberry juice is consumed in moderation (2x 8 oz glasses/day)

Table 1. Summary of studies examining a potential cranberry juice-warfarin interaction from the literature

Study	Participant numbers	Study design	Treatment groups	Duration of cranberry juice exposure	PK result[a]	PD result[a]
Li et al (2006)[7]	7 patients (warfarin for AF)[a]	Crossover	Warfarin + cranberry juice/placebo	Extended	Not determined	No effect (INR)
Greenblatt et al (2006)[8]	14 healthy volunteers	Crossover	Flurbiprofen (single dose) (preceded by cranberry juice, placebo, grape juice, tea or fluvoxamine)	Short-term	No effect	N/A
Lilja et al (2007)[9]	10 healthy volunteers	Parallel	R-S warfarin, tizanidine, midazolam (5 days) + cranberry	Extended	No effect	No effect (thromboplastin time)
Abdul et al (2008)[10]	12 healthy male volunteers	Open-label, randomized crossover	Single dose 25 mg warfarin, alone or after 2 weeks of cranberry juice concentrate capsules or garlic tablets	Extended	No effect	INR AUC increased by 28% (max 8% difference at any individual time point) in warfarin/cranberry juice group
Asseli et al (2009)[11]	30 patients (14: placebo, 14 cranberry juice) AF (9), DVT (9), PE (6), VHD (3), CVD (4), CHF (1)[a]	Parallel	Cranberry juice vs. placebo	Extended	No effect	No significant effect on INR
Uchijima et al (2009)[12]	6 male, 2 female healthy volunteers, mean age 30.5 (range 23–44 years)	Open-label, two-period, crossover design with a wash-out period of >2 weeks	Cranberry juice vs. water with or without diclofenac (a medication metabolized by CYP2C9)	Medium duration (5 days), dosing of cranberry juice 180 ml, twice a day	No effect in healthy volunteers	No interaction with diclofenac in vivo, although inhibition of CYP2C9 in microsomal preparation in vitro
Phelan, et al (2010)[13]	10 patients, ages 63–86, on warfarin for AF (3), PE (5), DVT-stroke or DVT and AF (1 each)[a]	Open-label, prospective	On stable warfarin dose, INR 2-3.	Cranberry juice (100%), 240 ml, twice/day x 7 days	N/A	No significant difference found in the mean PT at baseline vs. anytime during the study[a]

[a]AF = atrial fibrillation; DVT = deep vein thrombosis; PE = pulmonary embolism;VHD = valvular heart disease; CVD = cerebrovascular disease; CHF = congestive heart failure; AUC = area under the curve; PT = prothrombin time.

How to Lead Positive Change in your Facility

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Keys to Implementing Change

- Nursing Home staff are committed, intelligent, hardworking people.
- Changes in knowledge and skills of front-line staff are needed for sustaining changes.
- Organizational structures and processes must be adjusted to support the change for desired outcomes.

Bowers, B. Implementing Change in Long Term Care. 2007. link

SWOT ANALYSIS

Key Recommendations

- **Create strategies to engage staff at all levels.**
- **Design changes with ongoing input from staff.**
- **Ensure engagement of unit nurses and department heads in planning educational programs.**
- **Address the organizational influences on changes.**
- **Address organizational and clinical barriers to change.**
- **Support development of problem-solving skills.**
- **Create accountability systems that provide timely and effective feedback.**
- **Be sure roles are clear and consistent with goals of implementation.**

Bowers, B. Implementing Change in Long Term Care. 2007. link

Change and Effective Leaders

Effective Leaders:

- ✓ **Build relationships**
- ✓ **Provide direction**
- ✓ **Lead courageously**
- ✓ **Influence others**
- ✓ **Foster teamwork**
- ✓ **Champion change**
- ✓ **Coach and develop others**
- ✓ **Motivate and inspire others**

From www.leadershipthatworks.com

Bowers, B. Implementing Change in Long Term Care. 2007.

What Leaders Can Do in Times of Change

1. **Be clear about why change is being implemented.**
2. **Understand what your staff are experiencing by actively participating in the change.**
3. **What you do is more important than what you say.**
4. **Anticipate and address staff responses.**
5. **Determine how you will determine whether you have been successful.**
6. **Look at whether your daily activities are consistent with the changes you are implementing.**
7. **Respond to challenges during the changes by helping staff clarify the problem.**

An Example of Leading Change for Better UTI Outcomes

UTI Rate Before Changing UTI Protocol

- **UTI incident rate prior to UTI protocol:**
  6% in 2012
- **Previous UTI protocol:**
  - Cranberry juice/tabs
  - Antibiotics
  - Multiple repeat cultures were used

Potential Challenges to Changes

Initial reaction from colleagues to UTI protocol using concentrated liquid cranberry complex:

Skeptical → "New Fad" → Won't work

Effective Implementation of a UTI Protocol

Tools used to get "buy-in" from staff/doctors:

- Education including new employee orientation
- Printed information to all of the MD's
- Persistence
- Open discussions regarding best practices, resident well being, falls, fractures, hospitalizations and deaths

UTI Protocol Implementation

- Complete urine dip on **all new admissions**
- Administer liquid cranberry complex to all resident with **positive urine dips for 30 days**
- Administer liquid cranberry complex to **all residents with foley cath indefinitely**
- Administer liquid cranberry complex to all residents who have **recent foley cath for 30 days**
- Administer liquid cranberry complex to all resident with **diagnosis of UTI for 30 days** (even if on an antibiotic)
- Administer to all residents with **neurogenic bladder indefinitely**

UTI Protocol – Monitoring the Change

Compliance of Protocol

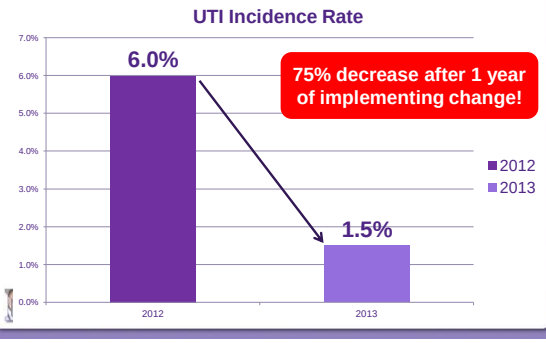
- Nurse sign on the MAR for administration of liquid cranberry complex
- Audit the MARS
- Track the UTI's
- Audit new admissions for urine dips and qualifying diagnosis

Success!

UTI incident rate after UTI Protocol implemented:

1.5% in 2013

UTI Incidence Rate Improvement



Summary

True leadership lies in guiding others to success.
—Bill Owens

- **UTIs are the most prevalent infection in LTC & impact many quality indicators.**
- **Dietary interventions, including medical foods containing cranberry & prebiotics, have been shown to help manage UTIs.**
- **Implementing a Protocol for UTI management provides:**
  - A tool for educating staff at all levels.
  - A method to consistently provide a high level of care.
  - A system to audit and evaluate care processes.
- **A Reduction in UTIs leads to improvement in Quality Indicators & Resident Quality of Life**

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Thank you and Questions

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