Management of Recurrent UTIs: The Urology Perspective
Melissa Montgomery, MD
Ochsner Department of Urology

1 in 3 women will have a UTI by age 24
20% of college age women had recurrence in 6 months in 1 study
44% of Finish women had a recurrence of a UTI in 1 year of initial UTI

The most likely time to recurrence of a UTI is 30-60 days


Recurrent UTI

- The most common bacterial infection in the ambulatory care setting is UTI and accounted for 8.6 million visits in 2007.
- In 2011, there were 400,000 admissions costing 2.8 billion.
- Incidence increased by 52% from 1998-2011.

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Recurrent UTI

- 3 or more culture proven symptomatic urinary tract infections in 12 months or 2 in 6 months.
- A follow up culture 2 weeks after treatment should be performed (in practice doesn’t happen much).
Reinfection or Persistence?

- Bacterial reinfection – Evident if follow up culture after treatment with culture based antibiotic therapy shows:
  - A different organism
  - Same organism more than 2 weeks later
  - Same organism with a proven negative culture

- Bacterial Persistence – Same organism with no resolution of culture on 2 week follow up

Persistent UTI

- Distinguish from Recurrent UTI – same organism, culture never became negative
- Causes
  - Bacterial resistance
  - Sub-therapeutic levels
  - Fistula
  - Diverticulae (incomplete eradication) – calyceal, bladder, urethral
  - Stones, esp. struvite; foreign body: unsterilizable reservoir
- Treatment
  - Check sensitivities/compliance
  - Imaging/Cystoscopy
Complicated UTI

- Immunosuppressed (Steroids, diabetes, HIV, transplant)
- Pregnant
- Male
- Structural abnormality (VUR, calyceal tic, UPJ obstruction)
- Urinary obstruction (BPH, stricture, UPJ), Neurogenic bladder, high PVR
- Urolithiasis
- Cystocele, Diverticulum, Fistulae, Tumor
- Iatrogenic – Nosocomial, Surgery, Indwelling foley, stent or drains
Other Risk Factors

- Sexual activity – new partner in last year, multiple partners
- Spermicide use (alters vaginal flora)
- Family history in the mother
- Childhood history of frequent UTI

Risk Factors for Recurrent Urinary Tract Infection in Young Women
Delia Scholes Thomas M. Hooton Pacita L. Roberts Ann E. Stapleton Kalpana Gupta Walter E. Stamm

Behavioral Modifications

- Wiping front to back
- Urinating before and after intercourse
- Not delaying urination
- NO data to suggest this works, but REASONABLE to suggest

Duane R Hickling, MD and Victor W Nitti, MD
Asymptomatic Bacteriuria

- More common in women and elderly patients
- Antibiotics can lead to more antibiotic resistance
- Don’t treat!
- Screening and treatment indicated for pregnancy and prior to GU procedures

Physical Examination

- Female
  - Prolapse
  - Atrophic Vaginitis
  - Urethral diverticulum
  - Cath urine for PVR and send for culture
  - Fistulae
- Male
  - Penis – circumcised/phimosis/meatal stenosis
  - Testicles – epididymitis?
  - Prostate – Enlargement/Nodules/Prostatitis/Abscess
  - Bladder scan for PVR
Urine Studies

- Urinalysis
  - Leukocyte esterase dipstick alone does not diagnose a UTI. 64-90% specific and sensitive for a UTI
  - Not all bacteria reduce nitrate to nitrite (Strep, Enterococcus, Pseudomonas), only 50% sensitive for a UTI
  - Pyuria (>10 WBC/hpf) very sensitive for UTI, but not specific

- Urine culture
  - Greater than 100,000 colonies/mL considered diagnostic
  - Cath urine and suprapubic aspirates can be diagnostic if lower counts

- Urine gram stain

Pyuria without Bacteriuria

- Causes
  - Bacterial vaginosis
  - Chlamydia, Gonorrhea, Trichomoniasis
  - High-grade bladder cancer
  - Urolithiasis
  - Tuberculosis
  - Prostatitis
  - Foreign body
Relapsing Infections

- Should prompt a urologic investigation to detect possible anatomic and treatable causes of these infections

Additional Workup

- Imaging
- Cystoscopy?
- Urodynamics?
- Selective ureteral urine cultures
- Stamey test/VB3
Selective Cultures

- Use for patients with recurrent UTI, where we are unsure of the source
  - Atrophic kidney
  - Hydronephrosis
  - Small stones

- Technique: open ended catheter up ureter with wash from each kidney (right, left, transplant)

Stamey Test

- VB1 - voided bladder 1, which represents the urethra (initial urine)
- VB2 - voided bladder 2, which represents the bladder (mid stream)
- EPS - expressed prostatic fluid, which represents the prostate (from tip of penis after examination)
- VB3 - voided bladder 3, which also represents the prostate (urine after EPS)

Chronic Bacterial Prostatitis

**Class II Prostatitis**

<table>
<thead>
<tr>
<th>TRADITIONAL</th>
<th>NATIONAL INSTITUTES OF HEALTH</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute bacterial prostatitis</td>
<td>Category I</td>
<td>Acute infection of the prostate gland</td>
</tr>
<tr>
<td>Chronic bacterial prostatitis</td>
<td>Category II</td>
<td>Chronic infection of the prostate gland</td>
</tr>
<tr>
<td>N/A</td>
<td>Category III</td>
<td>Chronic pelvic pain syndrome (CPPS)</td>
</tr>
<tr>
<td>Nonbacterial prostatitis</td>
<td>Category IIIA</td>
<td>Inflammatory CPPS</td>
</tr>
<tr>
<td>Prostatodynia</td>
<td>Category IIIB</td>
<td>Noninflammatory CPPS</td>
</tr>
<tr>
<td>N/A</td>
<td>Category IV</td>
<td>Asymptomatic inflammatory prostatitis (AIP)</td>
</tr>
</tbody>
</table>

- 4-5% of patients will have a positive VB3 culture
- Antibiotics should not be given to patients with long standing chronic prostatitis
- Antibiotics can be considered in patients that are antibiotic naïve, regardless of culture status
- Placebo, Anti-inflammatory effect, non-pathogenic bacteria

Imaging

Renal Ultrasound
CT Scan

Staghorn Calculus
Urolithiasis

- Renal Stones
  - Struvite Stones
  - Other infection stones
  - Calyceal diverticulum with stones
- Ureteral Stones
  - Obstructing and Non-obstructing
  - Surgical emergency in the presence of a UTI
- Bladder stones

ESWL

LITHOTRIPSY

Ultrasound shock waves

Smaller pieces that then can easily pass through the ureters

Kidney stones

Ureter
Percutaneous Nephrolithotripsy

Ureteroscopy with laser lithotripsy
Stone Cultures

- 204 percutaneous procedures
- 9.8% had SIRS despite adequate treatment of pre-op urine cultures and pre-op antibiotics
  - 1st or 2nd generation cephalosporin
  - Aminoglycoside with metronidazole or clindamycin
- 64% (renal pelvic culture) and 75% concordance with (stone culture) with post operative positive cultures

Hydronephrosis

- UPJ obstruction
- Ureteral stricture
- Vesico-ureteral reflux
- Urothelial tumors
- Extrinsic compression (tumors, retroperitoneal fibrosis)
Chronic Ureteral Stents

- Chronic Hydronephrosis
- Extrinsic Tumors
- Retroperitoneal Fibrosis
- Ureteral stricture

Biofilms/Encrustations

- Biofilms are sheets of bacteria in extracellular matrix that grow on/in stents and catheters
- Antibiotics can not eradicate: should change catheter/stent before starting antibiotics
- Urease producing organisms can from encrustations that obstruct the lumen of stents/catheters
Spinal Cord Injury/Neurological Conditions

- Spinal Cord Injury
- Multiple Sclerosis, Diabetes, Spina bifida
- Risk for neurogenic bladder (NGB) or bladder dysfunction
- Risk of recurrent urinary tract infections
  - Risk of UTI is 2x per year per patient with NGB
  - 70% of fevers in hospital admissions in one study (346 patients in study)
  - Etiology of 1/5 of patients readmitted after SCI and average stay was 15 days (951 patients studied)


Bladder Management

- CIC – clean intermittent catheterization (also sterile)
  - Lower risk of infection
  - Preferred if patient performs it or single provider
- Indwelling foley
  - Must be closed system with minimal to no disconnections
- Suprapubic Catheters
  - Increased risk of Stones
Symptoms of UTI in SCI patients/Neurogenic Bladder

- Fever, rigors
- Altered mental status
- Increase frequency of catheterization/Change in continence
- Malaise or lethargy with no other causes
- Pain
- Autonomic reflexia/Increased spasticity
- *** Cloudy Urine, Odor, Pyuria and a Positive Culture alone do NOT constitute an infection in these patients ***

UTI in CIC patients

- High intra-vesical pressures increase the risk of UTI and renal deterioration
- Prophylactic antibiotics – NOT recommended
- Supplements show no proven benefits in these patients
Outcome comparison of different approaches to self-intermittent catheterization in neurogenic patients: a systematic review
Shamout S, Biardeau X, Corcos J, Campeau L.

- Systematic review
- Reviewed 3768 articles, 31 were included based on 1b-2b evidence
- Recurrent UTI and urethral trauma decreased in hydrophilic-coated catheters. Patient satisfaction also higher.
- Sterile CIC showed less UTI, but costs higher

UTI and Indwelling Catheters

- Risk of bacteriuria = 5% per day
- Most important factor in prevention – is not placing it if not needed
- Second most important factor in prevention – closed drainage system with few disconnections
- Antibiotic prophylaxis at time of catheter removal for GU surgery, not for a simple atraumatic catheter change – AUA Best Practice guidelines
Cystourethroscopy
Bladder Tumors
Bladder Stones
Bladder diverticulae
Urethral diverticulum
Foreign body
Bladder outlet obstruction
Urethral strictures

Cystoscopy?
Prior urinary tract surgery or trauma
Gross hematuria
Previous bladder or renal calculi
Obstructive symptoms (straining, weak stream, intermittency, hesitancy), low uroflowmetry or high PVR
Urea-splitting bacteria on culture (e.g., Proteus, Yersinia)
Bacterial persistence after sensitivity-based therapy
Prior abdominopelvic malignancy
Diabetes or otherwise immunocompromised
Pneumaturia, fecaluria, anaerobic bacteria or a history of diverticulitis
Repeated pyelonephritis (fevers, chills, vomiting, CVA tenderness)
Asymptomatic microhematuria after resolution of infection (Defined by 3 or more RBC per HPF)
Urodynamics

Neurogenic Bladder
Spinal Cord Injury
Bladder Outlet
Obstruction
Incontinence
Incomplete bladder emptying

Antibiotic Prophylaxis
for Urodynamics

- Prophylaxis for
  - Elevated PVR
  - Known neurogenic lower urinary tract dysfunction
  - Asymptomatic bacteriuria
  - Immunosuppression
  - Age over 70
  - Patient with any indwelling catheter, external urinary collection device or performing catheterization.

Best practice policy statement on urodynamic antibiotic prophylaxis in the non-index patient
Anne P. Cameron, Lysanne Campeau, Benjamin M. Brucker, J. Quentin Clemens, Gregory T. Bales, Michael E. Albo, Michael J. Kennelly. 27, March 2017. Neurourology and Urodynamics.
Bladder Outlet Obstruction

- Benign Prostatic Enlargement
- Prostate cancer (advanced)
- Bladder neck contracture
- Urethral stricture

Medical Management of Benign Prostatic Enlargement

- Alpha Blockers
- 5 alpha reductase inhibitors
Surgical Management of BPH

Antibiotics

- Consult local antibiogram
Uncomplicated UTI (cystitis)

- Nitrofurantoin 100 mg BID x 5 days or a 3 day course of oral trimethoprim/sulfamethoxazole (TMP/SMX) is 95% effective
- If TMP/SMX resistance is > 10 – 20% (U.S. West coast, Europe), consider fluoroquinolones.
- Only use fluoroquinolones or beta-lactams if one of these recommended antibiotics cannot be used due to availability, allergy, or tolerance
- Augmentin x 7 days could be second line
- Can try fosfomycin 3g x 1. (less effective than Bactrim)

Other Uncomplicated UTI

- A full 7 – 10 day antibiotic course should be used in patients with: diabetes, symptom duration before treatment of > 7 days, pregnancy, age >65 years, or past history of pyelonephritis or UTI with resistant organisms
Complicated UTI (acute pyelonephritis)

- Patients who are candidates for outpatient therapy may utilize:
  - Oral ciprofloxacin 500 mg BID x 7 days
  - Once daily oral fluoroquinolone (ciprofloxacin 1000 mg ER x 7 days or levofloxacin 750 mg x 5-7 days)
  - Oral TMP-SMX DS BID x 14 days (not for Enterococcus or Pseudomonas)
  - Use of initial one-time IV agent (ceftriaxone 1 g, aminoglycoside, fluoroquinolone) until susceptibility back
  - Treat for 14 days with other beta-lactam agents if needed

- For inpatient management
  - IV fluoroquinolone
  - Aminoglycoside +/- ampicillin
  - 3rd generation cephalosporin
  - Extended spectrum penicillin
  - Carbapenem

- Blood cultures positive in 20 – 40% of patients

- Adjust antibiotics based on cultures and switch from parenteral to oral therapy at 48 hours after clinically well and treat for 14 days

Post-coital UTI

- Post coital antibiotics taken within 2 hours of intercourse does decrease the risk of recurrent UTI

- One study suggests equal efficacy with daily antibiotics


Daily Prophylaxis

- Daily Prophylaxis does decrease the risk of recurrent UTI by almost 90%
- Antibiotic resistance is significantly increased
- The recurrent UTI usually will return after prophylaxis is stopped.

Antibiotics for Prophylaxis

- Nitrofurantoin 50mg daily
- Cephalexin 250mg daily
- Trimethoprim 100mg daily
- Fosfomycin 3g every 10 days
- (Cipro, Bactrim?)
Antibiotics in Pregnancy

- Rate of asymptomatic bacteriuria is not increased (5%)
- Early screening for asymptomatic bacteriuria and treatment to decrease risk of pyelonephritis, IUGR, low birth weight babies and pre-term labor.

<table>
<thead>
<tr>
<th>Safe</th>
<th>Unsafe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>Fluoroquinolones (cartilage)</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>Chloramphenicol (grey baby)</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>Trimethoprim: folate metabolism</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Tetracycline: binds bone/teeth</td>
</tr>
<tr>
<td>Avoid 3rd trimester: sulfa drugs; neonatal jaundice, nitrofurantoin – both cause hemolytic anemia esp with G6PD def.</td>
<td></td>
</tr>
</tbody>
</table>


Urinary Diversion

- Non-Continent Urinary Diversion
- Continent Urinary Diversion
- Orthotopic Neo-bladder
### Treatment of UTI in Urinary Diversion

<table>
<thead>
<tr>
<th>Type of Diversion</th>
<th>Microorganisms Isolated</th>
<th>Treatment</th>
</tr>
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<tbody>
<tr>
<td>Noncontinent Urinary Diversion</td>
<td>Gram-positive skin flora, Gram-negative Enterobacteriaceae (E.coli, Pseudomonas, Proteus), Enterococcus</td>
<td>No tx for asymptomatic bacteriuria, unless hx of recurrent pyelo</td>
</tr>
<tr>
<td>Continent Nonorthotopic Urinary Diversion</td>
<td>Chronic bacteriuria as patient performs CIC</td>
<td>No tx for asymptomatic bacteriuria</td>
</tr>
<tr>
<td>Orthotopic Urinary Diversion</td>
<td>E. Coli and other gram negative Enterobacteriaceae</td>
<td>No treatment for asymptomatic bacteriuria (controversy). Treat for urea-splitting organisms (potential for stones).</td>
</tr>
</tbody>
</table>

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### UTI Prevention

- Cranberry, Ellura
- D-mannose for recurrent e.coli
- Methenamine
- Vitamin C
- L-methionine
- Post coital prophylaxis/Daily prophylaxis
- Estrogen
- Hydration
Cranberry contains Benzoic acid and this gets excreted in the urine as hippuric acid which inhibits bacterial growth (BUT at very high concentrations).

Cranberry contains proanthocyanidin (PAC) that inhibits mannose resistant pili.

Ellura is 36mg of PAC.
Can Cranberries Contribute to Reduce the Incidence of Urinary Tract Infections? A Systematic Review with Meta-Analysis and Trial Sequential Analysis of Clinical Trials
Luís, Ângelo et al.
September 2017

**Systematic review** was done as a meta-analysis and trial sequential analysis of clinical trials.

Examined 25 separate studies involving 4,947 patients and concluded that cranberries can reduce the incidence of UTI, especially in patients with recurrent infections.

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**Weakness of Study**

- Weakness of study was definition of UTI (E.coli UTI or all UTI)
- Daily recommended dose of PAC is 36mg. Patients were not standardized in their ingestion of cranberry.
Small prospective randomized double-blinded placebo control study

24 patients were given either daily oral 36mg PACBL−DMAC or placebo for 16 weeks.

Provided a urine sample every 2 weeks and reported any symptoms of a urinary tract infection at each visit.

This data suggests that concentrated cranberry supplementation may NOT reduce colony counts or prolong the time to symptomatic UTI in patients with neurogenic bladder dysfunction who are dependent on self catheterization.

Cranberry Cost

- Ellura is $40.00 a month
- Cranberry tablets are $7-10 dollars a month
Cranberry Cautions

- Cautions – cranberries and cranberry extract have large amounts of oxalate (concerns with development of kidney stones), might increase Vitamin B12 absorption.

D-Mannose

D-Mannose binds and blocks FimH adhesin which is at the tip of the type I fimbria of enteric bacteria.

Fim H can bind to the carbohydrate-containing glycoprotein receptors on the epithelium of the urinary tract.

D-Mannose can cause saturation of the Fim H receptors and thus prevent adherence of the uro-epithelium.

These are not the E.coli that cause pyelonephritis.
D-Mannose

308 women with history of recurrent UTI (no other risks)
3 groups (D-mannose 2g, Nitrofurantoin 50mg, no prophylaxis)
14%, 20%, 60% respectively developed UTI in follow up over 6 months


D-Mannose

Cost

Cost - $15.00 a month online
D-Mannose

Cautions

- Could have GI side effects/Possibly inhibit sperm capacitation

Methenamine

Mechanism of Action:

- In an acidic environment, methenamine is hydrolyzed to ammonia and to formaldehyde
- Administered with hippuric acid (methenamine hippurate) or mandelic acid (methenamine mandelate). These weak organic acids have some antibacterial activity and also act to keep the urine acidic.
Methenamine

Cost

- Methenamine Mandelate 500mg: $79.71 for 60 tablets
- Methenamine Mandelate 1000mg: $160.95 for 60 tablets
- Methenamine Hippurate 1g: $116.99 for 60 tablets
- Administer with Vitamin C to lower pH (500mg with each dose)

Methenamine

Cautions

- Contraindicated in patients with renal insufficiency, severe liver disease, severe dehydration and patients taking sulfonamides (can form an insoluble precipitate in the urine)
Vitamin C

- Ascorbic acid can have bacteriostatic effects in the urine. Effect is thought to be the reduction of urinary nitrites to reactive nitrogen oxide (not due to lowering urinary pH).
- Vitamin C may lower risk of UTI (not good data)

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Vitamin C Cautions

- The Cohort of Swedish Men (COSM). 48,000 men asked about use of ascorbic acid and 20 other supplements and examined for first incidence of kidney stones.
- Most doses of Vitamin C on the Swedish market are 1000mg
- Study showed a 2x risk of developing kidney stones while taking Vitamin C supplements. This was not shown for those taking multi-vitamins.
Vitamin C Cost

- $7.00 for 1000mg of Vitamin C, 100 tablets online

L-Methionine

- Retrospective study of 82 transplant patients treated with L-methionine, Cranberry or Both and compared it to a control group
- UTI decreased by 63% in Cranberry group (2x 50ml/day) and 48% in L-methionine group (3x 500mg/day)

Ascorbic Acid Supplements and Kidney Stone Incidence Among Men: A Prospective Study. Laura D. K. Thomas, MSc; Carl-Gustaf Elinder, MD; Hans-Göran Tiselius, MD; Alicja Wolk, DrMedSc; Agneta Åkesson, PhD. JAMA Intern Med. 2013;173(5):386-388.
L-Methionine
Cost

- $10.00 for 100 capsules online

L-Methionine
Cautions

- May worsen atherosclerosis (elevating homocysteine levels)
- MTHFR deficiency (processing of homocysteine)
Vaginal Estrogen

- After menopause, only 25-30% of women have lactobacilli in the vagina.
- Vaginal pH increases without lactobacilli presence in the vagina
- Multiple trials with vaginal estrogen have shown some decrease in pathogenic bacteria in the vagina and a decrease in urinary tract infections


Randomized Controlled Trial of Intravaginal Estriol in Postmenopausal women with recurrent UTI

- 93 patients randomized to placebo cream versus vaginal estriol
- UTI was classified as typical symptoms with pyuria, a culture of 100,000 organisms from a mid stream urine
- Symptomatic patients without pyuria had a cath urine performed

A Controlled Trial of Intravaginal Estriol in Postmenopausal Women with Recurrent Urinary Tract Infections
Effects of Vaginal Estrogen

- No lactobacilli were present in vagina of women prior to starting vaginal estrogen
- Almost ½ of women had lactobacilli present in vagina at 1 month of estriol therapy
- No women had lactobacilli in the placebo group at 1 month
- Mean vaginal pH fell from 5.5 to 3.8
- Decrease in vaginal colonization with Enterbacteriaceae

A Controlled Trial of Intravaginal Estriol in Postmenopausal Women with Recurrent Urinary Tract Infections
Estrogen Formulations and Cost

- Estrace – 100 mcg vaginal cream (Daily for 2 weeks, then 3 times per week. Doses are 100-400mcg) – $287.28
- Premarin – 0.625 mg vaginal cream (Daily for 2 weeks, then 3 times per week. Doses are 0.3-1.25mg) - $383.25
- Vagifem -10mcg vaginal suppository. Daily for 2 weeks, then twice a week - $253.99
- Estring – 7.5mcg silastic vaginal ring. Good for 90 days. $422.99
- Femring – (much high doses, consider systemic therapy, not local)

Vaginal Estrogen Cautions

- Endometrial hyperplasia if woman has not had a hysterectomy (decreased if given with progesterone) – can increase risk of endometrial cancer
- Increased risk of ovarian cancer if given with progesterone
- Known history or high risk for Estrogen dependent breast cancer
- Active DVT or Pulmonary embolism
- Stroke or myocardial infarction in the last year
- Liver dysfunction
- Pregnancy
What to buy?

What do I buy?

Azo Cranberry Urinary Tract Health – 60mg Vitamin C, 500mg Cranberry, 30mg of Bacillus Coagulans. $21.00 50 tablets

Azo Urinary tract defense – 162 mg of methenamine/162 mg of sodium salicylate. $7.97 for 24 tablets

Azo Cranberry - Vitamin C (Ascorbic Acid) 120 mg; PACran Natural Cranberry Concentrate 500 mg (High density PAC cranberry concentrate equivalent to 25,000 mg of fresh cranberries per serving. $6.47 for 40 tablets

D-mannose/Cranberry supplements – 1g of D-mannose/300-400mg of cranberry 15.00 for 60 tablets
Vaccines

- Heat killed uro-pathogenic bacteria in suppository form to stimulate innate immunity
- Uro-Vaxom (E.coli) and Solco Urovac (E. coli, Klebsiella, Proteus, P Morganii, Enterococcus)
- Not available in the US
- May show a slight benefit

Probiotics

- No decrease in rate of UTI
- Decrease in febrile UTI in one pediatric study

Solution to Pollution?

Dilution

Research presented at ID week in San Diego 2017 by Dr. Thomas Hooton

Study: 140 premenopausal women in Bulgaria with recurring urinary tract infections, defined as more than three in the previous year, who drank less than a liter and a half of water (about six cups) each day. For an entire year, half the participants upped their daily water intake by one and a half liters, while the other half didn't change their water intake. The women who drank more water cut their UTI rates nearly in half — getting an average of 1.6 infections versus the control group's 3.1 infections. The research has not yet been submitted for publication.
Constipation

- Lots of data on constipation and UTI in children
- Not a lot of data on constipation in adults

CO2 laser resurfacing

- “restoration of the vaginal thick squamous stratified epithelium with a significant storage of glycogen in the epithelial cells and a high degree of glycogen-rich shedding cells at the epithelial surface. Moreover, in the connective tissue constituting the lamina propria, active fibroblasts synthesized new components of the extracellular matrix including collagen and ground substance (extrafibrillar matrix) molecules”.
CO2 laser resurfacing

- CO2 laser
- Improved vaginal atrophy
- May need retreatments 18-24 months
- Improvement in lactobacillus in postmenopausal women (30%-79%)
- Decrease in vaginal pH from 5.5 to 4.7


Menopause. 2017 Jul 31. Randomized, double-blind, placebo-controlled clinical trial for evaluating the efficacy of fractional CO2 laser compared with topical estril in the treatment of vaginal atrophy in postmenopausal women. Cruz VL 1, Steiner ML 1, Pompeu LM 1, Grisafi R 1, Fonseca PLA 1, Santiago LH 1, Wajsfeld T 1, Fernandez CE 1.
CO2 laser resurfacing Cost

- Mona Lisa – 3 treatments at $2700
  - Offered by GYN Ochsner physician at BellaDonna
- Lumenis Femtouch: 3 treatments at $975-1175 per treatment
- Retreatments may be needed

Community Antibiotic Prescribing Rates by State (2013/2014)*

50% of all antibiotics prescribed in U.S. health provider offices are either unnecessary or inappropriate

*Antibiotic prescriptions per 1000 persons
Prescribing data from 2014; population data from 2013
Source: IMS Health
Antibiotic Stewardship

- Do not treat asymptomatic bacteriuria
- Do not treat non-infectious prostatitis
- Stop antibiotics after appropriate short period of prophylaxis
- Treat recurrent/persistent and proven infections with another class of antibiotics
- Shorter courses; never longer nor repeated without due cause
- Educate patients on harms of overuse (including c. dif)

Thank you