Shared Care and the Appropriate treatment of UTIs

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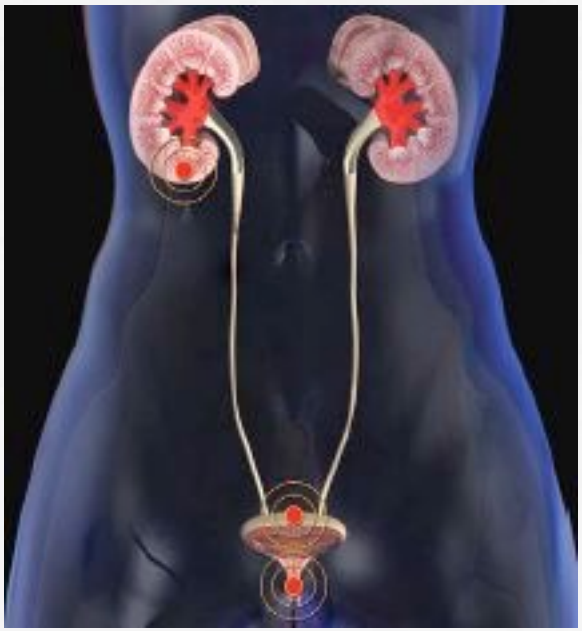
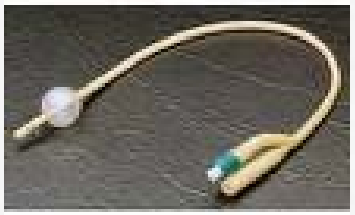
UTI Overview

- Problem
- Etiology
- Simple Vs Complicated
- Bacteria
- Antibiotics
- Resistance patterns
- Cost
- Suggestions for treatment

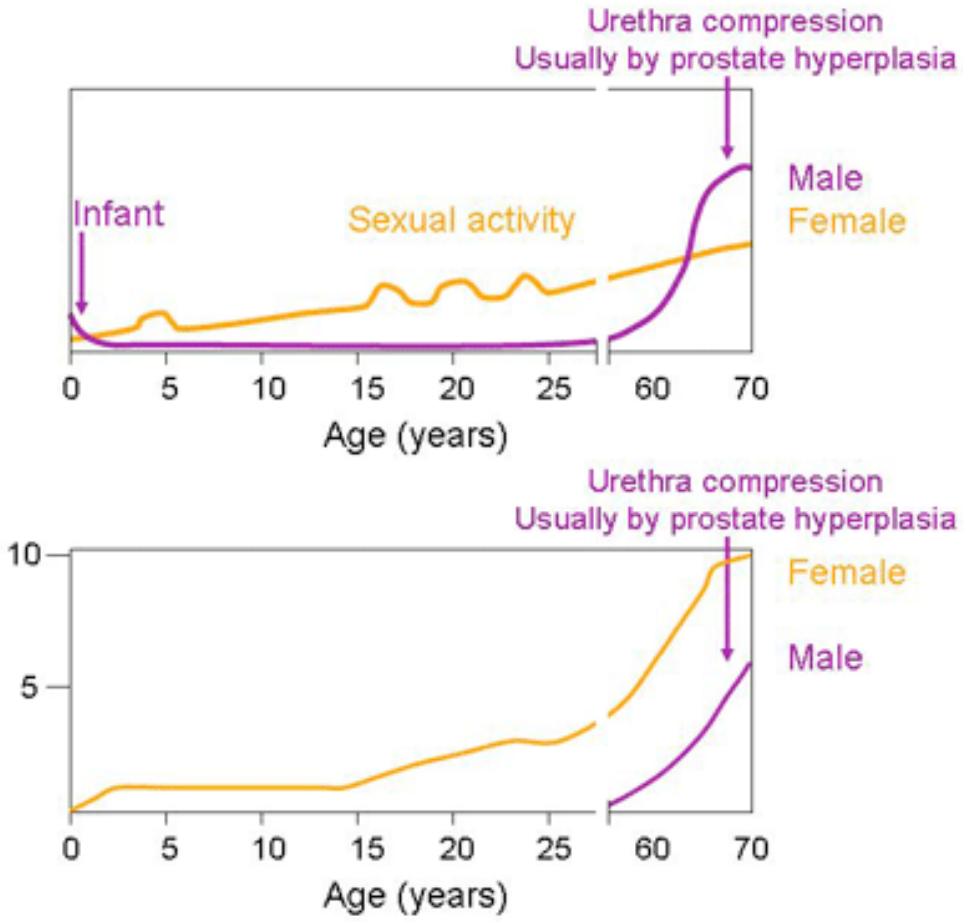


UTI- Most Common Bacterial infection

- Close to 50% of women thru their lifetime
- 40% of all nosocomial infections are UTIs
  - urinary catheters
- > 1 million catheter-associated UTIs/year (U.S.)
  - 40% of hospital gram negative bacteremias
- majority treated by family doctors
- total cost exceeding 1 billion dollars



Incidence of UTI



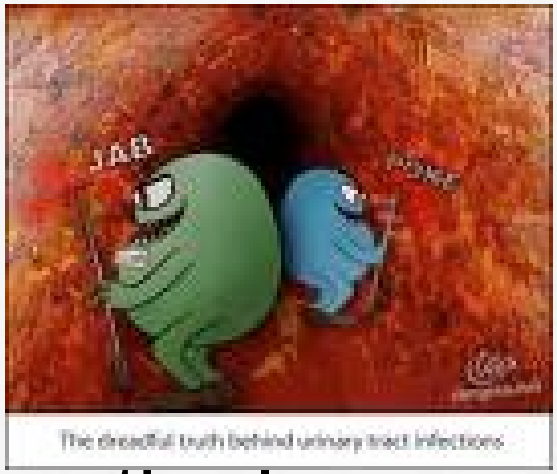
Etiology-Enteric organisms

- Engineering principles??
- Urine is sterile, feces is not
  - perineum to urethra
  - colonize bladder
  - potential to ascend

Host factors

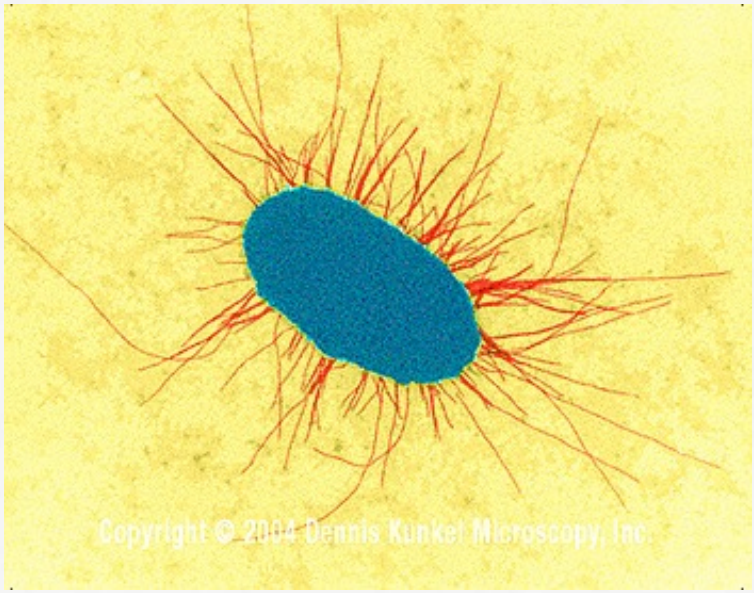
- Mechanical
  - urethral length
  - bladder emptying (leading to residual urine in the bladder)
  - uretervesical junction

- Biochemical properties
  - acid pH
  - high urea content
  - high osmolality
- mucosal properties
  - mucopolysaccharide within the lining
  - local antibody production
- genetic
  - predisposition



Bacterial factors

- limited number of E. coli serotypes cause UTIs
  - adhesion
    - Type 1 pili- cystitis
    - P pili Pyelonephritis
  - colonization
  - tissue invasiveness
    - hemolysin



Risk factors simple UTI

- Female
  - sexual activity
- Not risk factors-
  - bubble bath
  - hygiene (in healthy people)
  - direction of wiping
  - underwear

True or False: High Heels Cause UTIs?

Fri, 10/12/2007 - 1:00pm by DearSugar

31 Comments - 8,396 Views

There are many reasons why women get UTIs: holding your pee, not going to the bathroom after sex, wiping the wrong way, and not flushing out your kidneys, but let me ask you this question:

Is it true or false that wearing high heels can cause a bladder infection?

Don't feel like a heel

So are your high heels causing your problems with recurring UTIs? Some leading medical experts have performed some "sole" searching and found that when women don their heels, their torsos tilt forward, which takes their hips and spine out of alignment.

By repeatedly wearing heels that are too high for your hip and leg structure, you can also cause "lordosis," an often painful condition that creates pressure on the nerves in the lower back. Lordosis can also contribute to inefficient urination, a precursor for urinary tract infections.

Simple Vs Complicated

Table 1

Factors Suggestive of Complicated Urinary Tract Infection (UTI)

- Male sex
- Advanced age
- Presentation in an urban emergency department
- Hospital-acquired infection
- Pregnancy
- Indwelling urinary catheter
- Recent urinary tract instrumentation
- Functional or anatomic abnormality of urinary tract
- Childhood UTI
- Recent antimicrobial use
- Symptoms for >7 days
- Diabetes
- Immunosuppression

Adapted from *Infect Dis Clin North Am*, Vol. 1, Johnson JR, Stamm WE, Diagnosis and treatment of acute urinary tract infections, 783, Copyright 1987, with permission from Elsevier.

Why does it matter?

- Different organisms
- Longer duration antibiotics
- Closer monitoring

Table 3

Most Frequent Urinary Pathogens

Uncomplicated UTI	Complicated UTI
Escherichia coli	*E coli*
Staphylococcus saprophyticus	*Klebsiella* spp
Klebsiella spp	*Enterobacter cloacae*
Proteus mirabilis	*Serratia marcescens*
Group B streptococci	*P mirabilis*
	Pseudomonas aeruginosa
	Enterococcus faecalis
	Group B streptococci

Adapted from *Am J Med*, Vol. 113 (suppl 1A), Ronald A. The etiology of urinary tract infection: traditional and emerging pathogens, 14S. Copyright 2002, with permission from Excerpta Medica.

Enteric organisms

- E. coli >90%
- Klebsiella 1-2%
- Proteus 1-2%
- Staph saprophyiticus (coagulase -) 5-10%
- Enterococcus

What do we not find in simple UTI?

- Hematogeous eg. Staph aureus
- Fungi
- Anaerobes

Diagnosis- Simple UTI

- Symptoms
  - sudden onset of
    - frequency & urgency
    - dysuria
- Signs
  - no flank tenderness
  - mild fever if any

Laboratory-

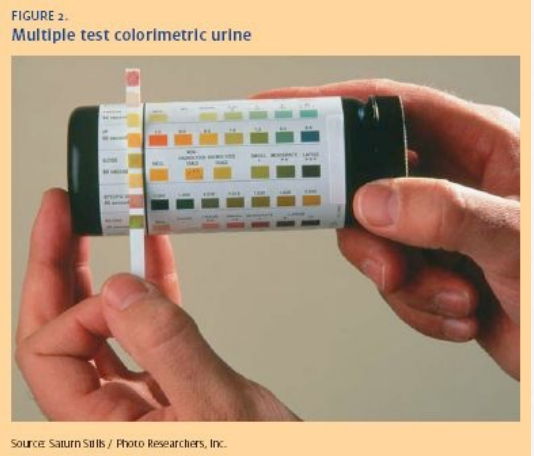
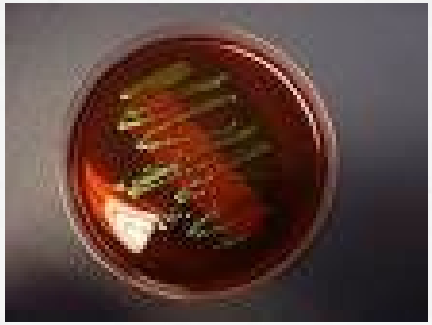


FIGURE 2.
Multiple test colorimetric urine
Source: Saturn Stills / Photo Researchers, Inc.

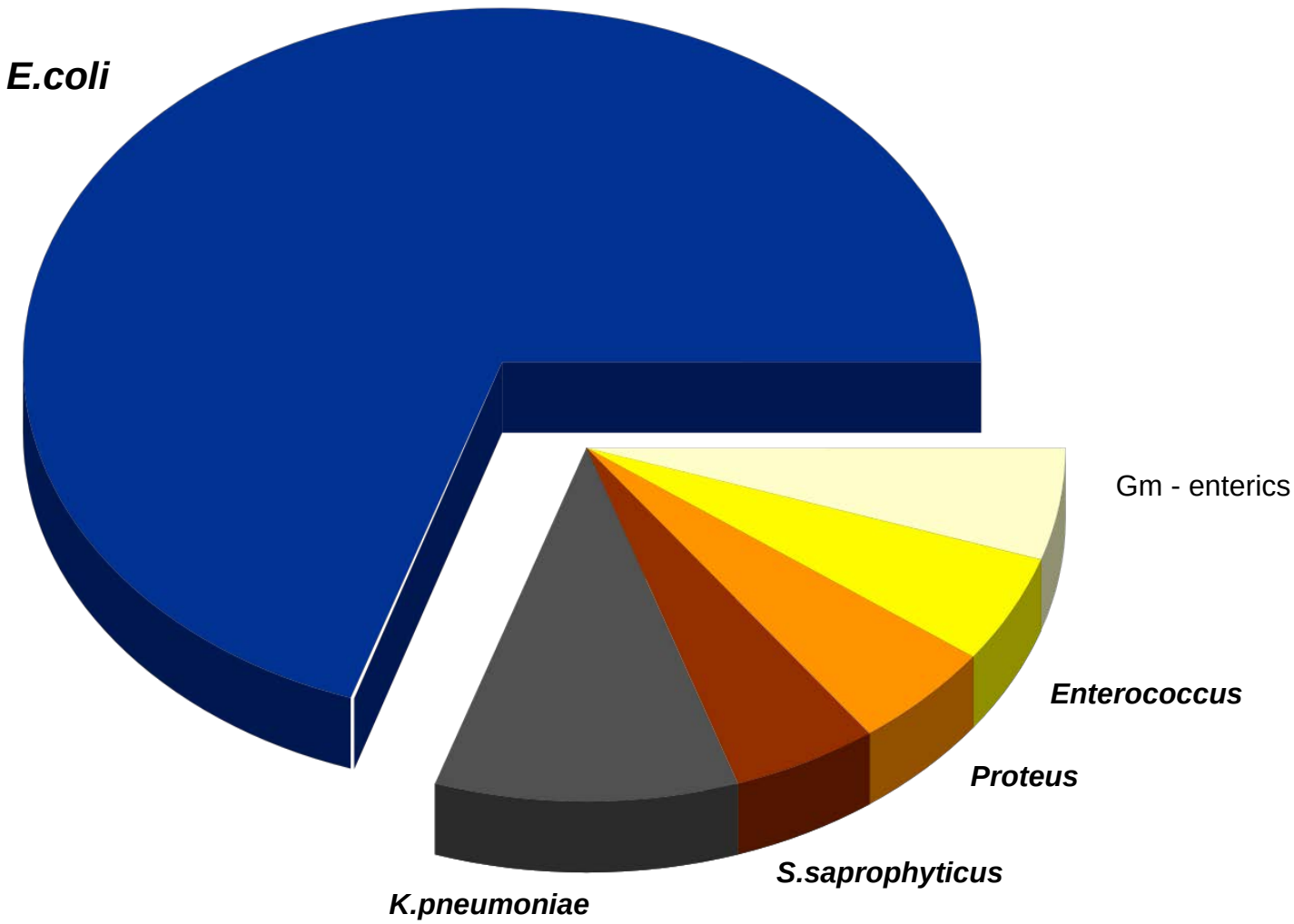
- Dip stick
  - Leukocytes positive
  - +/- nitrites
  - usually micro hematuria
- Microscopic and Culture
  - if atypical, suspect pyelonephritis or previous poor response



Differential diagnosis

- Women
  - Interstitial cystitis
  - Vaginal/vulvar infection /STD
  - atrophic vaginitis
  - distal stone
- Men
  - STD, prostatitis, stricture, stone

Community-Acquired UTI



Antibiotics

- Penicillins
- Macrolides
- Tetracycline
- Septra
- Fluroquinolones
- Macrodantin

Suggested approach...

- What do I know that antibiotic is good for?
  - penicillin is good for sore throat
- Is that condition caused by Gm+ or Gm -?
  - ‘Strep’ throat is Gm+
- Therefore, penicillin would only be good if the UTI were gm + which most are not

Penicillins

- Amoxil has better gm- but...
  - 30% E. coli resistant
    - not first line
  - Safe, renal excretion and well tolerated
  - ONLY Used in pregnancy or if culture proven Entercoccus

Macrolides (erythromycin, azithromycin)

Alternatives to penicillin/ respiratory stuff- therefore gm+ mainly

- not used for UTI

GI side effects, hepatic metabolism

Tetracyclines (doxycycline, minocycline)

- Good for acne. Skin bugs are gm+
  - Not indicated for UTI
- Likes Ca++ in milk, teeth, babies

Septra TMP/SMX

- classic UTI treatment
- good gm-
- Staph saprophytiticus but not Enterococcus

Septra

- Affects 2 sequential steps in bacterial folate metabolism
  - Humans not dependent on this pathway
  - Low resistance within one individual

Septra resistance

- Increasing global resistance
- West to East
- Abandon- 20%
- not on West coast

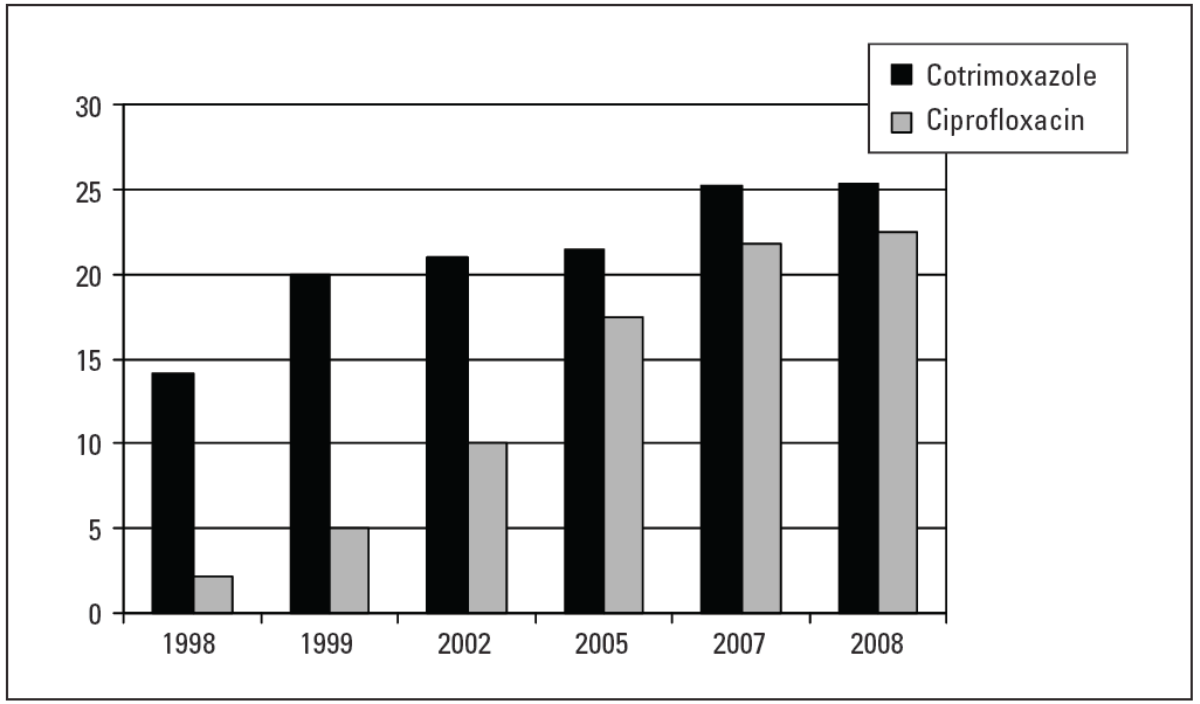


Figure. Percent of *Eschericia coli* isolates resistant to cotrimoxazole and to ciprofloxacin.

Source: BC Biomedical Laboratories

E. coli resistance to Septra

30%

20%

13%

Capital Health

Antibiotic Susceptibility Patterns for Commonly Isolated Organisms

Division of Microbiology

Department of Pathology and Laboratory Medicine
Developed by the Antimicrobial Agents Subcommittee
Capital Health
5788 University Avenue
Halifax, Nova Scotia B3H 1V8

2014

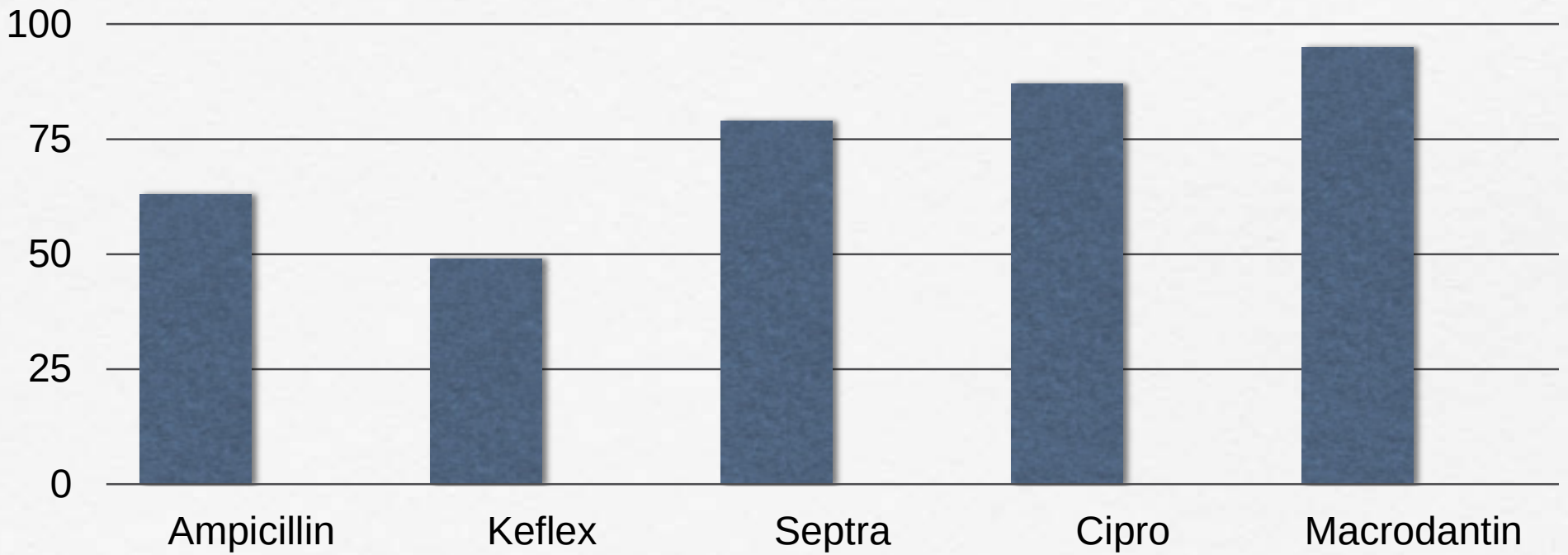
GRAM POSITIVE ISOLATES – % SUSCEPTIBLE

	Number of strains	Ampicillin	Cefazolin	Cephalexin	Ciprofloxacin	Clindamycin	Cloxacillin	Erythromycin	Nitrofurantoin*	Tetracycline	TMP-SMZ	Vancomycin
Staphylococcus aureus (MSSA)	1350	NT	100	100	91	79.2	100	74	DNU	97	98	100
MRSA**	285	IR	IR	IR	15	41	IR	9	DNU	96	99	100
Coag negative staphylococci	401	NT	41	41	51	65	41	48	97	91	63	100
Enterococcus faecalis	73	99	IR	IR	70	IR	IR	IR	100	36	IR	100
Enterococcus faecium	42	5	IR	IR	2	IR	IR	IR	12	83	IR	98
Streptococcus pyogenes (Group A Strep)***	67	100†	100†	100†	NT	91	100†	82	NT	NT	IR	100†

GRAM NEGATIVE ISOLATES – % SUSCEPTIBLE

	Number of strains	Amoxicillin/clavulanate	Ampicillin	Cefazolin	Ceftazidime*	Ceftriaxone	Cephalexin	Ciprofloxacin*	Gentamicin	Tobramycin	Meropenem**	Ertapenem	Nitrofurantoin***	Piperacillin/tazobactam	TMP-SMZ	tetracycline
Escherichia coli	7977	85	63	89	97	95	49	87	94	94	99	100	95	96	79	80
Klebsiella pneumoniae	546	95	IR	96	98	97	89	97	99	98	99	100	30	96	92	85
Klebsiella oxytoca	129	82	IR	49	99	88	80	92	100	100	100	99	63	84	98	92
Enterobacter aerogenes	114	IR	IR	IR	75	75	6	99	100	100	98	99	6	41*	98	97
Enterobacter cloacae	300	IR	IR	IR	84	81	2	99	98	97	97	90	19	38*	91	91
Citrobacter freundii	109	IR	IR	IR	73	72	5	88	90	97	99	99	84	45	72	77
Serratia marcescens	240	IR	IR	IR	99	89	0	96	97	IR	99	100	IR	NT	99	31
Morganella morganii	117	IR	IR	IR	83	84	1	92	96	98	100	100	IR	100	87	IR
Proteus mirabilis	470	100	81	65	100	97	86	96	96	96	100	100	IR	100	89	IR

E. Coli- Community Halifax



AFERMENTERS – % SUSCEPTIBLE

	Number of strains	Ceftazidime	Ticarcillin/ clavulanate	Piperacillin/ tazobactam	Meropenem*	Ertapenem	Ciprofloxacin	Gentamicin	Tobramycin	Amikacin	TMP-SMZ
Pseudomonas aeruginosa	824	86	NT	97	84	IR	72	76	88	86	IR
Stenotrophomonas maltophilia	96	32	26	IR	IR	IR	17	9	7	15	91
Acinetobacter baumannii	64	88	NT	89	NT	IR	97	100	100	100	100
*Burkholderia cepacia**	69	34	3	NT	71	IR	2	2	2	9	26

Fluroquinolones

- Noroxin, Cipro, Floxin and Levoquin all UTI indication
- Affect DNA gyrase (supercoiling)
  - E.coli resistance increasing 13%
- Excellent gm- (little Enterococcus)
- Well tolerated

Macrobid (nitrofurantoin)

- Only urinary
  - Keeps resistance low
  - No secondary vaginitis
  - safe in pregnancy (except delivery)
- Excellent E. coli

QEII 2014 Gm negatives

	E. coli	Proteus	Klebsiella
Septra	79	89	92
Cipro	87	96	97
Macrobid	95	none	30
Amoxil	63	81	none

QEII 2014 Gm +

	Staph sap.	Entercoccus
Septra	63	none
Cipro	51	70
Macrobid	97	100
Amoxil	100	99

Cost/Duration

	Cost	Duration
Septra	$12	3
Cipro	$19	3
Macrobid	$19	5-7

Side effects

	Common	Rare
Quinilones	Headache	P450/tendon
Septra	Rash	Stevens Johnson
MacroBid	GI	Pul. Fibrosis

Resolution of Symptoms

- 2323 Canadian female patients with UTI
- symptoms, compliance, impact and symptom resolution
- baseline, day 4 and day 10

Natural history of urinary tract infections in the primary care environment. Nickel,Lee, Grantmyre and Polygenis. J Urol Aug 2005

Symptoms

- Frequency 94%
- Dysuria 87%
- Urgency 83%
- supra pubic pain 70%
- visible hematuria 25%

Duration and Impact

- 4.9 days mean before treatment
- 63% impact
  - 36% work
  - 47%personal life
  - 40% social life
  - 40% sexual relations

Resolution of Symptoms

- Day 4
  - 71% complete
- Day 10
  - 84.3% complete
  - 15.7% same
  - 1.6% deteriorated

Recommendations for Treatment

Simple UTI

- Typical symptoms and infrequent
  - Just treat
    - Septra DS BID X 3 days
    - Cipro XL 500 mg OD X 3 days
    - Macrobid 100 mg BID x 5 days

- Typical but frequent (few per year)
  - Culture
  - Self medication
- Male
  - Refer

A ‘run’ of UTIs

- Culture
- Suppressive therapy at HS x 1 month (MacroBid)
- Consider referral

Atypical symptoms

- Reassess diagnosis
- Urinalysis (hematuria)
- Culture
- Referral

Pregnancy

- Asymptomatic bactiuria from 4% to 7%.
  - similar nonpregnant women
- 20% to 40% of pregnant women with untreated bactiuria will develop pyelonephritis
  - Acute pyelonephritis -premature labor
    - intrauterine growth retardation and low birth weight

UTI in Pregnancy

- Amoxil best
  - but 30% E. coli resistance
- MacroBid fine except at term
  - Fetal Hb issue
- Septra-no
  - 1st Trimethoprim
  - 3rd Sulfa
- Quinolones- no

Asymptomatic bactiuria

- The prevalence of bacteriuria increases in females by about 1% per decade and reaches 8% to 10% in elderly women
- Ignore unless
  - pregnant
  - immuno-compromised
  - impending surgery

UTIs in the Elderly

- E coli is still most frequent.
  - S saprophyticus is rare
  - Enterococcus is common, accounting for 10% to 20% of infections
  - Polymicrobial 10% to 25% if institutionalized
  - frequent antibiotics in the institutionalized elderly, resistant gram-negative rods such as P aeruginosa and Providencia spp are common.

Prevention of UTIs

- continuous low-dose prophylaxis and postcoital prophylaxis effective
- Cranberries, blueberries contain proanthocyanidins which prevent adhesion
- Lactobacillus probiotics preventing disease
- hormone replacement

Conclusions-UTI

- Vast majority of UTIs will be effectively treated by family physicians
- Treatment is usually empiric and requires awareness of local resistance patterns
- Atypical or frequent infections may prompt urologic investigations to rule out anatomic abnormalities


sangrea.net
AAAEEEEIIIIII!!!!!!
Oh no! She's been possessed by *Satan*!
Nope. Worse. It's a urinary tract infection. I'll write her a script for antibiotics.
THE EXORCIST