UTI: A practical approach

Leonor Echevarria, MD; FACP
Infectious Disease Attending
BUMC-P

Clinical Scenario # 1

- A 22-yo woman evaluated for one day history of dysuria and urinary urgency and frequency. She had an episode of cystitis 2 years ago. The patient has a sulfa allergy.
- On PE : Afebrile , BP 110/60, HR 60 and RR 14 . Mild suprapubic tenderness but no flank tenderness.. The remainder of the examination is N.
- Urine dipstick analysis shows 3 +leukocyte esterase. A pregnancy test is negative.

Treatment with which of the following options is most appropriate?

A) Amoxicillin
B) Fosfomycin
c) Levofloxacin
d) Nitrofurantoin

Clinical scenario # 2

- A 32 yo woman is evaluated for 2 day history of dysuria and urinary urgency and frequency and a 1 day history of fever . She has no nausea or vomiting.
- PE : Temp 38.5 C (101.3 F), BP 120/70, HR 90/ min, RR 12 /min. R flank tenderness at palpation .
- A urinalysis shows more than 20 leukocytes /hpf and 4 + bacteria. A pregnancy test is negative.

In addition to obtaining a urine culture, which of the following is the most appropriate empiric treatment ?

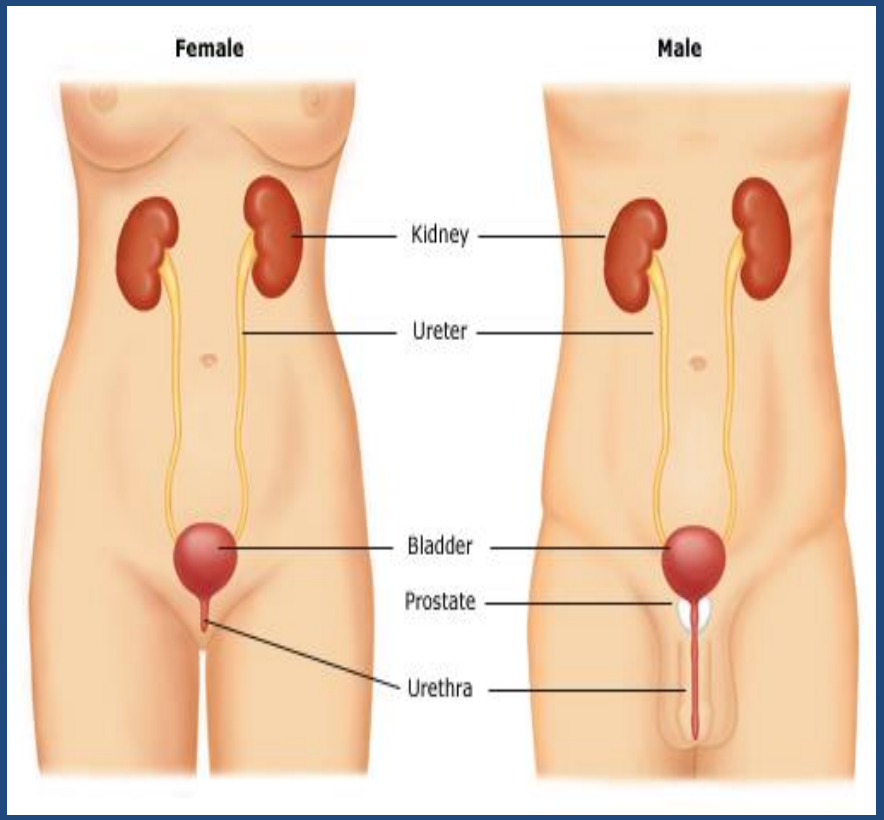
A) Ampicillin
B) Ciprofloxacin
C) Nitrofurantoin
D) TMP/SMX

Urinary Tract Infections Outline

- Definition
- Diagnosis
- Microbiology
- UTI (syndromes)
- Treatment

Urinary tract infection

- Uncomplicated UTI: infection in a premenopausal , non pregnant women with no urological abnormalities
- Complicated UTI: infection and a urinary tract with functional or structural abnormalities.



UTI : Clinical symptoms and presentation in adult

- Lower tract : cystitis

 - Dysuria urinary urgency and frequency lateral fullness discomfort.

 - hemorrhagic cystitis bloody urine (10%)

- Upper tract: pyelonephritis

 -Fever, sweating

 -Nausea, vomiting, flank pain, dysuria

 - Dehydration, hypotension

- Vaginal discharge (ho STD)

Diagnosis of UTI

- Collection of specimens
- Urinalysis microscopic examination
  - WBC upper limit 5-10 leukocytes hpf.
  - presence of bacteria
- Urine dipstick test : rapid screening test

-Leukocyte esterase test (rapid pyuria screen)

  – Se (detect >10 WBC/mL) 75-96%, Sp 94-98%

-Nitrate->Nitrite test positive in only 25%

  – Se ~20%, Sp 95%

Diagnosis of UTI

- Indications for urine culture

  -Pyelonephritis

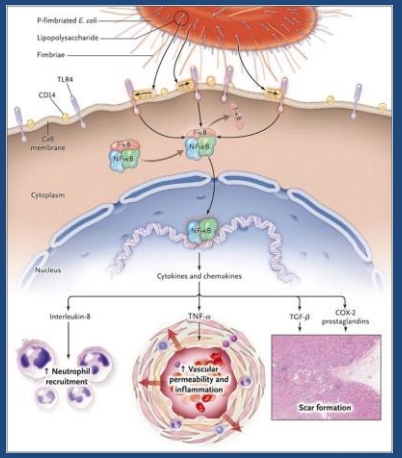
  - complicated UTI

  - Recurrent UTI

  - Patients with multiple allergies

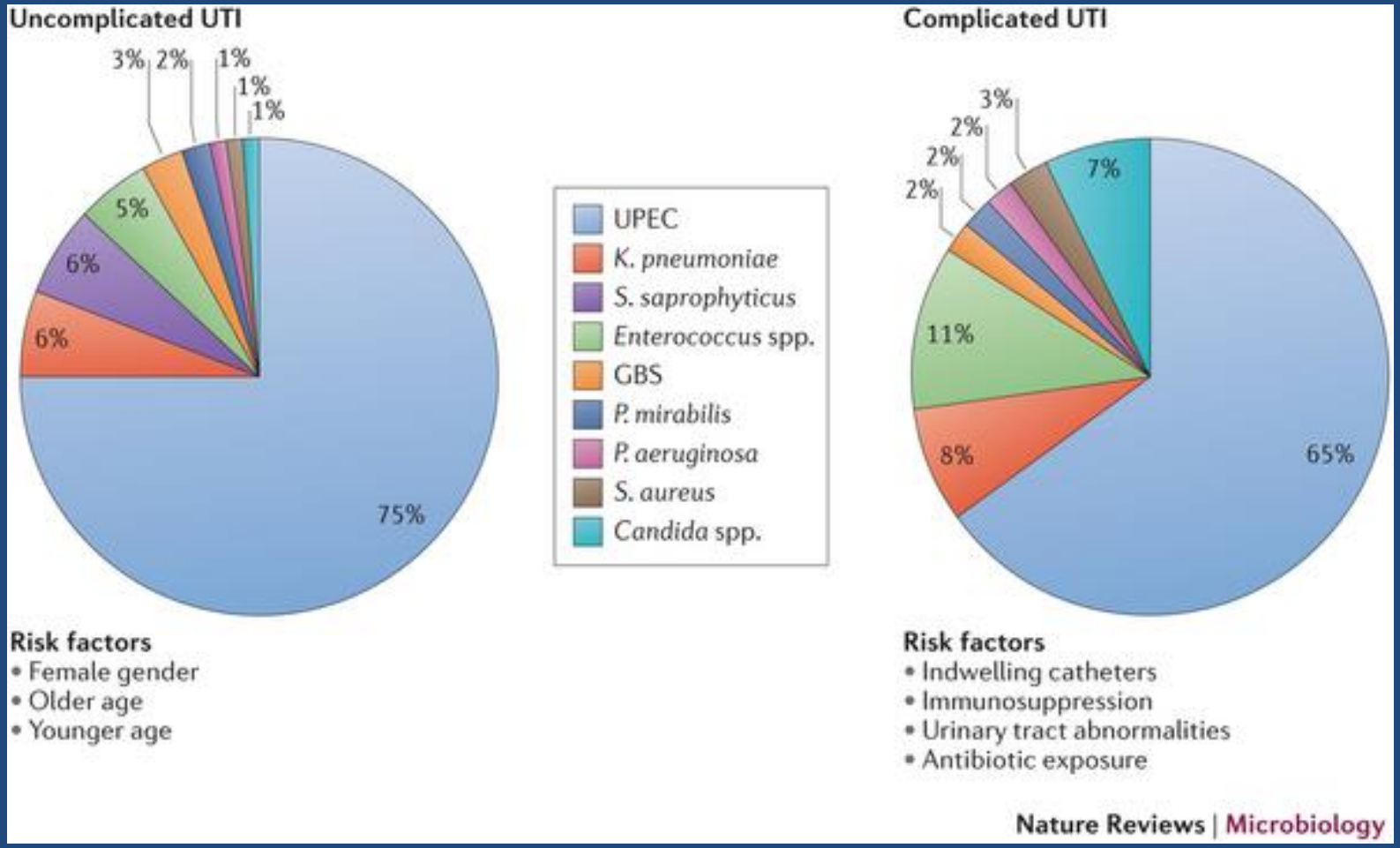
  -Suspect MDRO

Microbiology of UTI



- *E. coli 75-90%*
- *S. saprophyticus 5-15%*
- Klebsiella, Proteus, Enterococcus, Pseudomonas small percentages
  - Hospital acquired : Enterobacter, Klebsiella, Acinetobacter, Serratia, Citrobacter, Providencia, Pseudomonas, Enterococcus
  - Anaerobes rarely cause UTI
  - Candida increasingly recognized as a cause of UTI

Microbiology of UTI



Nature Reviews Microbiology 13, 269-284 (2015)

Urinary Tract Infections

- Acute uncomplicated cystitis
- Acute uncomplicated pyelonephritis
- Recurrent UTI
- Complicated UTI- sepsis
- CA UTI
- Candida UTI

Treatment of UTIs

- Acute uncomplicated cystitis
- Acute uncomplicated pyelonephritis

Clinical Practice Guidelines CID 2011;52 (1 March)

Treatment of UTIs

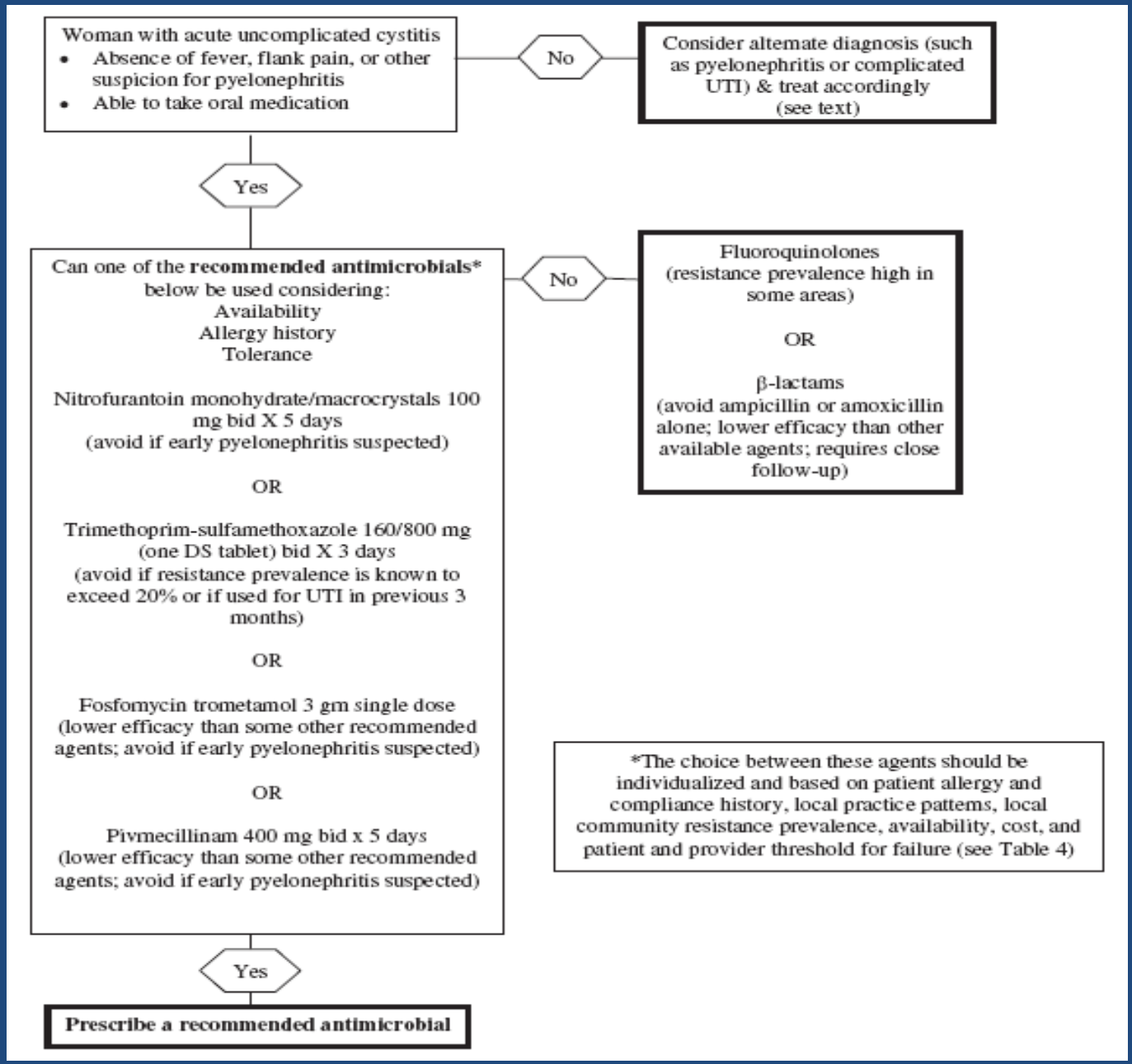
For AUC and AUP consider :

- Antimicrobial resistance
- Collateral damage

-Cephalosporins linked to subsequent infections VRE, ESBL Klebsiella, Beta lacatamse R acinetobacter, C Dif

-Fluoroquinolones linked to infection with MRSA and FQ R in GN

Clinical Practice Guidelines CID 2011;52 (1 March)



Clinical Practice Guidelines CID 2011:52 e103-e120

Acute uncomplicated pyelonephritis

- Urine culture and susceptibility testing
- Oral ciprofloxacin 500 BID x 7 days (w or wo initial IV). Resistance < 10%
- Oral TMP/SMX (160/800) if uropathogen known to be susceptible x 14 days. If susc not known initial IV (ceftriaxone or AG)
- Oral B- lactam less effective. If used initial IV (ceftriaxone or AG) 10-14 days

CDC Warning on FQ Antibiotic use: Rolling Back Use for Patient Safety

1. FDA recommendations state that risks of serious side effects with fluoroquinolones generally outweigh benefits for patients with the following:
    a. **Acute bacterial sinusitis**
    b. **Acute exacerbation of chronic bronchitis**
    c. **Uncomplicated UTI**
2. The FDA has determined that fluoroquinolones should be reserved for the previous three conditions only when there are no alternative treatment options.
3. Fluoroquinolones may be considered in the following scenarios:
    a. Patient with type 1 hypersensitivity reaction to both penicillin and cephalosporins
    b. Definitive therapy for multidrug resistant organism in which the isolate is resistant to all beta-lactams and susceptible to fluoroquinolone.
    c. For bacteremia stepdown therapy in which organism is susceptible
    d. For serious bacterial infections (i.e. anthrax & plague) where the benefits of fluoroquinolones outweigh the risk.

Fluoroquinolone Boxed Warning	
July 2008	• increased risk of tendinitis and tendon rupture
February 2011	• increased risk of exacerbating muscle weakness related to Myasthenia gravis
August 2013	• increased potential risk for irreversible peripheral neuropathy
July 2016	• increased CNS effects ((i.e. anxiety, depression, hallucinations, suicidal thoughts, confusion)
July 2018 (new labeling change)	• new mental health side effects updated to include ddisturbances in attention, disorientation, agitation, nervousness, memory impairment and delirium • serious blood sugar disturbances, particularly risk of coma with hyopglycemia

Recurrent UTIs

- 2 or > episodes 6M or 3 or > in a year. Non pregnant adult women
- Relapse : If current infection is caused by same pathogen as the initial UTI and occurs within 2 weeks
- Re infection: If current infection is caused by a different strain than initial UTI of Urine culture was sterile

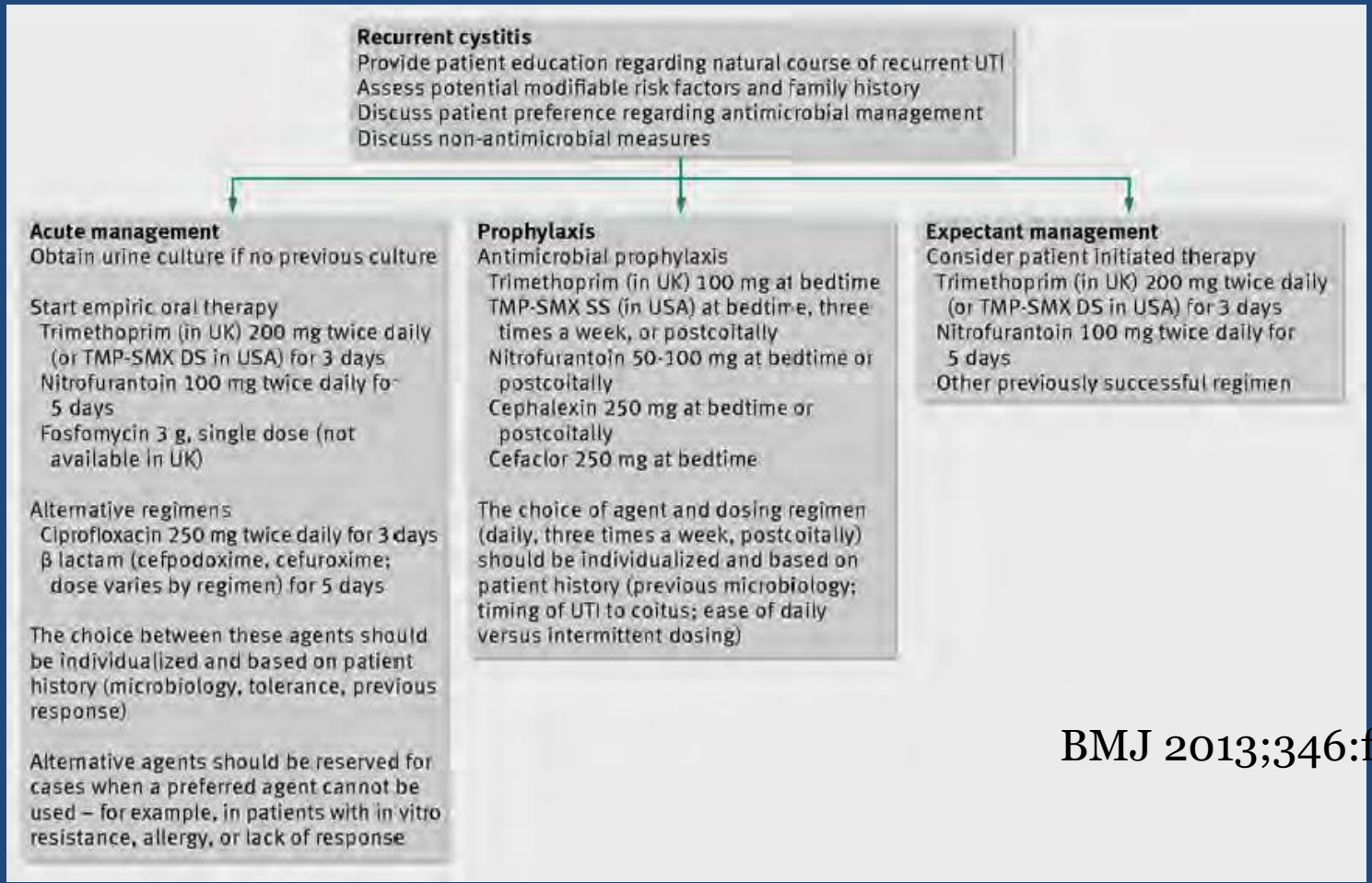
Recurrent UTI : Risk Factors

- Spermicidal products
- Sexually active
- Genetic factors
- Variations in innate immune system low CXCR1 and CxCR2 expression)

BMJ 2013;346:f3140

Preventive measures

- Antimicrobial prophylaxis
- Patient centered approach



BMJ 2013;346:f3140

Non antimicrobial strategies

- Lactobacillus : L crispatus intravaginal suppositories, oral capsules with L rhamnosus GR-1 and L reuteri RC- 14
- Estrogens
- Cranberries
- Urination before and after sexual activity
- Diet (alcalinizing agents and siderocalin)

Infect Dis Clin N Am 28 (2014) 135-147
CID 2013 : 57 719-24
Shields-Cutter RR et al. Human urinary composition controls antibacterial activity of siderocalin J Biol Chem 2015;290(26):15949-15960

Drug induced UTI's

- Recent reports of drug induced UTI's related to sodium-glucose coransporter 2 (SGLT2) inhibitors "flozins"
- Oral hypoglycemics that work by increasing the amount of glucose spilled in the urine
- Include canagliflozin (Invokana), empagliflozin (jardiance) and dapagliflozin (Farxiga)

www.fda.gov/Drugs/DrugSafety/ucm475463.htm

Complicated UTIs

Initial evaluation:

- Detailed history- Previous UTI, prior ATB use
- Physical exam – Sepsis ?
- UA and Urine culture
- Imaging

If obstruction

- Prompt urologic evaluation

Complicated UTIs

- Diabetes Mellitus
- Acute pyelonephritis
- Emphysematous pyelonephritis
- Renal abscess
- Renal papillary necrosis
- UTI in renal transplant recipients
- Nephrolithiasis
- Prostatitis

Diagnosis of CA-UTI

- In patients with indwelling urethral, indwelling supra pubic or intermittent catheterization
- Presence of symptoms or signs cw UTI with no other identified source of infection along with 10^3 CFU/ml of ≥ 1 bacterial species in a single urine specimen.

CID 2010:50 (1 March) 625-63

Diagnosis of CA-UTI

- Signs and symptoms cw UTI include: new onset of worsening fever, rigors, altered mental status, malaise, or lethargy with no other identified cause, flank pain; CVA tenderness; acute hematuria; pelvic discomfort
- When catheter removed : dysuria, urgent or frequent urination, supra pubic pain or tenderness

CID 2010:50 (1 March) 625-63

Diagnosis of CA-UTI

- A urine culture should be obtained prior to initiating antimicrobial treatment
- If an indwelling catheter has been in place for > 2 weeks at the onset of CA-UTI and is still indicated, the catheter should be replaced and a urine sample sent from freshly placed catheter
- If catheter can be discontinued , a culture of voided midstream urine specimen should be obtained

CID 2010:50 (1 March) 625-63

Banner Clinical Practice

- Discuss with patient indication and risk of placing an indwelling urinary catheter and document in chart.
- Select an indication for the catheter when ordering.
  - Urinary retention or obstruction
  - U.O. monitoring in critically ill, incontinent, uncooperative
  - Peri-operatively for selected surgical procedures
  - Fluid challenge in patients with ARF
  - Urinary incontinence posing risk to patient
  - Prolonged immobilization
  - Palliative care in terminally ill
- Continuing the catheter requires daily renewal order.
  - Nursing will contact you on daily basis for indication and order
  - Exceptions include certain urologic/gyn/perineal procedures

CA UTIs

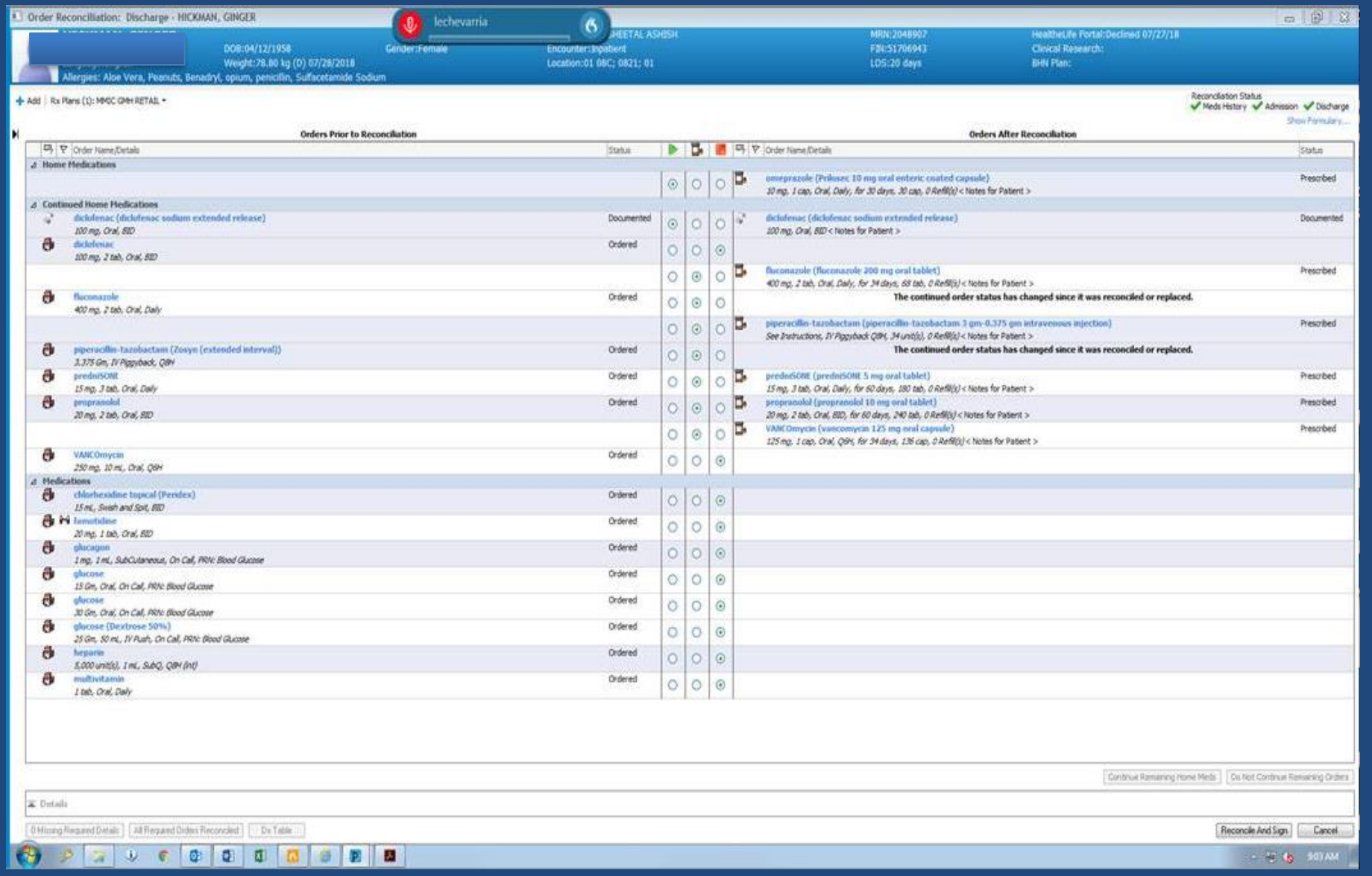
- Cefepime 2 gm IV q 12h, Pip/tazo 3.375 gr q 6h or IMP 500 mg q 6h
- Discontinue or exchange catheter
- Duration 5- 14 days
- Shorter duration in uncomplicated UTI 3d
- Do not use moxifloxacin

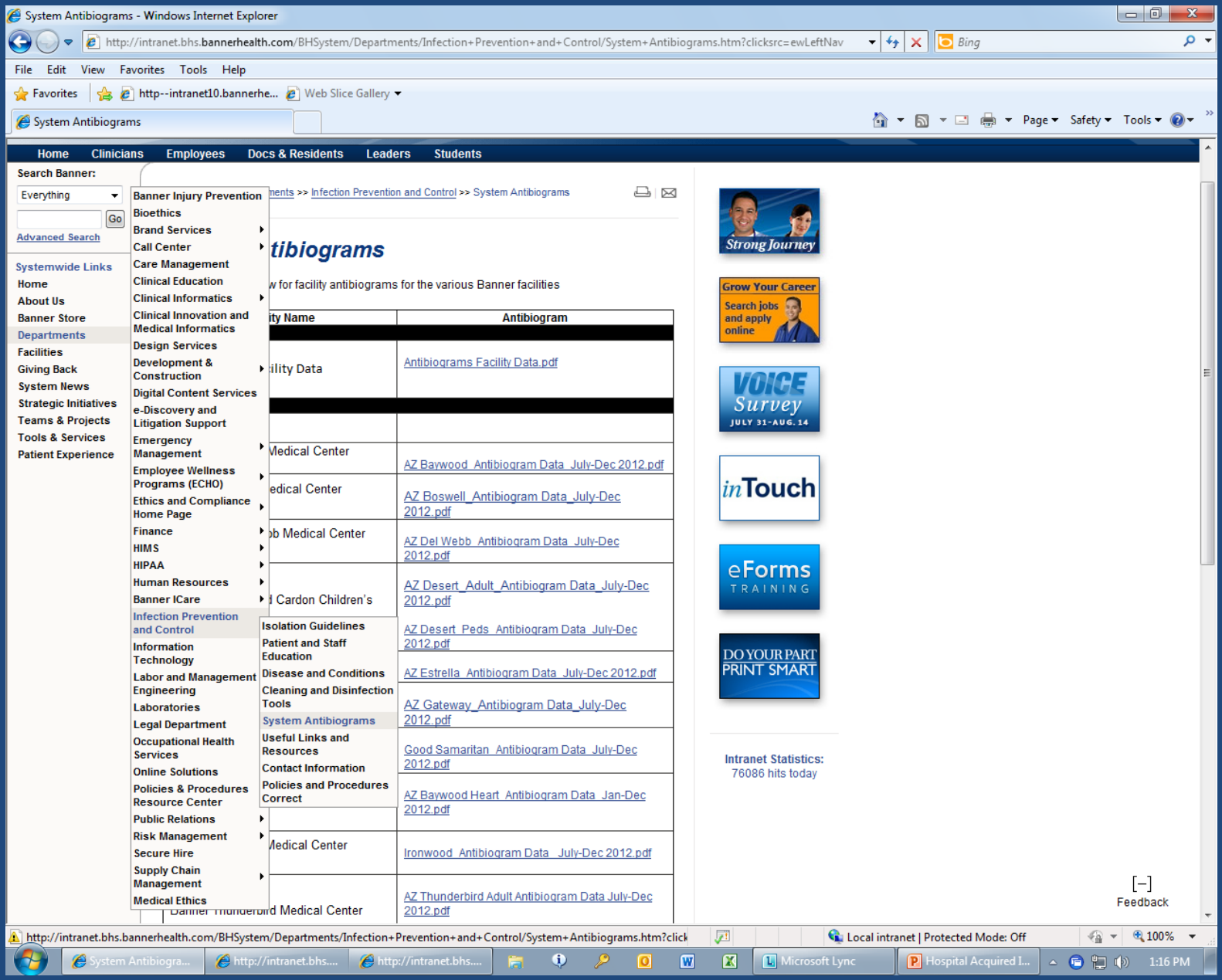
CID 2010:50 (1 March) 625-63

Zosyn extended infusion

- Zosyn 4.5 gm IV q 6h will be automatically replaced 3.375 GM IV extended infusion (4hs) q 8h. MIC <16
- ER 30 min infusion will continue

CID 2013; 56(2): 272-282
J Pharm Pract.2011 Dec ;24(6):571-6
J Expert Opin Drug Metab Toxicol.2010 Aug; 6(8): 1017-31


Order Reconciliation: Discharge - HICKMAN, GINGER
lechevarria
DOB:04/12/1958
Weight:78.80 kg (D) 07/28/2018
Gender:Female
Encounter:Inpatient
Location:01 08C; 0821; 01
MRN:2048907
FIN:51706943
LOS:20 days
Health eLife Portal:Declined 07/27/18
Clinical Research:
BHN Plan:
Allergies: Aloe Vera, Peanuts, Benadryl, opium, penicillin, Sulfacetamide Sodium
Add
Rx Plans (1): MMSC GMH RETAIL
Reconciliation Status
Meds History
Admission
Discharge
Show Formulary...
Orders Prior to Reconciliation
Order Name/Details
Status
Orders After Reconciliation
Order Name/Details
Status
Home Medications
omeprazole (Prilosec 10 mg oral enteric coated capsule)
10 mg, 1 cap, Oral, Daily, for 30 days, 30 cap, 0 Refill(s) < Notes for Patient >
Prescribed
Continued Home Medications
diclofenac (diclofenac sodium extended release)
100 mg, Oral, BID
Documented
diclofenac (diclofenac sodium extended release)
100 mg, Oral, BID < Notes for Patient >
Documented
diclofenac
100 mg, 2 tab, Oral, BID
Ordered
fluconazole (fluconazole 200 mg oral tablet)
400 mg, 2 tab, Oral, Daily, for 34 days, 68 tab, 0 Refill(s) < Notes for Patient >
Prescribed
fluconazole
400 mg, 2 tab, Oral, Daily
Ordered
The continued order status has changed since it was reconciled or replaced.
piperacillin-tazobactam (piperacillin-tazobactam 3 gm-0.375 gm intravenous injection)
See Instructions, IV Piggyback Q8H, 34 unit(s), 0 Refill(s) < Notes for Patient >
Prescribed
piperacillin-tazobactam (Zosyn (extended interval))
3.375 Gm, IV Piggyback, Q8H
Ordered
The continued order status has changed since it was reconciled or replaced.
predniSONE
15 mg, 3 tab, Oral, Daily
Ordered
predniSONE (predniSONE 5 mg oral tablet)
15 mg, 3 tab, Oral, Daily, for 60 days, 180 tab, 0 Refill(s) < Notes for Patient >
Prescribed
propranolol
20 mg, 2 tab, Oral, BID
Ordered
propranolol (propranolol 10 mg oral tablet)
20 mg, 2 tab, Oral, BID, for 60 days, 240 tab, 0 Refill(s) < Notes for Patient >
Prescribed
VANCOmycin (vancomycin 125 mg oral capsule)
125 mg, 1 cap, Oral, Q6H, for 34 days, 136 cap, 0 Refill(s) < Notes for Patient >
Prescribed
VANCOmycin
250 mg, 10 mL, Oral, Q6H
Ordered
Medications
chlorhexidine topical (Peridex)
15 mL, Swish and Spit, BID
Ordered
famotidine
20 mg, 1 tab, Oral, BID
Ordered
glucagon
1 mg, 1 mL, SubCutaneous, On Call, PRN: Blood Glucose
Ordered
glucose
15 Gm, Oral, On Call, PRN: Blood Glucose
Ordered
glucose
30 Gm, Oral, On Call, PRN: Blood Glucose
Ordered
glucose (Dextrose 50%)
25 Gm, 50 mL, IV Push, On Call, PRN: Blood Glucose
Ordered
heparin
5,000 unit(s), 1 mL, SubQ, Q8H (Int)
Ordered
multivitamin
1 tab, Oral, Daily
Ordered
Continue Remaining Home Meds
Do Not Continue Remaining Orders
Details
0 Missing Required Details
All Required Orders Reconciled
Dx Table
Reconcile And Sign
Cancel
9:07 AM


System Antibiograms - Windows Internet Explorer
http://intranet.bhs.bannerhealth.com/BHSystem/Departments/Infection+Prevention+and+Control/System+Antibiograms.htm?clicksrc=ewLeftNav
File Edit View Favorites Tools Help
System Antibiograms
Home Clinicians Employees Docs & Residents Leaders Students
Search Banner:
Everything
Go
Advanced Search
Systemwide Links
Home
About Us
Banner Store
Departments
Facilities
Giving Back
System News
Strategic Initiatives
Teams & Projects
Tools & Services
Patient Experience
Banner Injury Prevention
Bioethics
Brand Services
Call Center
Care Management
Clinical Education
Clinical Informatics
Clinical Innovation and Medical Informatics
Design Services
Development & Construction
Digital Content Services
e-Discovery and Litigation Support
Emergency Management
Employee Wellness Programs (ECHO)
Ethics and Compliance Home Page
Finance
HIMS
HIPAA
Human Resources
Banner ICare
Infection Prevention and Control
Information Technology
Labor and Management Engineering
Laboratories
Legal Department
Occupational Health Services
Online Solutions
Policies & Procedures Resource Center
Public Relations
Risk Management
Secure Hire
Supply Chain Management
Medical Ethics
Isolation Guidelines
Patient and Staff Education
Disease and Conditions
Cleaning and Disinfection Tools
System Antibiograms
Useful Links and Resources
Contact Information
Policies and Procedures Correct
>> Infection Prevention and Control >> System Antibiograms
tibiograms
w for facility antibiograms for the various Banner facilities
ity Name
Antibiogram
ility Data
Antibiograms Facility Data.pdf
Medical Center
AZ Baywood_Antibiogram Data_July-Dec 2012.pdf
edical Center
AZ Boswell_Antibiogram Data_July-Dec 2012.pdf
b Medical Center
AZ Del Webb_Antibiogram Data_July-Dec 2012.pdf
l Cardon Children's
AZ Desert_Adult_Antibiogram Data_July-Dec 2012.pdf
AZ Desert_Peds_Antibiogram Data_July-Dec 2012.pdf
AZ Estrella_Antibiogram Data_July-Dec 2012.pdf
AZ Gateway_Antibiogram Data_July-Dec 2012.pdf
Good Samaritan_Antibiogram Data_July-Dec 2012.pdf
AZ Baywood Heart_Antibiogram Data_Jan-Dec 2012.pdf
Medical Center
Ironwood_Antibiogram Data_July-Dec 2012.pdf
AZ Thunderbird Adult Antibiogram Data July-Dec 2012.pdf
Strong Journey
Grow Your Career
Search jobs and apply online
VOICE Survey
JULY 31-AUG. 14
inTouch
eForms TRAINING
DO YOUR PART PRINT SMART
Intranet Statistics:
76086 hits today
[–]
Feedback
http://intranet.bhs.bannerhealth.com/BHSystem/Departments/Infection+Prevention+and+Control/System+Antibiograms.htm?click
Local intranet | Protected Mode: Off
100%
1:16 PM

Candida UTI

- Candidemia rarely results from asymptomatic candiduria
- Patients who have symptoms of UTI should be treated . Oral fluconazole .
- Candiduria + indwelling catheter ,remove catheter. If not possible -> repeat UA
- Treatment of asymptomatic candiduria:
  - Very low birth weight infants
  - Patients undergoing urologic procedures
  - Neutropenic patients

Treatment Guideline for Candidiasis CID 2009 503-537
Fungal UTI Infect Dis Clin N Am 28 (2014) 61-74

Recommended reading

- Clinical Practice Guidelines CID 2011:52 e 103-120
- Urinary Catheter Guidelines CID 2010:50 625-663
- Infect Dis Clin N Am 28 (2014) 1-159
- Uncomplicated Urinary Tract Infection N Engl J Med 366;11
- In the Clinic. Urinary Tract Infection. Ann Intern Med 2017; 167: ITC 49-63