URINARY TRACT INFECTIONS: Focus on CA-UTIs

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LECTURE TOPICS

- Prevalence
- Pathogenesis
- Etiology of UTIs
- Risk factors
- Prevention

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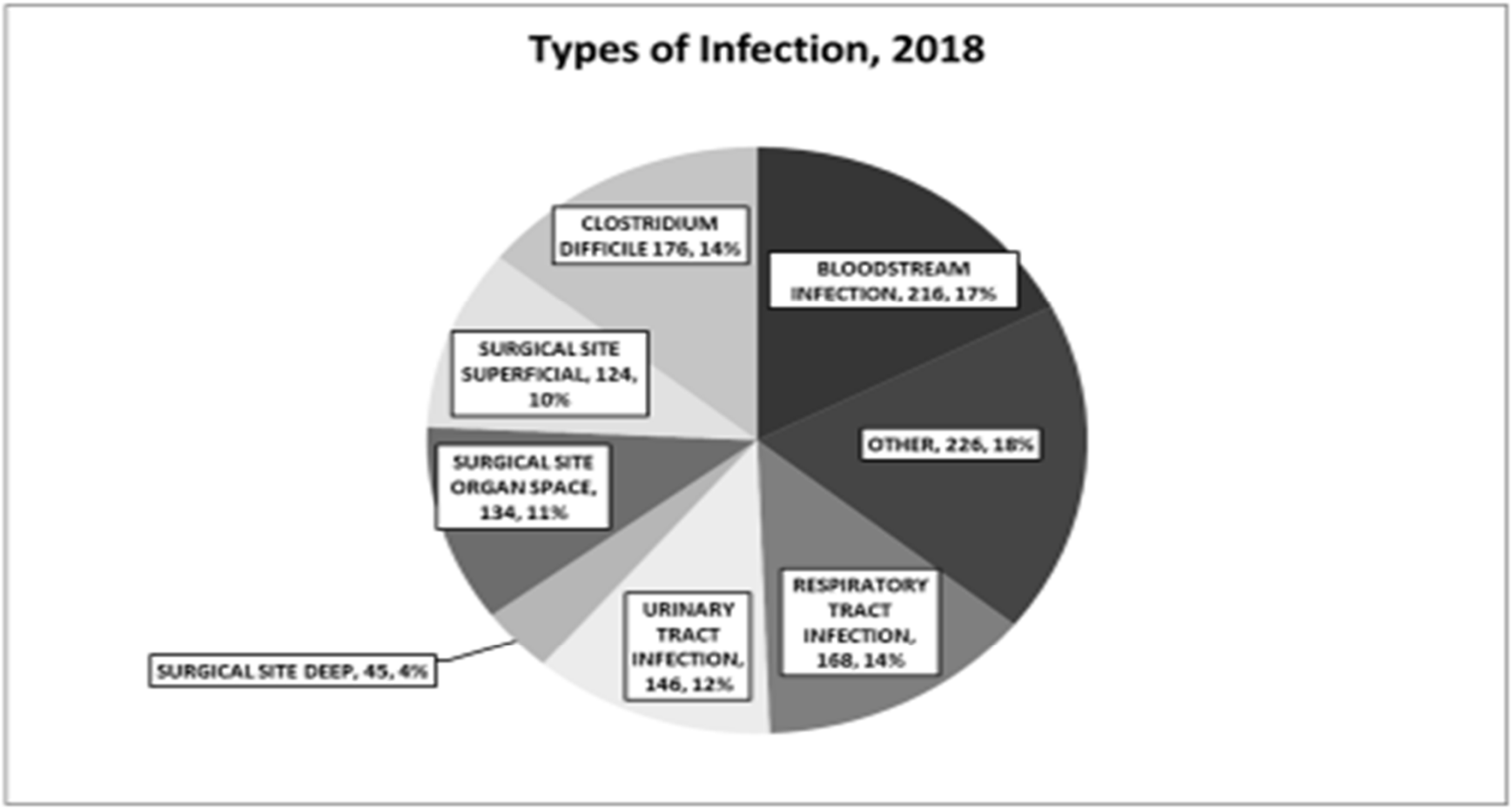
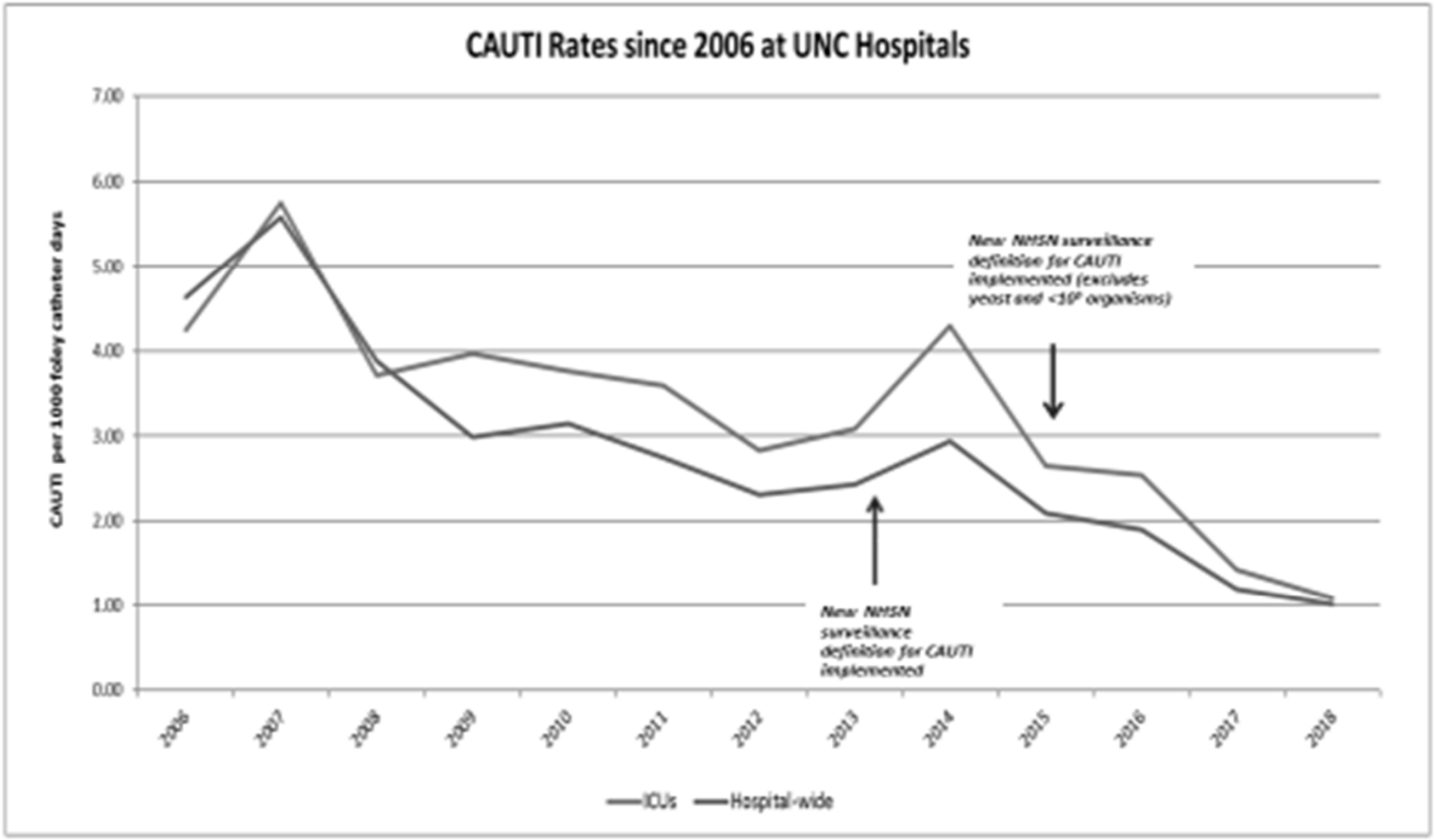
UNC Hospitals



Clostridium difficile infections and surgical site infections accounted for a greater percentage of our 2018 infections compared to 2017, while bloodstream infections and urinary tract infections accounted for a smaller percentage of our 2018 infections compared to 2017

UNC Hospitals



CA-UTIs

- Definitions
  - CA infection refers to infection occurring in a person whose urinary tract (UT) is currently catheterized or has been catheterized within the previous 48h
  - UTI refers to significant bacteruria in a patient with symptoms or signs attributable to the UT
  - Asymptomatic bacteruria refers to significant bacteruria in a patient without symptoms or signs attributable to UT

CATHETER-ASSOCIATED URINARY TRACT INFECTIONS (CA-UTI)

- Prevalence, Incidence
  - Most common site of HAI: Accounts for more than 30% of all reported HAIs by acute care hospitals
  - Estimated >560,000 healthcare-associated UTIs annually
  - 15-25% patients in hospitals have a urethral catheter
  - Most hospitalized patients are catheterized for only 2-4 days but many longer
  - Incidence of bacterurias associated with indwelling catheter is 3-8% per day

Adapted from CDC: http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf

CATHETER-ASSOCIATED URINARY TRACT INFECTIONS (CA-UTI)

- Impact
  - About 15% of cases of nosocomial bacteremia are attributable to the UT
  - Bacteruria is the most common source of gram-negative bacteremia among hospitalized patients
  - Bacteremia complicates CA-bacteruria in 1-4% of cases
  - Estimated 13,000 attributable deaths annually
  - Leading cause of secondary BSI with ~10% mortality
  - Excess length of stay: 2-4 days
  - Increased cost: $0.4-0.5 billion per year nationally

URINARY CATHETER USE

- 15-25% of hospitalized patients
- 5-10% (75,000-150,000) of patients in extended care facilities
- Often placed for inappropriate purposes
- Physicians frequently unaware
  - In a recent survey of US hospitals:
    - **>50% did not monitor which patients were catheterized**
    - **75% did not monitor duration and/or discontinuation**

Adapted from CDC: http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf

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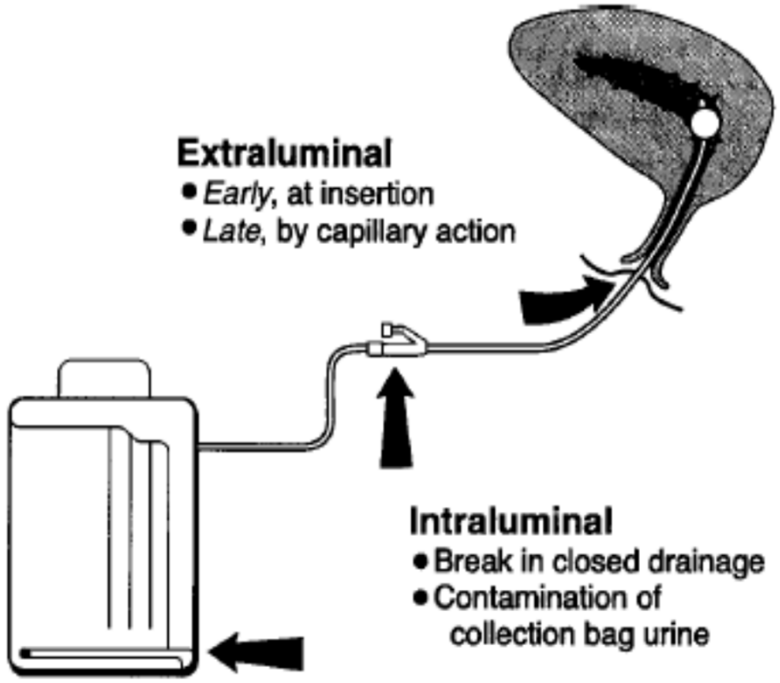
PATHOGENESIS OF CA-UTI

- Source of microorganisms
  - Endogenous: meatal, rectal, vaginal colonization
  - Exogenous: via contaminated hands of HCP during catheter insertion or manipulation of the collecting system



Maki DG, Tambyah PA. Emerg Infect Dis 2001;7:1-6

CA-UTIs

- Introduction of bacteria into the bladder at the time of catheter insertion
- Extraluminal migration of bacteria or perianal bacteria into the bladder along the outer surface of the catheter
- Intraluminal retrograde migration of bacteria into the bladder from the drainage bag along the inner surface of the catheter following a catheter care violation

SOURCE OF CA-UTI PATHOGENS

Table 2. Mechanisms of catheter-associated urinary tract infection, based on a prospective study of 1,497 newly catheterized patients who had 235 new-onset infections (16)

	Organisms causing CAUTI[a]			
Mechanism of CAUTI	Gram-positive cocci (n=44)	Yeasts (n=34)	Gram-negative bacilli (n=37)	Overall (n=115)
Extraluminal	79%	69%	54%	66%
Intraluminal	21%	31%	46%	34%

[a]Percentages refer to organisms in which the mechanism of infection could be determined. For comparison of gram-positive cocci and yeasts vs. gram-negative bacilli, p = 0.007.
CAUTI = catheter-associated urinary tract infection.

Maki DG, Tambyah PA. Emerg Infect Dis 2001;7:1-6

PATHOGENESIS OF CA-UTI

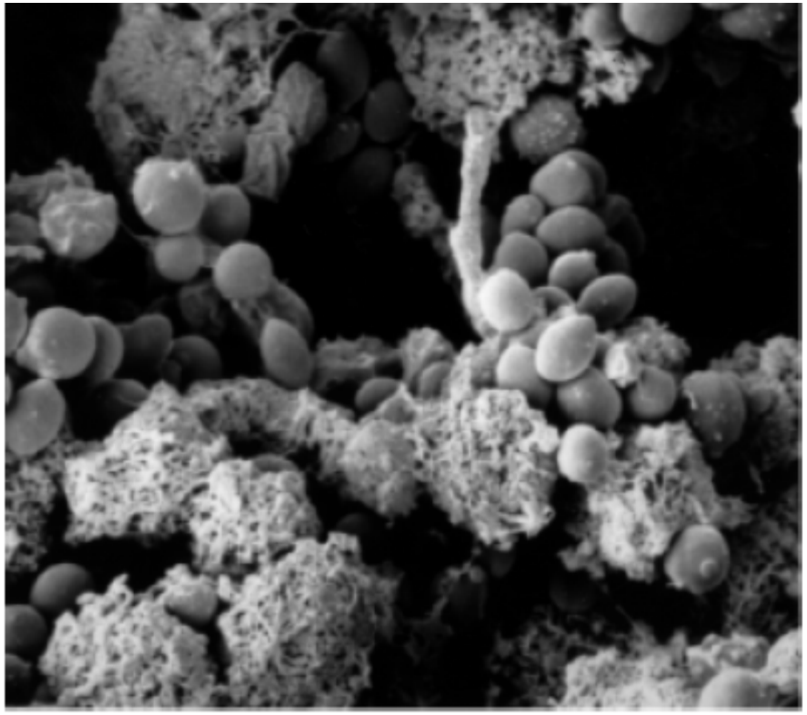


Figure 2. Scanning electron micrograph of an infected catheter showing dense and complex biofilm on the extraluminal surface. Urine culture at catheter removal yielded *Candida albicans* 10^4 CFU/mL and *C. glabrata* 10^4 CFU/mL (X 5000).

- Formation of biofilms by urinary pathogens common on surfaces of catheters and collecting systems
- Bacteria within biofilms resistant to antimicrobials and host defenses
- Some novel strategies in CA-UTI prevention have targeted biofilms

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HAI PATHOGENS, NHSN, 2011-2014

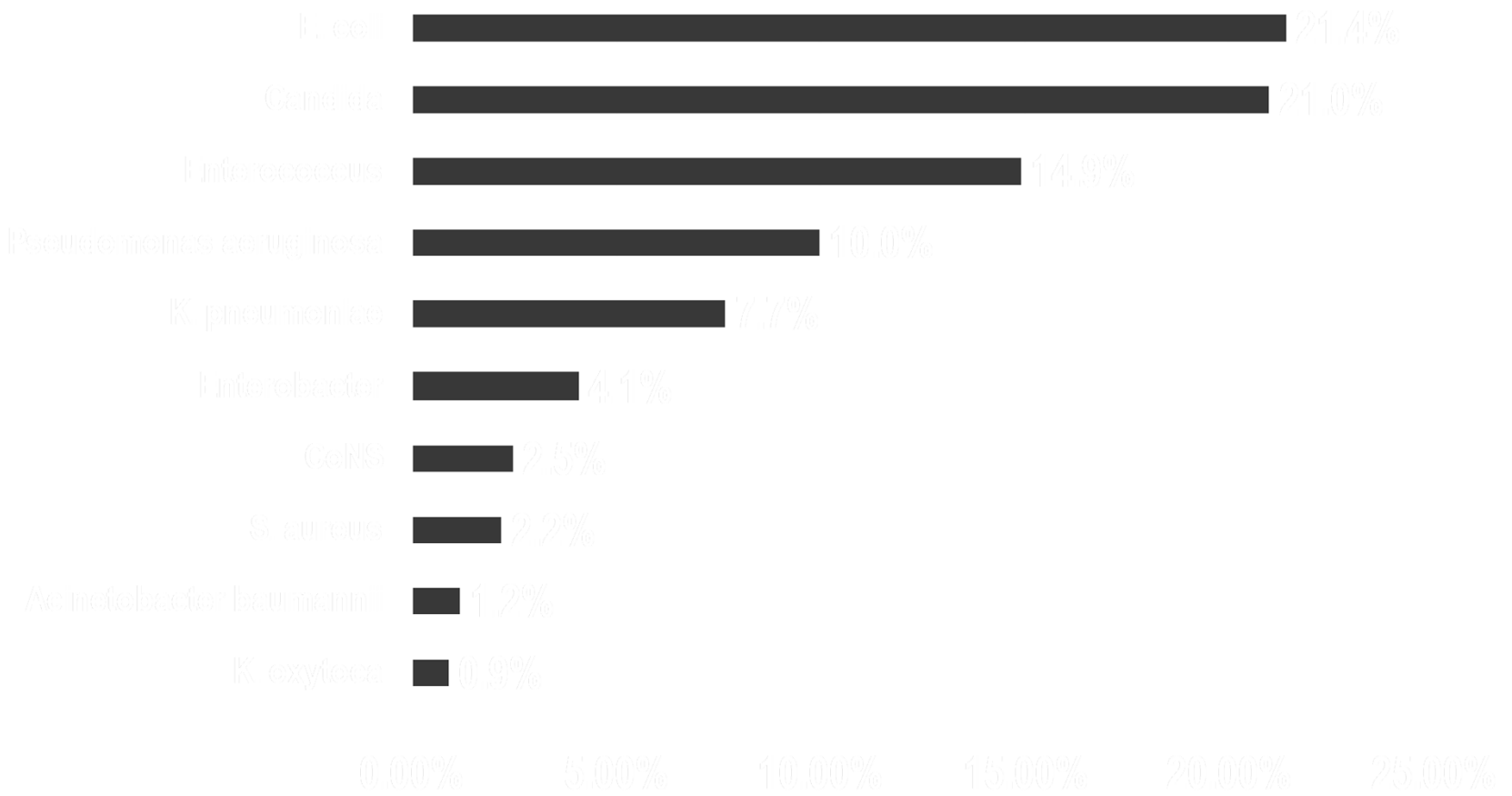
TABLE 4. Distribution and Rank Order of Pathogens Frequently Reported to the National Healthcare Safety Network (NHSN), by Type of Healthcare-Associated Infection (HAI), 2011–2014

	Overall		CLABSI		CAUTI		VAP[a]		SSI	
Pathogen	No. (%) of pathogens	Rank[b]	No. (%) of pathogens	Rank[b]	No. (%) of pathogens	Rank[b]	No. (%) of pathogens	Rank[b]	No. (%) of pathogens	Rank[b]
Escherichia coli	62,904 (15.4)	1	5,193 (5.4)	7	36,806 (23.9)	1	476 (5.4)	6	20,429 (13.7)	2
Staphylococcus aureus	48,302 (11.8)	2	12,706 (13.2)	2	2,515 (1.6)	14	2,179 (24.7)	1	30,902 (20.7)	1
Klebsiella (pneumoniae/oxytoca)	31,498 (7.7)	3	8,062 (8.4)	4	15,471 (10.1)	4	898 (10.2)	3	7,067 (4.7)	6
Coagulase-negative staphylococci[c]	31,361 (7.7)	4	15,794 (16.4)	1	3,696 (2.4)	13	72 (0.8)	13	11,799 (7.9)	3
Enterococcus faecalis[d]	30,034 (7.4)	5	8,118 (8.4)	3	10,728 (7.0)	5	32 (0.4)	21	11,156 (7.5)	4
Pseudomonas aeruginosa	29,636 (7.3)	6	3,881 (4.0)	10	15,848 (10.3)	3	1,449 (16.5)	2	8,458 (5.7)	5
Candida albicans[d]	27,231 (6.7)	7	5,761 (6.0)	6	17,926 (11.7)	2	193 (2.2)	10	3,351 (2.2)	12
Enterobacter spp[c]	17,235 (4.2)	8	4,204 (4.4)	9	5,689 (3.7)	9	727 (8.3)	4	6,615 (4.4)	8
Enterococcus faecium[d]	14,942 (3.7)	9	6,567 (6.8)	5	4,212 (2.7)	11	23 (0.3)	24	4,140 (2.8)	11
Other *Enterococcus* spp.[d]	14,694 (3.6)	10	1,974 (2.0)	14	6,291 (4.1)	7	19 (0.2)	27	6,410 (4.3)	9
Proteus spp.[c]	11,249 (2.8)	11	820 (0.8)	17	6,108 (4.0)	8	125 (1.4)	12	4,196 (2.8)	10
Yeast NOS[e]	10,811 (2.6)	12	763 (0.8)	18	9,443 (6.1)	6	54 (0.6)	16	551 (0.4)	25
Other *Candida* spp.[d]	10,641 (2.6)	13	4,730 (4.9)	8	5,178 (3.4)	10	37 (0.4)	19	696 (0.5)	19
Candida glabrata[d]	8,121 (2.0)	14	3,314 (3.4)	11	4,121 (2.7)	12	12 (0.1)	33	674 (0.5)	20
Bacteroides spp.	7,560 (1.9)	15	515 (0.5)	19	2 (<0.1)	130	2 (<0.1)	72	7,041 (4.7)	7
Other pathogen	51,932 (12.7)		14,130 (14.6)		9,771 (6.4)		2,507 (28.5)		25,524 (17.1)	
Total	408,151 (100)		96,532 (100)		153,805 (100)		8,805 (100)		149,009 (100)	

%MRSA by site: CLABSI, 50.7% (2014); VAP, 42.4% (2012); SSI, 42.6% (2014); CAUTI, 52.0% (2014)

Weiner LM, et al. ICHE 2016;37:1288-1301

CA-UTI: PATHOGENS
NHSN, 2006-2007

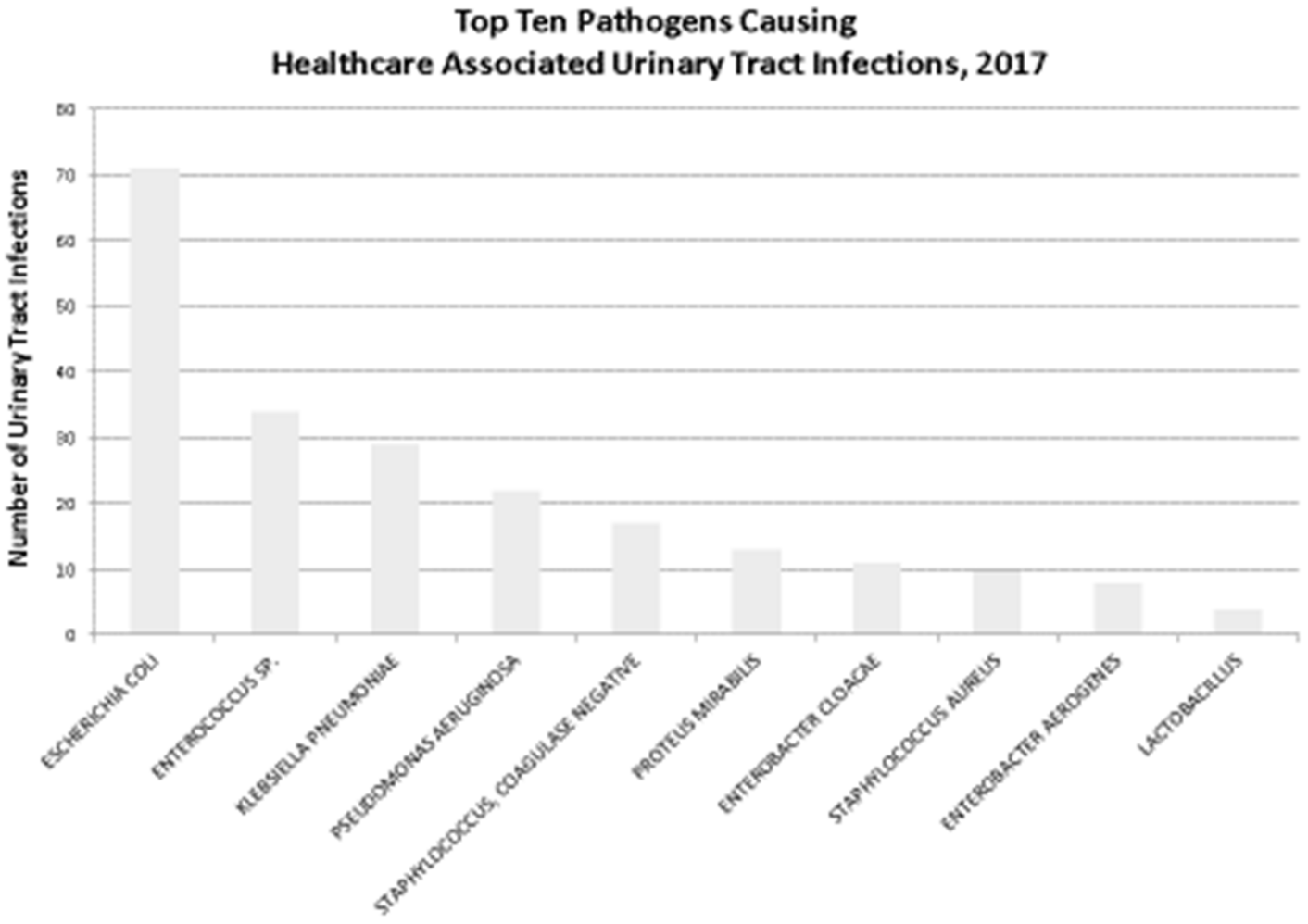


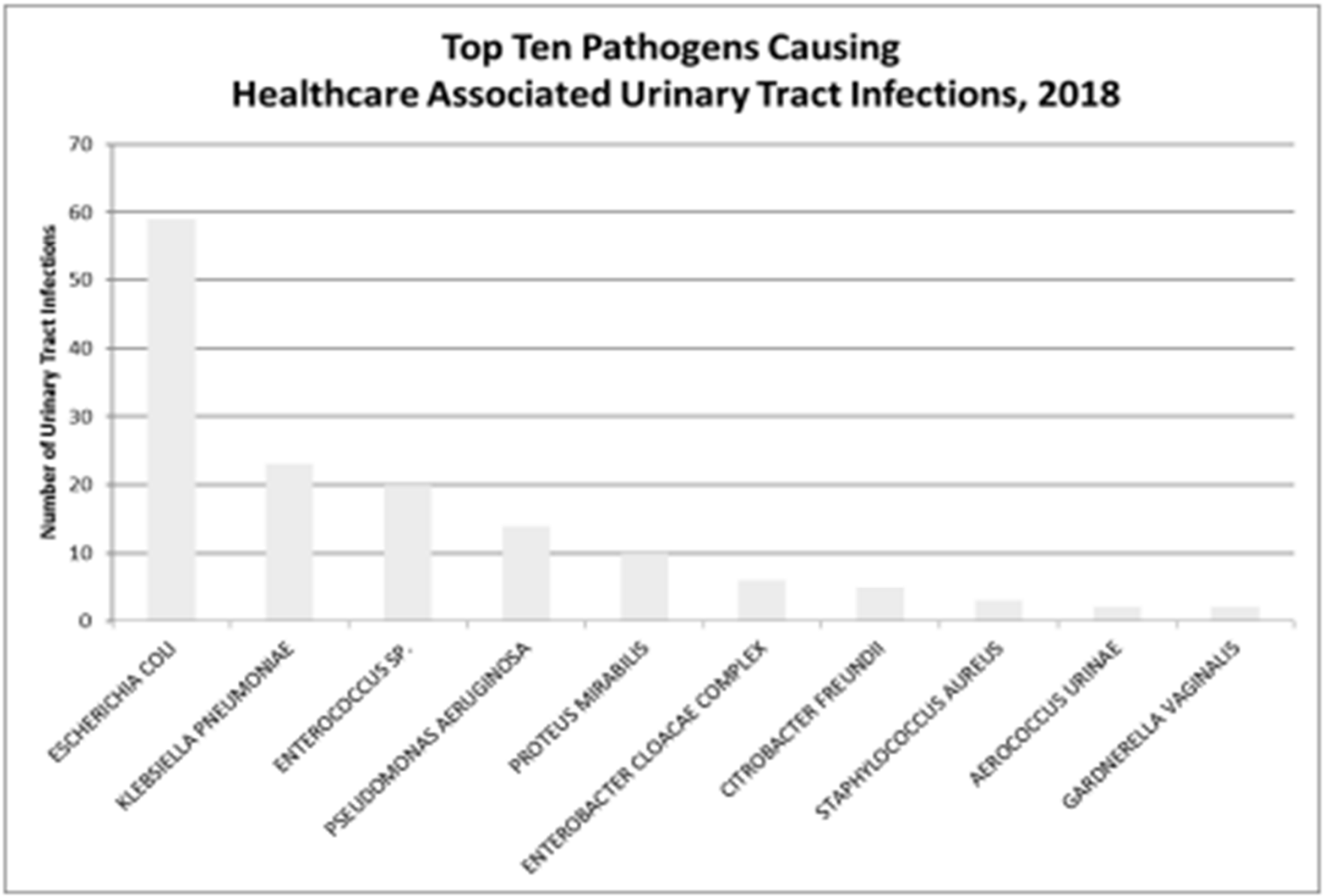
Hidron AI, et al. Infect Control Hosp Epi 2008;29:996-1011

HAI Pathogens, NHSH, 2011-2014

Pathogen	Number (%)
E. coli	36,806 (23.9)
Candida albicans	17,926 (11.7)
Pseudomonas aeruginosa	15,848 (10.3)
K. pneumoniae/oxytoca	15,471 (10.1)
Enterococcus faecalis	10,728 (7.0)
Yeast	9,443 (6.1)
Other *Enterococcus* spp	6,291 (4.1)
Proteus spp	6,108 (4.0)
Enterobacter spp.	5,680 (3.7)

Weiner LM, et al. ICHE 2016;37:1288-1301


Top Ten Pathogens Causing
Healthcare Associated Urinary Tract Infections, 2017
Number of Urinary Tract Infections
80
70
60
50
40
30
20
10
0
ESCHERICHIA COLI
ENTEROCOCCUS SP.
KLEBSIELLA PNEUMONIAE
PSEUDOMONAS AERUGINOSA
STAPHYLOCOCCUS, COAGULASE NEGATIVE
PROTEUS MIRABILIS
ENTEROBACTER CLOACAE
STAPHYLOCOCCUS AUREUS
ENTEROBACTER AEROGENES
LACTOBACILLUS


Top Ten Pathogens Causing
Healthcare Associated Urinary Tract Infections, 2018
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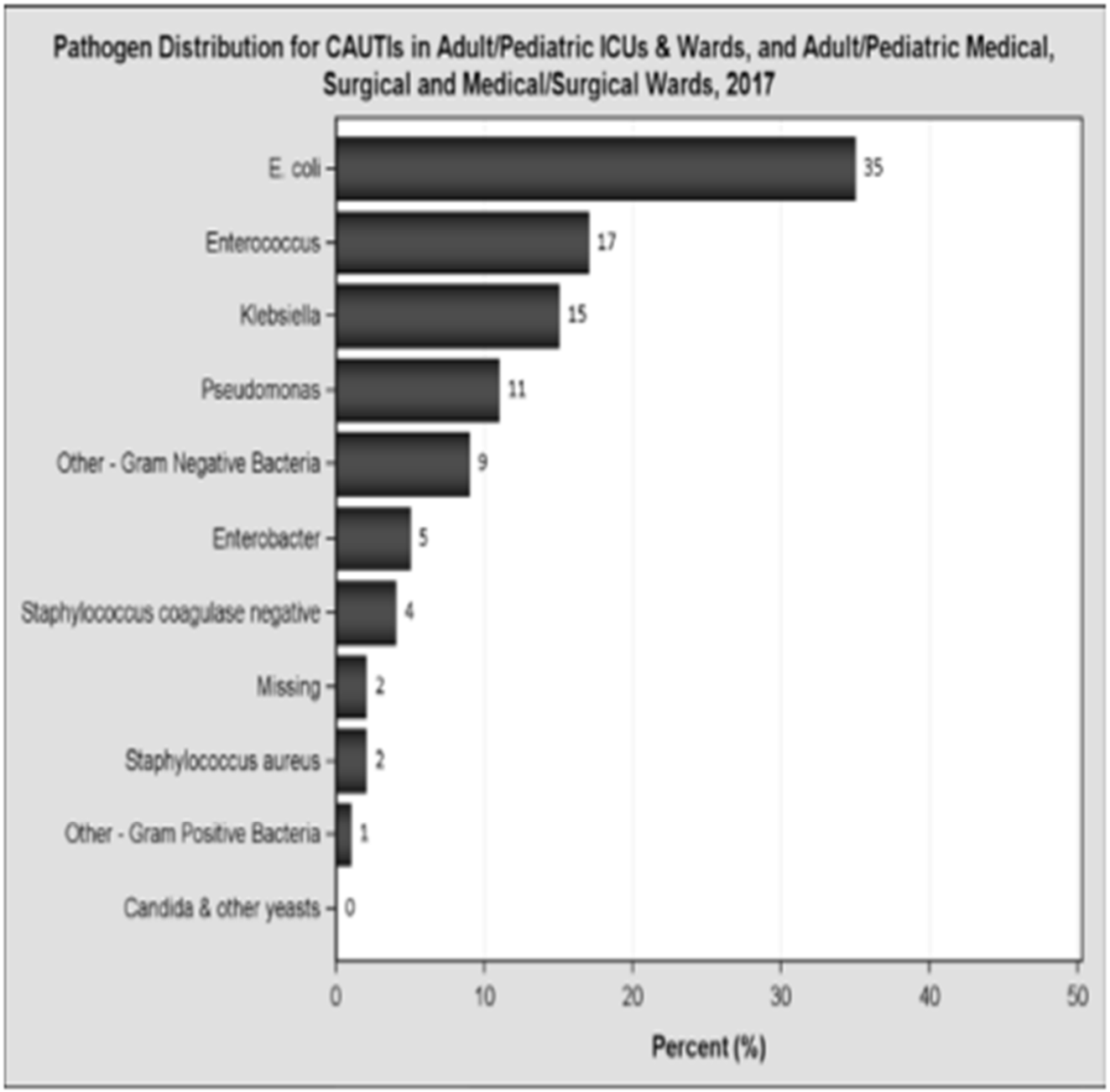
ESCHERICHIA COLI
KLEBSIELLA PNEUMONIAE
ENTEROCOCCUS SP.
PSEUDOMONAS AERUGINOSA
PROTEUS MIRABILIS
ENTEROBACTER CLOACAE COMPLEX
CITROBACTER FREUNDII
STAPHYLOCOCCUS AUREUS
AEROCOCCUS URINAE
GARDNERELLA VAGINALIS



How to Understand Figure 11:

- *E. coli* (35%) and *Enterococcus* (17%) were the most commonly identified pathogens among reported CAUTI infections in 2017
- *Candida* species and other yeasts are considered excluded organisms and cannot be used to meet the UTI definition

HEALTHCARE-ASSOCIATED UTIs, UNCHC, 2006-2009

	CA-UTI (N=1218)	UTI (N=459)
E. coli	23.6%	29.0%
Enterococcus spp.	15.4%	16.3%
Candida spp.	14.9%	6.1%
P. aeruginosa	9.2%	7.2%
Klebsiella spp.	9.1%	12.6%
Proteus spp.	6.2%	4.1%
Enterobacter spp.	4.7%	4.6%
Coag neg staph	2.9%	4.6%
Torulopsis glabrata	2.1%	0.7%
Acinetobacter	1.8%	0.0%
S. aureus	1.6%	2.4%
Serratia marcescens	1.3%	1.3%
Citrobacter spp.	1.2%	2.2%
Other	6.0%	8.9%

CA-UTI: NHSN, 2006-2008

Unit	Infection Rate (pooled mean)	Infection Rate (10% - 90%)	Urinary Cath Utilization Ratio
Burn ICU	7.4	2.6, 12.3	0.61
Medical cardiac ICU	4.8	0.0 – 9.4	0.56
Medical, major teaching ICU	4.7	1.0 – 8.9	0.72
Neurology ICU	7.4	NA	0.77
Neurosurgical ICU	6.9	1.6 – 10.8	0.76
Pediatric medical ICU	4.0	NA	0.21
Pediatric, med/surg ICU	4.2	0.0 – 7.2	0.29
Surgical ICU	4.3	0.7 – 9.1	0.81
Cardiothoracic ICU	3.6	0.7 – 7.0	0.77
Trauma ICU	5.4	0.2 – 8.1	0.89
Medicine floor	6.7	1.2 – 14.4	0.20
Surgical floor	6.5	0.0 – 11.8	0.26

Edwards JR, et al. Am J Infect Control 2009;37:783-805

HEALTHCARE-ASSOCIATED UTIs, UNCHC, 2006-2009

Weber, Sickbert-Bennett, Gould, Brown, Huslage, Rutala. ICHE. 2011;32:822

	CA-UTI Number	CA-UTI Rate*	UTI Number	UTI Rate^
Medicine ICU	133	3.75	6	0.16
Medicine Step Down	27	2.65	7	0.42
Medicine Ward	101	3.35	77	0.43
Surgery ICU	300	4.81	9	0.13
Surgery Step Down	31	2.90	3	0.30
Surgery Ward	358	4.59	108	0.42
Pediatric ICU	50	4.52	77	0.92
Pediatric Ward	25	4.83	38	0.32
Rehabilitation Ward	43	10.12	60	1.68
Psychiatric Ward			26	0.30
TOTAL	1068	4.32	411	0.48

* Per 1,000 day catheterized ^ Per 1,000 days hospitalized

LECTURE TOPICS

- Prevalence
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- Risk factors
- Prevention

RISK FACTORS FOR CA-UTI

Hooton, et al. IDSA Guidelines CID 2010:50:625

- Indwelling catheterization
- Not receiving systemic antimicrobial therapy
- Female sex
- Positive urethral meatal culture results
- Microbial colonization of the drainage bag
- Catheter insertion outside the OR
- Catheter care violations
- Older age
- Diabetes mellitus
- Rapidly fatal underlying illness
- Elevated serum creatinine at the time of catheterization

RISK FACTORS FOR CA-UTI

Table 3. Risk factors for catheter-associated urinary tract infection, based on prospective studies and use of multivariable statistical modeling (27-30)

Factor	Relative risk
Prolonged catheterization >6 days	5.1-6.8
Female gender	2.5-3.7
Catheter insertion outside operating room	2.0-5.3
Urology service	2.0-4.0
Other active sites of infection	2.3-2.4
Diabetes	2.2-2.3
Malnutrition	2.4
Azotemia (creatinine >2.0 mg/dL	2.1-2.6
Ureteral stent	2.5
Monitoring of urine output	2.0
Drainage tube below level of bladder and above collection bag	1.9
Antimicrobial-drug therapy	0.1-0.4

Maki DG, Tambyah PA. Emerg Infect Dis 2001;7:1-6

EVIDENCE-BASED RISK FACTORS FOR CA-UTI

Symptomatic UTI

Prolonged catheterization*

Female gender^

Older age^

Impaired immunity^

Bacteriuria

Disconnection of drainage system*

Lower professional training of inserter*

Placement of catheter outside of OR^

Incontinence^

Diabetes

Meatal colonization

Renal dysfunction

Orthopaedic/neurology services

* Main modifiable risk factors

^ Also inform recommendations

ANTIBACTERIAL HOST DEFENSES IN THE URINARY TRACT

- Urine (osmolality, pH, organic acids)
- Urine flow and micturition
- Urinary tract mucosa (bactericidal activity, cytokines)
- Urinary inhibitors of bacterial adherence
  - Tamm-Horsfall protein
  - Bladder mucopolysaccharide
  - Low-molecular-weight oligosaccharides
  - Secretory immunoglobulin A (SIgA)
  - Lactoferrin
- Inflammatory response
  - Polymorphonuclear neutrophils (PMNs)
  - Cytokines
- Immune system
  - Humoral immunity
  - Cell-mediated immunity
  - Miscellaneous
    - Prostatic secretions

CA-UTI DEFINITIONS

- UTI that occurs in a patient who has had an indwelling urethral catheter in place within the 48-hour period before the onset of the UTI
- Does not include in and out catheters or urinary catheters that are not placed in the urethra (e.g., suprapubic catheter)
- Do not include patients with asymptomatic bacteriuria

COMPLICATIONS OF SHORT-TERM CATHETERIZATION

- Less than 25% of hospitalized patients with CA-bacteriuria develop UTI symptoms
- ~15% of cases of nosocomial bacteremia are attributable to the urinary tract
- Bacteriuria is the most common source of Gram negative bacteremia among hospitalized patients
- However, bacteremia complicates CA-bacteriuria in only <1% to 4% of cases
- The mortality of nosocomial bacteremic UTI is ~13%, but <1% of hospital deaths are due to bacteremic UTI

Hooton TM, et al. Clin Infect Dis 2010;50:625-663

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CA-UTI Prevention-IHI

- Avoid unnecessary catheters
- Insert urinary catheters using aseptic technique
- Maintain urinary catheters based on recommended guidelines
- Review urinary catheters necessity daily and remove promptly when not needed

CA-UTI Prevention-IHI

- Avoid unnecessary urinary catheters
  - Explicit criteria for appropriate insertion should be in place and verification that criteria are met prior to insertion
  - Indications
    - **Preoperative use for selected surgical patients**
    - **Urine output monitoring in critically ill patients**
    - **Management of acute urinary retention and urinary obstruction**
    - **Assistance in pressure ulcer healing for incontinent patients**
    - **As an exception, at patient request to improve comfort or for comfort during end-of-life care**
  - Strategies: require verification that criteria are meet; build criteria for catheter insertion into order entry systems and require documentation of need at time of order; review cases of insertion that do not meet criteria

CA-UTI Prevention-IHI

- Insert urinary catheters using aseptic technique
  - Use appropriate hand hygiene
  - Insert catheter using aseptic technique and sterile equipment (gloves, drape, sponges, antiseptic solution for cleaning urethral meatus, sterile lubricant gel)
  - Use as small a catheter as possible consistent with proper drainage
  - Strategies: checklist for indications for catheter use and insertion; kits; education and training of staff; competency assessment

CA-UTI Prevention-IHI

- Maintain catheters based on recommended guidelines
  - Maintain sterile, continuously closed drainage system
  - Keep catheter properly secured to prevent movement and urethral traction
  - Keep collection bag below the level of the bladder
  - Maintain unobstructed urine flow
  - Empty collection bag regularly
- Strategies: verify and document five items at least once per shift; avoid irrigating catheters; disconnecting the catheter from the drainage bag; and replacing catheters routinely

CA-UTI Prevention-IHI

- Review urinary catheter necessity daily and remove promptly (duration of catheterization is the most important risk factor for development of infection)
  - Daily review of catheter necessity is recommended
- Strategies: automatic stop orders; daily reminders by nurses to physicians; alerts in computerized ordering systems; daily assessment at the start of every shift with the requirement to contact physician if criteria are not meet

CA-UTI Prevention-IHI

- Forming the Team
- Champions
- Setting Aims
  - Decrease the rate of CA-UTI by 5% within one year by achieving high levels of performance in the preventive measures
- Assess where we stand presently

CA-UTI Prevention-IHI

- Process Measures
  - Unnecessary urinary catheters (inserted without appropriate indication documented at the time of insertion)
  - Number of patient records or forms with documentation of aseptic technique
  - Urinary catheters maintained according to recommended practices (sterile, closed drainage; bag below bladder, etc)
  - Unnecessary urinary catheter days (number of days with no documentation of indication for continued necessity)

CA-UTI Prevention-IHI Questions

- Do we require verification that catheter indications are met
- Do we conduct a daily review of catheter necessity
- Are we measuring unnecessary catheters
- Is there a process in place for daily review of inserted catheters
- Are we using an insertion checklist
- Do we follow daily maintenance procedures
- Are all supplies for compliance with appropriate insertion available at point of care
- Do we teach core principles of prevention of CA-UTI
- Where are urinary catheters used most frequently
- What is our CA-UTI rate

CDC/HICPAC AND IDSA SCORING SYSTEMS

Table 1. Modified HICPAC Categorization Scheme* for Recommendations	
Category IA	A strong recommendation supported by high to moderate quality† evidence suggesting net clinical benefits or harms
Category IB	A strong recommendation supported by low quality evidence suggesting net clinical benefits or harms or an accepted practice (e.g., aseptic technique) supported by low to very low quality evidence
Category IC	A strong recommendation required by state or federal regulation.
Category II	A weak recommendation supported by any quality evidence suggesting a trade off between clinical benefits and harms
No recommendation/ unresolved issue	Unresolved issue for which there is low to very low quality evidence with uncertain trade offs between benefits and harms

Table 1. Strength of Recommendation and Quality of Evidence

Category/grade	Definition
Strength of recommendation	
A	Good evidence to support a recommendation for or against use.
B	Moderate evidence to support a recommendation for or against use.
C	Poor evidence to support a recommendation for or against use.
Quality of evidence	
I	Evidence from >1 properly randomized, controlled trial.
II	Evidence from >1 well-designed clinical trial, without randomization; from cohort or case-controlled analytic studies (preferably from >1 center); from multiple time-series; or from dramatic results from uncontrolled experiments.
III	Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

PREVENTION

- Appropriate catheter use
  - **Insert urinary catheters only for appropriate indications and leave in place only as long as needed (IB)**
  - **Avoid urinary catheters in patients for management of incontinence (IB)**
  - **Use urinary catheters in operative patients only as necessary, rather than routinely (IB)**
  - **For operative patients who require a catheter, remove it as rapidly as possible, preferably within 24 hours (IB)**

CDC. http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf

PREVENTION:
APPROPRIATE INDICATIONS FOR A CATHETER

- Patient has acute urinary retention or bladder obstruction
- Need for accurate measurement of urinary output in critically ill patients
- Perioperative use for selected surgical patients
  - **Urological surgery or other surgery on contiguous structures of GU tract**
  - **Anticipated prolonged duration of surgery (remove in PACU)**
  - **Patient anticipated to receive large volume infusions or diuretics during surgery**
  - **Need for intraoperative monitoring of urinary output**
- To assist in healing of open sacral or perineal wounds in incontinent patients

Adapted from CDC: http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf

PREVENTION:
APPROPRIATE INDICATIONS FOR A CATHETER

Table 2. Acceptable Indications for Indwelling Urinary Catheter Use

Indication	Comment(s)
Clinically significant urinary retention	Temporary relief or longer-term drainage if medical therapy is not effective and surgical correction is not indicated.
Urinary incontinence	For comfort in a terminally ill patient; if less invasive measures (eg, behavioral and pharmacological interventions or incontinence pads) fail and external collecting devices are not an acceptable alternative.
Accurate urine output monitoring required	Frequent or urgent monitoring needed, such as with critically ill patients.
Patient unable or unwilling to collect urine	During prolonged surgical procedures with general or spinal anesthesia; selected urological and gynecological procedures in the perioperative period.

Hooton TM, et al. Clin Infect Dis 2010;50:626-663

ALTERNATIVES TO INDWELLING URETHRAL CATHETERIZATION IN SELECTED PATIENTS

- Consider an external catheter in cooperative male patients without urinary retention or bladder outlet obstruction (II)
- Consider intermittent catheterization in spinal cord injury patients (II)
- Consider intermittent catheterization in children with myelomeningocele and neurogenic bladder (II)
- Intermittent catheterization is preferable to an indwelling urethral or suprapubic catheter in patients with bladder or emptying dysfunction (II)

PREVENTION

- Use Standard Precautions during manipulation of the catheter or collection system (IB)
- Changing indwelling catheters or drainage bags at routine, fixed intervals is not recommended. Change based on clinical indications such as infection, obstruction or whether the system is compromised (II)
- Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place (IB)
- Unless obstruction is anticipated, bladder irrigation is not recommended (II)

CDC. http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf

PREVENTION

- Urinary catheter insertion
  - **Perform hand hygiene before and after insertion (IB)**
  - **Insert catheters using aseptic technique and sterile equipment (IB)**
    - **Use sterile gloves, drape, sponges, an appropriate antiseptic for periurethral cleaning, and a single-use packet of lubricant jelly for insertion**
    - **Routine use of antiseptic lubricants is not necessary**
  - **Properly secure indwelling catheters after insertion (IB)**
  - **If intermittent catheterization is used, perform it at regular intervals (IB)**
- Catheter maintenance
  - **Following aseptic insertion, maintain a closed drainage system (IB)**
  - **Maintain unobstructed urine flow (IB)**

Adapted from CDC: http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf

PREVENTION

- Screening for and treatment of CA-ASB are not recommended to reduce subsequent CA-bacteriuria or CA-UTI in patients with short or long term indwelling urethral catheters
- Screening for and treatment of CA-ASB are not recommended to reduce subsequent CA-bacteriuria or CA-UTI in patients with neurogenic bladders managed with intermittent catheterization
- Screening for and treatment of CA-ASB are not recommended to reduce subsequent CA-bacteriuria or CA-UTI in other patients, except in pregnant women and patients who undergo urologic procedures for which visible mucosal bleeding is anticipated

Hooton TM, et al. Clin Infect Dis 2010;50:626-663

PREVENTION

- Routine instillation of antiseptic or antimicrobial solutions into the urinary drainage bags is not recommended (II)
- Further research is needed on the effect of antimicrobial/antiseptic-impregnated catheters in reducing the risk of symptomatic UTI (no recommendation)
- Further research is needed on the benefit of spatial separation of patients with urinary catheters (no recommendation)

PREVENTION

- Quality Improvement Programs
  - Assure utilization of catheters
  - Remove catheters when no longer needed
  - Education and performance feedback regarding appropriate use, hand hygiene, and catheter care
  - Algorithms for perioperative management (removal, urinary retention)

SUMMARY OF PREVENTION MEASURES

CORE MEASURES

- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed
- Only properly trained persons insert and maintain catheters
- Maintain a closed drainage system
- Maintain unobstructed urine flow
- Hand hygiene and standard (or appropriate isolation precautions)

SUPPLEMENTAL MEASURES

- Alternatives to indwelling urinary catheterization
- Portable ultrasound devices to reduce unnecessary catheterizations
- Antimicrobial/antiseptic impregnated catheters

Adapted from CDC: http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf

STRATEGIES NOT RECOMMENDED FOR CA-UTI PREVENTION

- Complex urinary drainage systems (e.g., antiseptic-releasing cartridges in drain port)
- Changing catheters or drainage bags at routine, fixed intervals (clinical indications include infection, obstruction, or compromise of closed system)
- Routine antimicrobial prophylaxis
- Cleaning of periurethral area with antiseptics while catheter is in place (use routine hygiene)
- Irrigation of bladder with antimicrobials
- Instillation of antiseptic or antimicrobial solutions into drainage bags
- Routine screening for asymptomatic bacteriuria

Adapted from CDC: http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf

LECTURE TOPICS

- Prevalence
- Pathogenesis
- Etiology of UTIs
- Risk factors
- Prevention

REFERENCES

- Lo E, et al. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals. Infect Control Hosp Epidemiol 2008;29(suppl 1):S41-50
- Gould CV, et al. Guideline for prevention of catheter-associated urinary tract infections 2009. http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf
- Hooton TM, et al. Diagnosis, prevention and treatment of catheter-associated urinary tract infection in adults: 2009 international clinical practice guidelines from the Infectious Disease Society of America. Clin Infect Dis 2010;50:625-663.
- Weber DJ, et al. Incidence of healthcare-associated catheter- and noncatheter-associated urinary tract infections. ICHE. 2011;32:822