



ESUN Organised Course

Urinary Tract Infections

8-9 May 2015, Amsterdam, the Netherlands



European School of Urology Nursing (ESUN)

1st ESUN Course - Urinary Tract Infections

8-9 May 2015
Amsterdam, The Netherlands
<http://eaun.uroweb.org>



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Disclaimer

The statements and the opinions published in this programme book are solely those of the individual authors and not of the European Association of Urology Nurses (EAUN). The lectures have been printed as submitted. For the consistency of this publication only a standard language spelling check was made on all text; it is the decision of the EAUN not to edit the texts in order not to change any contexts.

Disclosure

The EAUN requests that you disclose to the audience any links you may have with the industry related to the topic of your lecture at the beginning of your session. A link can be: Being a member of an advisory board or having a consultancy agreement with a specific company.

Welcome

Dear friends,

It is with great pleasure that we welcome you all to the 1st Course of the European School of Urology Nurses (ESUN) in Amsterdam. The theme of this course is "Urinary Tract Infections (UTI)". The course will cover aetiology and microbiology, as well as the use of antibiotics and prevention and treatment of UTI in different groups of patients. Furthermore, patient and caregiver education will be discussed. All these topics will be addressed by experts (urologists and specialised nurses) in state-of-the-art lectures. Mrs. Gustafsson from Wellspect HealthCare will introduce to you their newly developed UTI Prevention App, developed in cooperation with, and acknowledged by the EAUN.

The European School of Urology Nurses offers this course to selected participants who will be able to disseminate the knowledge they gain to others in their daily work. The Friday programme will include group work, in which the groups will discuss a case. On Saturday, the course will be concluded with a test, including a UTI prevention plan for one's own clinic, and a certificate.

The ESUN aims to use this course as a basis for future courses, both national and international. We are happy to discuss possibilities to repeat this course in other locations with you.

The organising committee is grateful to all members of the faculty who will make this ESUN course a memorable event. It will be a great opportunity for all participants to be informed about the latest developments in UTI.

Sincerely,



A handwritten signature in cursive script that reads "Susanne Vahr".

Susanne Vahr
Organising Committee



A handwritten signature in cursive script that reads "Willem de Blok".

Willem De Blok
Organising Committee



A handwritten signature in cursive script that reads "Bente Thoft".

Bente Thoft Jensen
Organising Committee

Acknowledgements

Acknowledgements

The Scientific Organising Committee wishes to thank the following company for their support to organise this course:



General Information

General Information

Accreditation

The course will be accredited in The Netherlands. Dutch participants will automatically receive the credit points. If you would like a certificate which mentions the Dutch accreditation you can indicate this at the course or send an email to the EAUN at eaun@uoweb.org.

Certificate of Attendance

All participants will receive a Certificate of Attendance after the course

Course dinner

On Friday night at 20.00 hrs a dinner is organised for faculty and participants in Cedars Libanese Restaurant, Heemstedestraat 80, 1058 NP Amsterdam, www.cedars.nl

Exhibition

Wellspect HealthCare and the EAUN will be present with an information table in the hall to give further information on their activities and answer your questions

Insurance

The organisers do not accept liability for any personal damage. Participants are strongly advised to arrange their own personal insurance.

Language

The meeting will be conducted in English.

Lost and found

Please report to the organisers in case you have lost or found personal belongings.

Mobile phones

Mobile phones must be switched off during the lectures.

Smoking

Smoking is not allowed in the hospital unless indicated otherwise.

Programme

Friday, 8 May

12.30 – 13.30	Registration
13.30 – 13.35	Opening and welcome W. De Blok, Amsterdam (NL), <i>EAUN Board Member</i>
13.35 – 14.30	Module 1. The aetiology of UTI R. Pickard, Newcastle (UK), <i>urologist</i> , <i>Vice Chairman EAU Working Group on Urinary Incontinence and Member</i> <i>EAU Guidelines Working Group on Urological Infections</i>
13.35 – 13.50	Anatomy and physiology of the urinary tract
13.50 – 14.10	How bacteria enter the bladder in men and in women
14.10 – 14.30	Cross-contamination (hospital acquired UTI, UTI-SIRS-sepsis)
14.30 – 15.30	Module 2. Microbiology and use of antibiotics M.J. Grabe, Malmö (SE), <i>urologist</i> , <i>Chairman EAU Guidelines Working Group on Urological Infections</i>
14.30 – 15.00	Microbiology
15.00 – 15.30	Antibiotics, recommendations for use of antibiotics, bacterial resistance development
15.30 – 16.00	Coffee break
16.00 – 16.45	Module 3. UTI in adults J.P.F.A. Heesakkers, Nijmegen (NL), <i>urologist</i> , <i>ESFFU Chairman (EAU Section of Female and Functional Urology)</i> <ul style="list-style-type: none">• Definition, prevalence and diagnosis• UTI in diabetes mellitus and immunosuppression• Urethritis• Bacterial prostatitis• Epididymitis and orchitis• Recurrent and chronic UTI• UTI and pregnancy

16.45 – 17.30 **Module 4. UTI in people with indwelling and intermittent catheter**
M. Lester, Manchester (UK), *Urology Specialist Nurse*

16.45 – 17.00 **Definition**

17.00 – 17.15 **Prevalence**

17.15 – 17.30 **Diagnosis of UTI in catheter users**

17.30 – 17.40 **Break**

17.40 – 18.30 **Module 5. Group work - case**

20.00 **Dinner**

Saturday, 9 May

09.00 – 09.45 **Module 6. Prevention and treatment of UTI in adults**
R. Pieters, Ghent (BE), *Clinical Nurse Specialist Urology*

09.00 – 09.20 **Prevention**

09.20 – 09.45 **Treatment**

09.45 – 10.30 **Module 7. Treatment and prevention of UTI in catheter users and urostomy patients**
J.G.L Cobussen-Boekhorst, Nijmegen (NL),
Nurse Practitioner in continence and urostomy care

09.45 – 10.00 **Indwelling catheter**

10.00 – 10.15 **Intermittent catheter**

10.15 – 10.30 **Urinary stoma (continent and incontinent)**

10.30 – 10.50 **Coffee break**

10.50 – 11.00 **Presentation of the Wellspect UTI Prevention App**
L. Gustafsson, Mölndal (SE), Wellspect HealthCare, *Clinical Research Manager*

11.00 – 11.30	Module 8. How to educate caregivers to prevent UTI H.J. Mulder, Groningen (NL), <i>Nurse Practitioner in urology</i>
11.30 – 12.00	Module 9. How to educate patients to prevent UTI H.J. Mulder, Groningen (NL), <i>Nurse Practitioner in urology</i>
11.30 – 11.45	Indwelling and intermittent catheter users, male and female
11.45 – 12.00	Adults, elderly people, people with disabilities
12.00 – 12.10	Break
12.10 – 13.00	Test Group based test, including a UTI prevention plan for one's own clinic, evaluation Chairs: S. Vahr, Copenhagen (DK), <i>EAUN Board member,</i> <i>Clinical Nurse Specialist, Master in HRD/Adult Learning</i> B. Thoft Jensen, Århus (DK), <i>Former EAUN Board member,</i> <i>RN-PhD in Rehabilitation</i>
13.00	Closing remarks
13.00 – 14.00	Lunch

Learning outcomes

Learning outcomes

- List the risk factors for urinary tract infection in men, women and catheter users
- Describe the treatment of urinary tract infections in men, women and catheters users
- Summarise the best ways to prevent urinary tract infections in adults and in catheter users and urostomy patients
- Give examples of how to educate caregivers and patients to prevent urinary tract infections
- Outline an educational plan for preventing urinary tract infection in your own clinic

Abstracts & Presentations



Urinary Tract Infections

1st Course of the European School of Urology Nursing

8-9 May 2015, Amsterdam, the Netherlands



Module 1: The aetiology of UTI – The Host Perspective

Robert Pickard, *Professor of Urology, Newcastle University, UK and Chair of EAU Guideline Panel on Urological Infections* (robert.pickard@ncl.ac.uk)

Humans have a sophisticated defence strategy that makes severe or life-threatening UTI unusual. Indeed well conducted studies have shown that for women with acute cystitis symptomatic management with analgesia, rest and fluids will take only one day longer to resolve symptoms compared to short course antibiotic therapy. This is important because overuse of antibiotics is of increasing concern and new non-antibiotic strategies to resolve minor self-limiting infection is a worldwide research priority. Such therapies need to be based on our improved understanding of the pathophysiology of UTI and the existing innate mechanisms that we all possess to combat epithelial infection. This module will detail our current knowledge base regarding our defence against UTI and outline the strategies used by the main pathogen, *Escherichia coli* to overcome them. We will finish by introducing the clinical classification of UTI that can be used in different healthcare environments and illustrate the importance of reserving antibiotic use for severe infections.

1st ESUN Course on Urinary Tract Infection

Robert Pickard
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Newcastle University
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ean European
Association
of Urology
Nurses

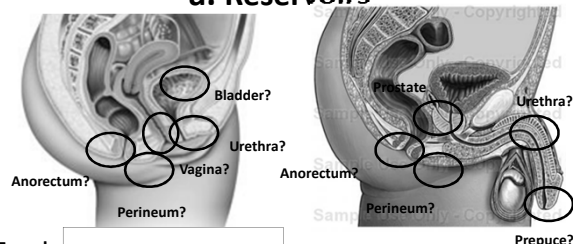


My Task

Module 1. The aetiology of UTI – The Host Perspective

- 13.35 – 13.50 **Anatomy and physiology of the urinary tract**
- 13.50 – 14.10 **How bacteria enter the bladder in men and in women**
- 14.10 – 14.30 **Cross-contamination (hospital acquired UTI, UTI-SIRS-sepsis)**

1. Anatomy and Physiology: a. Reservoirs



Female

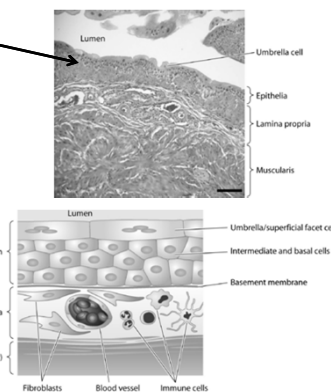
50% lifetime risk
Peak at ~ 30 years
Simple cystitis commonest syndrome
Escherichia coli 75 – 90%

Male

5% lifetime risk
Peak at ~ 75 years
Febrile UTI commonest syndrome
Escherichia coli 80 – 90%

b. Indirect protective mechanisms

- **Urothelium**
 - **Barrier function**
 - Tight junctions
 - Uroplakins
 - Polysaccharide coating
- **Physical**
 - Urine flow
 - Low Urine pH
 - High osmolarity
- **Others - ♀**
 - Low vaginal pH
 - Oestrogenisation



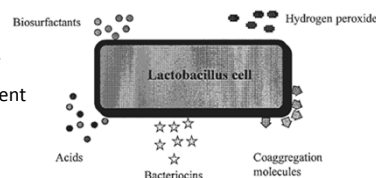
c. Direct innate antimicrobial defence

- **Constitutive (always present) antimicrobial secretions**
 - Urinary proteins from kidney
 - Tamm Horsfall – binds bacteria
 - Lipocalin – sequesters iron
 - Lactoferrin – sequesters iron
 - Soluble IgA – binds bacteria
 - Epithelial secretions
 - Cathelicidin – kills bacteria
 - Defensins – anionic peptides kill bacteria
 - ♂ - Seminal fluid – Whey acid motif proteins release antimicrobial peptides on digestion by PSA
 - ♀ - Vaginal secretions – Defensins, carbohydrates; kill or bind bacteria

d. Intrinsic probiotics

Probiotic = live micro-organisms that confer a health benefit on the host

- **♀ Vaginal biofilm**
 - Lactobacilli
 - Active inhibition of Coliform attachment and proliferation



- **♂ and ♀ Urethral and bladder microbiome**
 - Many different organisms isolated using advanced culture or molecular techniques from different human populations

Questions

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2. How bacteria enter the bladder

- Colonisation of adjacent surface
 - Vagina
 - Peri-urethra
 - Penile urethra/glans
- Transfer to bladder
 - Planktonic movement (flagella)
 - Proliferation within biofilm
- Attachment to bladder epithelium
 - Expression of adhesins (FimH)
- Proliferation (biofilm or intra-epithelial?)
 - Acquisition/expressions of virulent genotype/phenotype
- Invasion
 - Excitement of inflammatory response

a. Colonisation of adjacent epithelial surface

- Spread from ano-rectum
- Overwhelm vaginal defensins and establish 'niche' within biofilm
- 'Receptive' or 'permissive' vaginal cells favour *E. coli* attachment and proliferation
 - Genetic susceptibility (polymorphisms)
- Adjuncts
 - High pH
 - Low oestrogenisation

b. Transfer to bladder

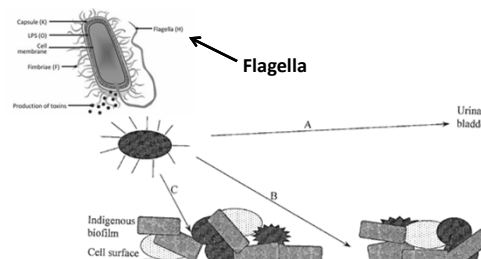
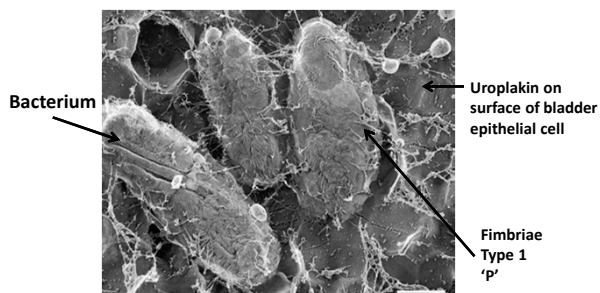


FIGURE 1. When fimbriated, uropathogenic *Escherichia coli* enters the urogenital mucosa from the intestine, it may do so by spreading along the mucosa or by coming directly from the fluid phase into the bladder (A). It may also attach itself to the bare surface of a vaginal epithelial cell (B) or become part of the cell's bacterial biofilm (C), in which it either remains or becomes the dominant organism. When a patient has a bladder infection, the urogenital flora is invariably dominated by the infecting pathogen. The biofilm shown represents that from healthy premenopausal women. Lactobacilli (rods) dominate and coexist with gram-positive cocci (dark open and spiked circles representing capsule) and coliforms (clear, oval shape).

Gregor Reid *Am J Clin Nutr* 2001;73(suppl):437S-43S.

c. Attachment to bladder mucosa



Mulvey MA. *PNAS* 2000; 97: 8829-8835

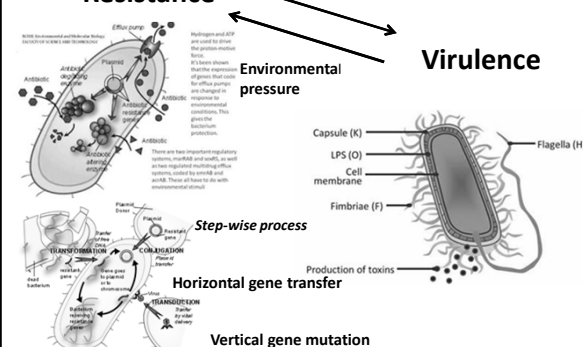
Adhesion Summary

- Prevents bacterial washout by micturition and initiates bacterial invasion.
- Mediated by the FimH adhesion located at the tip of the bacterial type 1 fimbrium, a filamentous attachment apparatus.
- Type 1 fimbriated and P fimbriated strains of *E. coli* are associated with cystitis and pyelonephritis

d. Acquisition of invasive and proliferative phenotype in *E. coli*

- Expression from existing genome
 - Previously 'hidden' until bladder entered
- Acquisition of new genetic material
 - Horizontal transfer
 - Plasmids of DNA switched between bacterial
 - New material engulfed as neighbours die
 - Phage (other micro-organisms)
 - Vertical mutation
 - Persistence and proliferation of clones with survival advantage
 - Environmental pressure
 - Expression/acquisition of antimicrobial resistance (AMR)

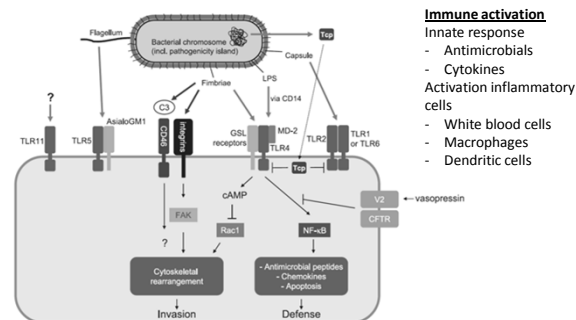
d. Acquisition of invasive and proliferative phenotype



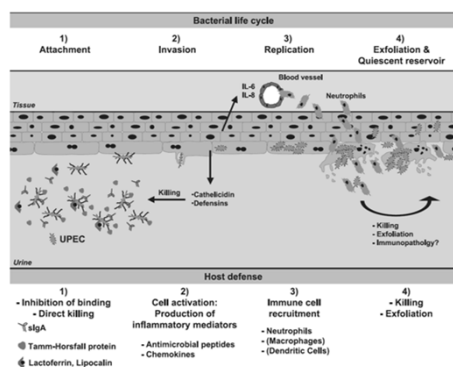
e. Invasion – setting off the host inflammatory response

- Activation of Toll-like receptors (TLR) on the bladder epithelial surface
 - Lipopolysaccharide/FimH – TLR 4
 - Flagellin – TLR5
- Release of haemolysins to drill into bladder cell
- Release of endotoxins - pyrexia
- Possible establishment of dormant intra-epithelial forms (L-forms)

Epithelial Cell Toll-Like Receptors



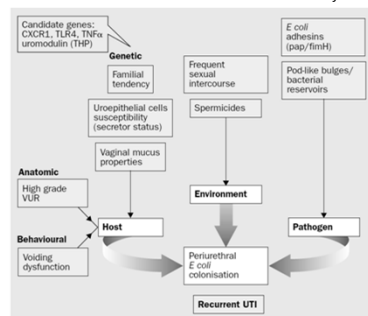
Bladder entry - summary



T. Weichhart. Eur J Clin Invest 2008; 38 (S2): 29–38

Host-pathogen interactions in UTI - summary

Finer G and Landau D. Lancet Infect Dis 2004; 4: 631–35



Pathophysiology model for recurrent UTI. CXCR1-interleukin-8 receptor; THP-Tamm Horsfall protein; TLR4-toll-like receptor-4; VUR-vesicoureteric reflux

Overall summary of inflammatory response in UTI

The inflammatory response during UTI consists of three principal steps:

- Uroepithelial cell activation associated with transmembrane signalling, which results in the production of distinct inflammatory mediators
- Direction of the innate immune cells to the infectious focus
- Local destruction and elimination of the invading bacteria, which is mediated by the generation of reactive oxygen intermediates and/or the release of preformed anti-microbial peptides

Questions

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3. Hospital-acquired UTI and severity

- Hospital acquired UTI
- Catheter-associated UTI
- Definition of severity

a. Hospital (healthcare) - Acquired UTI (HAUTI)

- Second commonest after respiratory
- Mainly catheter related (70% - CAUTI)
- Focus of infection control measures 'bundles' in many European health care systems
- Causation
 - Urinary catheters – 20 – 30% people admitted to hospital
 - Increased susceptibility from illness
 - Destruction of defences – surgery, drugs (antibiotics), toileting
 - Surgery to urinary tract
 - Higher virulence of bacteria
 - Cross-contamination
 - Poor hygiene – patient or healthcare workers

b. Catheter associated UTI

1. CDC Definitions

- UTI that occurs in a patient who had an indwelling urinary catheter in place within the 48 hour period preceding the UTI
- Presence of at least one **symptom** of UTI with:
 - $\geq 10^5$ cfu/mL
 - $\geq 10^3$ cfu/mL + positive urinalysis or microscopy
- Asymptomatic **bacteraemia** where organisms isolated from blood and urine match
- **NB** – Asymptomatic bacteriuria is **NOT** CAUTI

Catheter associated UTI

2. Short term catheterisation

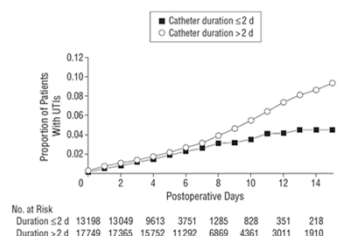


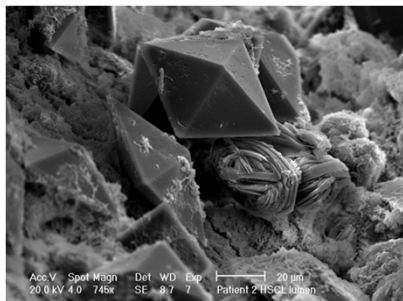
Figure. Cumulative probability of urinary tract infection (UTI) by postoperative catheterization. Log-rank test for difference between curves, $P = .004$. The difference first becomes significant at day 9.

Heidi L. Wald Arch Surg. 2008;143(6):551-557

Catheter associated UTI

3. Long term catheterisation

Biofilm formation



c. Severity of UTI: Definitions

- Simple UTI
 - Symptoms of local inflammation without significant fever ($< 38^{\circ}$)
 - “A bit poorly”
- Systemic inflammatory response syndrome
 - At least one of fever, tachycardia, hypotension
 - + documented infection = Sepsis
 - “Feeling pretty ill”
- Severe Sepsis
 - + Organ dysfunction (e.g. reduced urine output and raised creatinine)
 - “Need to do something quick”

Sepsis (SIRS)

TABLE 1. Diagnostic Criteria for Sepsis

Infection, documented or suspected, and some of the following:

General variables
Fever $> 38.3^{\circ}\text{C}$
Hypothermia (core temperature $< 36^{\circ}\text{C}$)
Heart rate $> 90/\text{min}^{-1}$ or more than two to three above the normal value for age
Tachypnea
Altered mental status
Significant odors or positive fluid balance $> 20\text{mL/kg}$ over 24 hrs
Hypoglycemia (plasma glucose $> 140\text{mg/dL}$ or 7.7mmol/L in the absence of diabetes)
Inflammatory variables
Leukocytosis (WBC count $> 12,000/\mu\text{L}^{-1}$)
Leukopenia (WBC count $< 4,000/\mu\text{L}^{-1}$)
Normal WBC count with greater than 10% immature forms
Plasma C-reactive protein more than two to three above the normal value
Plasma procalcitonin more than two to three above the normal value
Hemodynamic variables
Arterial hypotension (SBP $< 90\text{mm Hg}$, MAP $< 70\text{mm Hg}$ or an SBP decrease $> 40\text{mm Hg}$ in adults or less than two to three normal for age)
Organ dysfunction variables
Arterial hypoxemia ($\text{PaO}_2/\text{FiO}_2 < 300$)
Acute oliguria (urine output $< 0.5\text{mL/kg/hr}$ for at least 2 hrs despite adequate fluid resuscitation)
Creatinine increase $> 0.5\text{mg/dL}$ or $44.2\mu\text{mol/L}$
Congestive abnormalities (RAE > 15 or JVP $> 60\text{cm}$)
Brain (altered bowel sounds)
Thrombocytopenia (platelet count $< 100,000/\mu\text{L}^{-1}$)
Hypertension (plasma total bilirubin $> 4\text{mg/dL}$ or $70\mu\text{mol/L}$)
Tissue perfusion variables
Hypotension $< 1\text{mmHg}$
Decreased capillary refill or mottling

SBP = systolic blood pressure; MAP = mean arterial pressure; RAE = international normalized ratio; JVP = jugular venous pressure; mottling = mottled capillary refill or mottling.

Diagnostic criteria for sepsis in the pediatric population are signs and symptoms of inflammation plus infection with fever or hypothermia, heart rate > 90 or < 90 or tachypnea, leukocytosis or leukopenia, and at least one of the following indicators of altered organ function: altered mental status, hypoxemia, increased serum lactate level, or bounding pulses.

Adapted from Levy MM, Fink MP, Marshall JC, et al: 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. Crit Care Med 2003; 31: 1259-1266.

Severe sepsis

TABLE 2. Severe Sepsis

Severe sepsis definition = sepsis-induced tissue hypoperfusion or organ dysfunction (any of the following thought to be due to the infection)

Sepsis-induced hypotension
Lactate above upper limits laboratory normal
Urine output $< 0.5\text{mL/kg/hr}$ for more than 2 hrs despite adequate fluid resuscitation
Acute lung injury with $\text{PaO}_2/\text{FiO}_2 < 250$ in the absence of pneumonia as infection source
Acute lung injury with $\text{PaO}_2/\text{FiO}_2 < 200$ in the presence of pneumonia as infection source
Creatinine $> 2.0\text{mg/dL}$ ($176.8\mu\text{mol/L}$)
Bilirubin $> 2\text{mg/dL}$ ($34.2\mu\text{mol/L}$)
Platelet count $< 100,000/\mu\text{L}$
Coagulopathy (international normalized ratio > 1.5)

Adapted from Levy MM, Fink MP, Marshall JC, et al: 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. Crit Care Med 2003; 31: 1259-1266.

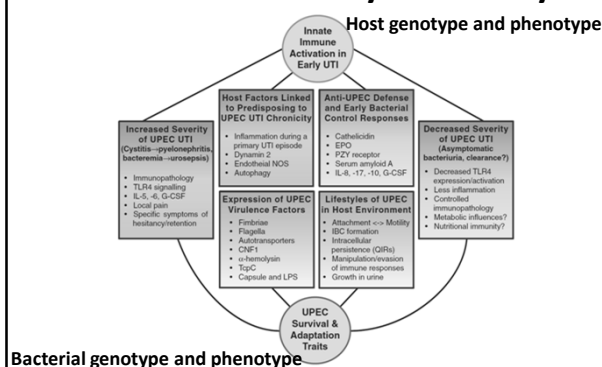
c. Severity of UTI

Clinical categorisation

Severity	Gradient of severity →					
Symptoms	No symptoms	Local symptoms Dysuria, frequency, urgency, pain or bladder tenderness	General symptoms Fever, flank pain, Nausea, vomiting	Systemic response SIRS Fever, shivering, Circulatory failure	Circulatory and organ failure	Organ failure
Diagnosis	ABU	CY-1	PN-2	PN-3 Febrile UTI	US-4	US-5 US-6
Investigations	Dipstick MSU Culture + S as required	Dipstick MSU Culture + S Renal US or I.V. Pyelogram /renal CT		Dipstick MSU Culture + S and Blood culture Renal US and/or Renal and abdominal CT		

Grabe M et al. EAU Guideline Urological Infections 2015. www.uroweb.org

Molecular summary of severity

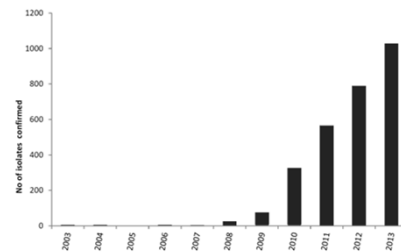


Questions

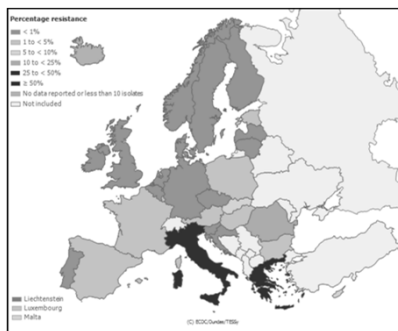
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The rise in carbapenem resistance - UK

Figure 2.16 Carbapenemase-producing Enterobacteriaceae referred from UK hospital microbiology laboratories and confirmed by PHE's Antimicrobial Resistance and Healthcare Associated Infections (AMR/HAI) Reference Unit.*



Klebsiella sp. resistance to carbapenems (ECDC)



Thank

You



Urinary Tract Infections

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8-9 May 2015, Amsterdam, the Netherlands



Module 2. Microbiology and the use of antibiotics in urinary tract infections

Magnus Grabe, Malmö (SE), *urologist, Chairman EAU Guidelines Working Group on Urological Infections*

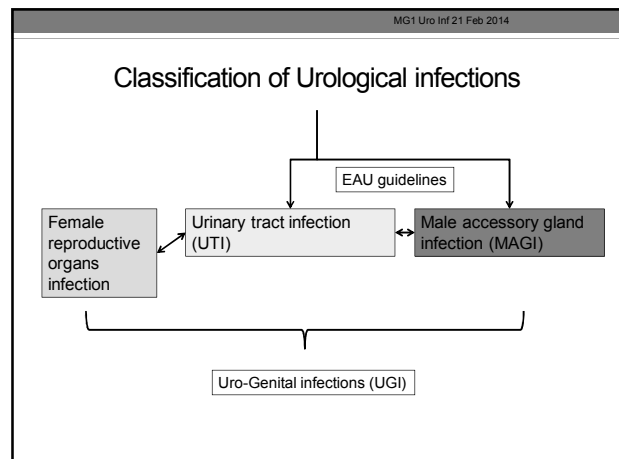
To understand urinary tract infections (UTI) and, in males, the relation to male accessory gland infections (MAGI), it is essential to recognize that humans are harbouring an enormous amount of microorganisms, living in balance with our own cells and organs. The gut and thus the faecal flora is the essential source of the microorganisms causing UTI and MAGI. *Escherichia coli* is the most common bacteria and the best studied. But there are several other secondary species such as *Proteus* sp, *Klebsiella* sp, *Pseudomonas* sp and on the gram positive side the *Enterococcus* sp and some *Staphylococcus* sp. Bacteria express virulence in different ways, causing a host defence reaction, a local inflammatory process as well as an immune response. We treat UTI with antimicrobial agents (also called antibiotics). However, the microorganism can adapt, mutate, and transfer gens between them, making them resistant to the antibiotics. This has become a real problem both in the community and in the hospital environment. Improved hygiene, a rational use of antibiotics, infection control, and clinical research and extensive teaching of both staff and patients are key factors to prevent the dramatic development of resistance of microorganisms.

The choice of an antibiotic will much depend on the type of infection (anatomic level, degree of severity, patient related risk factors), expected pathogen and the clinical circumstances. For uncomplicated cystitis, a 1-3-5 days treatment with antibiotics such as fosfomycin, mecillinam and nitrofurantoin will do well, while more severe infections involving the kidneys (pyelonephritis) will require drugs such as a cephalosporin or a fluoroquinolone. It is essential to avoid to treat asymptomatic bacteriuria and to use the broad-spectrum antibiotics in uncomplicated infections. The approach to antibiotic use will be described. Finally, it is important to underline that nurses do have an important role in the functions and roles described above.

EAUN UTI MG

URINARY TRACT INFECTIONS: MICROBIOLOGY RESISTANCE DEVELOPMENT BASIC PRINCIPLES OF THE USE OF ANTI-MICROBIAL AGENTS (ANTIBIOTICS)

Magnus Grabe, M.D., Ph.D.
University of Lund, Sweden
Chair of EAU Guidelines on *Urological Infections*
(2008 – 2014, including 2015 version)



MG1 Uro Inf 21 Feb 2014

Severity	Gradient of severity →						
Symptoms	No symptoms	Local symptoms Dysuria, frequency, urgency, pain or bladder tenderness	General symptoms Fever, Flank pain Nausea, vomiting	Systemic response SIRS Fever, shivering Circulatory failure	Organ failure Single-, multiple- Organ failure		
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Investigations	Dipstick (MSU Culture + S as required)	Dipstick MSU Culture + S Renal US or I.V. Pyelogram /renal CT	Dipstick MSU Culture + S and Blood culture Renal US and/or Renal and abdominal CT				
Risk factors	Risk factor assessment according to ORENUC (Table 2.1)						
Treatment Medical and Surgical	Uncomplicated UTI Complicated UTI						

* Two exceptions: pregnancy and prior to urological procedure

Grabe et al. EAU guidelines 2013

MG1 Uro Inf 21 Feb 2014

Severity	Gradient of severity →						
Symptoms	No symptoms	Local symptoms Dysuria, frequency, urgency, pain or bladder tenderness	General symptoms Fever, Flank pain Nausea, vomiting	Systemic response SIRS Fever, shivering Circulatory failure	Organ failure Single-, multiple- Organ failure		
Clinical diagnosis	ABU	CY-1	PN-2	PN-3 Febrile UTI	US-4	US-5	US-6
Investigations	Dipstick (MSU Culture + S as required)	Dipstick MSU Culture + S Renal US or I.V. Pyelogram /renal CT	Dipstick MSU Culture + S and Blood culture Renal US and/or Renal and abdominal CT				
Risk factors	Risk factor assessment according to ORENUC (Table 2.1)						
Treatment Medical and Surgical	Uncomplicated UTI Complicated UTI						

* Two exceptions: pregnancy and prior to urological procedure

Grabe et al. EAU guidelines 2013

MG1 Uro Inf 21 Feb 2014

Severity	Gradient of severity →						
Symptoms	No symptoms	Local symptoms Dysuria, frequency, urgency, pain or bladder tenderness	General symptoms Fever, Flank pain Nausea, vomiting	Systemic response SIRS Fever, shivering Circulatory failure	Organ failure Single-, multiple- Organ failure		
Clinical diagnosis	ABU	CY-1	PN-2	PN-3 Febrile UTI	US-4	US-5	US-6
Investigations	Dipstick (MSU Culture + S as required)	Dipstick MSU Culture + S Renal US or I.V. Pyelogram /renal CT	Dipstick MSU Culture + S and Blood culture Renal US and/or Renal and abdominal CT				
Risk factors	Risk factor assessment according to ORENUC (Table 2.1)						
Treatment Medical and Surgical	Uncomplicated UTI Complicated UTI						
	NO*	Empirical 3-5 days	Empirical + directed 7-14 days	Empirical + directed 7-14 days Consider combine 2 antibiotics	Empirical + directed 10-14 days Combine 2 antibiotics		
	Drainage/surgery as required →						

* Two exceptions: pregnancy and prior to urological procedure

Grabe et al. EAU guidelines 2013

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Disposition (1)

- Bacteriae of the Urinary tract (= uro-pathogens)
 - Primary and secondary pathogens
 - Virulence factors
 - Defence of the host
- Bacterial adaptation
 - Resistance development
 - Spreading of resistance
 - The ESBL example
 - Prevention
- Use of antibiotics
 - Mechanism of action
 - Minimal inhibitory concentration

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Disposition (2)

- Use of antibiotics
 - Risks associated with the use of antibiotics
 - Collateral damage
- Antibiotics in use in the urinary tract (examples)
 - Antibiotics for oral use
 - Antibiotics for i.v. use (parenteral)
- What is antibiotic stewardship?
- Adherence to the EAU guidelines
- Role of the nurses in infection issues
 - Infection control
 - Stewardship
 - Clinical research

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PATHOGENS OF THE URINARY TRACT

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Which bacteria (pathogens)?

Gram negative

- Primary pathogens
 - *Escherichia coli*
- Secondary pathogens
 - *Proteus* sp
 - *Klebsiella* sp
 - Enterobacteriaceae
 - *Pseudomonas aeruginosa*

Gram positive

- Primary pathogens
 - *Staphylococcus saprophyticus*
- Secondary pathogens
 - *Enterococcus faecalis*
 - *Staphylococcus epidermidis* and *aureus* spp

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E. coli

With virulence factors such as fimbriae on the surface, toxin-production and iron-binding capacity

Asymptomatic E. coli

Rarely fimbriae
Lost of all or part of the genes expressing virulence

By courtesy C Svanborg, Lund

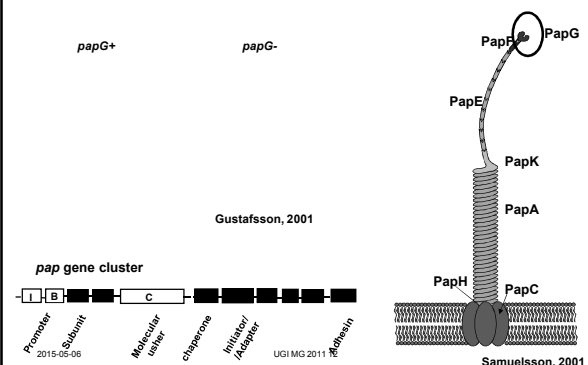
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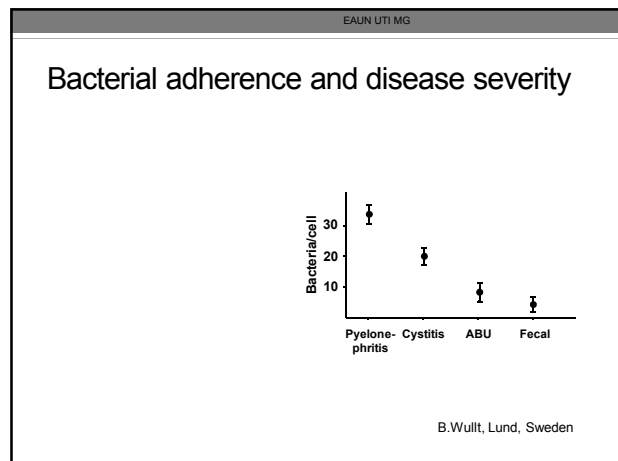
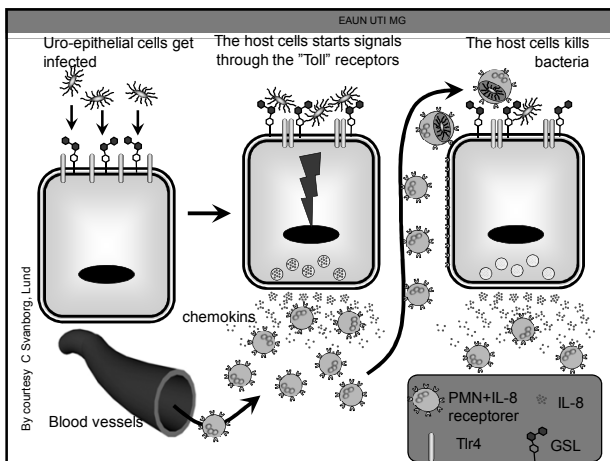
Virulence factors of bacteria (examples)

- Production of toxins
 - Exotoxins
 - Endotoxins (e.g. sepsis with circulatory collapse)
- Production of enzymes (e.g. destruction of tissues, red blood cells, inhibition of antibiotics, etc..)
- Capacity to adhere (adherence)
 - P fimbriae (e.g. *E. coli*)
 - Type 1 fimbriae
- Biofilm formation

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P fimbriae





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BACTERIAL ADAPTATION AND RESISTANCE DEVELOPMENT

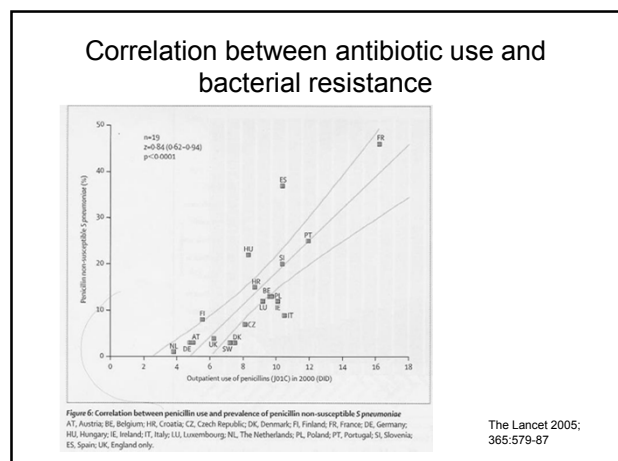
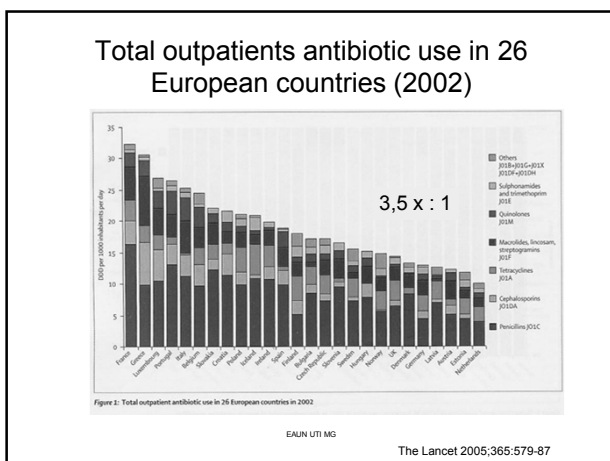
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Why antimicrobial resistance?

Antimicrobial resistance is the sum of all antimicrobial use

The only weapon we have to not lose the control – is to take the control

Photo from Diaz Högberg, REACT



E. Coli resistance to 3rd generation cephalosporins EARSS 2003 & 2007

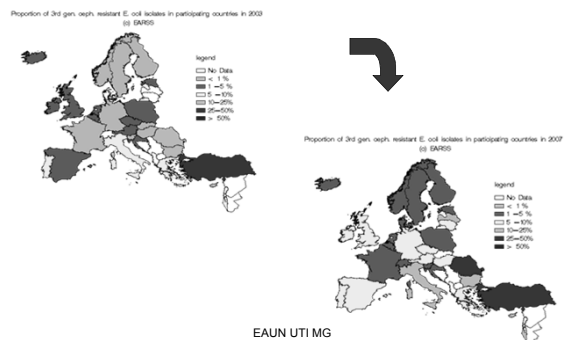


Figure 3.1. *Escherichia coli*. Percentage (%) of invasive isolates with resistance to third-generation cephalosporins by country, EU/EEA countries, 2012



Figure 3.2. *Escherichia coli*. Percentage (%) of invasive isolates with resistance to fluoroquinolones, by country, EU/EEA countries, 2012



Figure 3.3. *Klebsiella pneumoniae*. Percentage (%) of invasive isolates with resistance to fluoroquinolones, by country, EU/EEA countries, 2012



Figure 3.4. *Klebsiella pneumoniae*. Percentage (%) of invasive isolates with combined resistance (resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides), by country, EU/EEA countries, 2012



ESBL (CTX-M) producing *Enterobacteriaceae*

2001-2002



2007



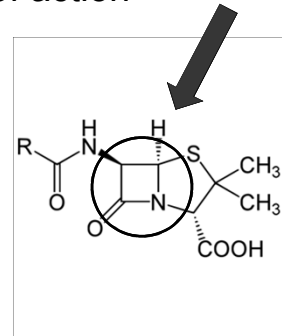
ESBL what's that?

- EXTENDED SPECTRUM BETA-LACTAMAS
- Series of > 500 enzymes produced by some *Enterobacteriaceae*
- Most common in Europe
 - CTX-M enzymes (mainly CTX-M15)

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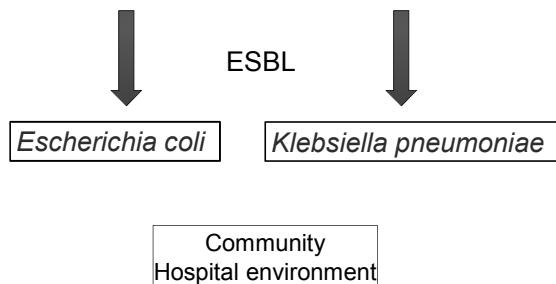
Mode of action

- Breaks down beta-lactam antibiotics
- Core structure of
 - Penicillin group
 - Cephalosporin group
 - Monobactam
 - Carbapenem group
- Beta-lactam antibiotics inhibit bacterial cell wall biosynthesis



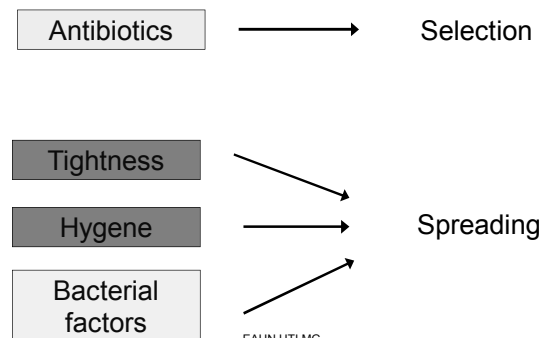
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Two main bacterial species



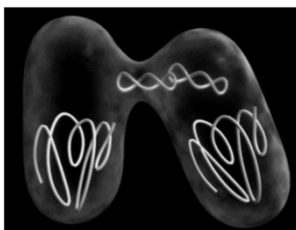
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Reasons for resistance development:



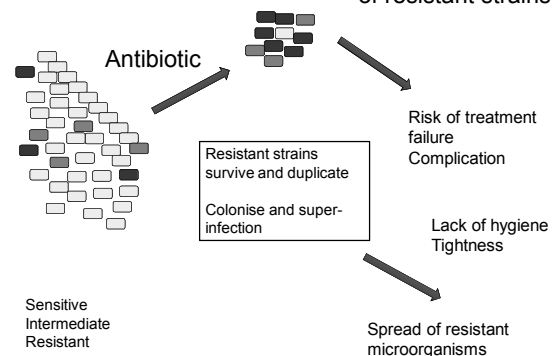
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Bacteria get new resistant characteristics
Spontaneous chromosomal mutations
Transmission of genes between bacteria



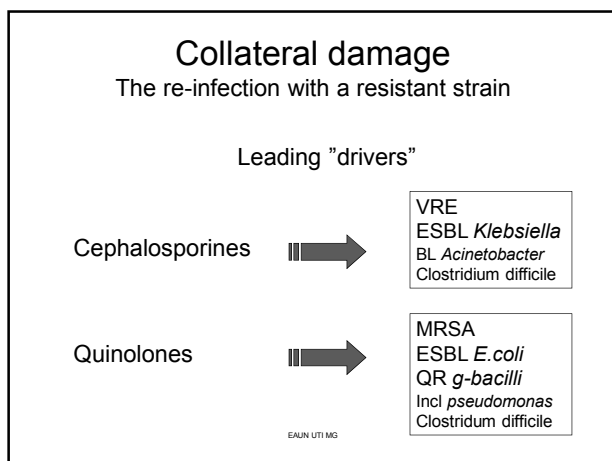
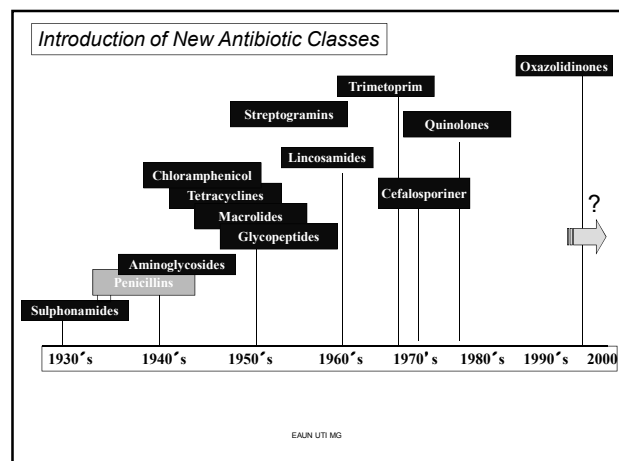
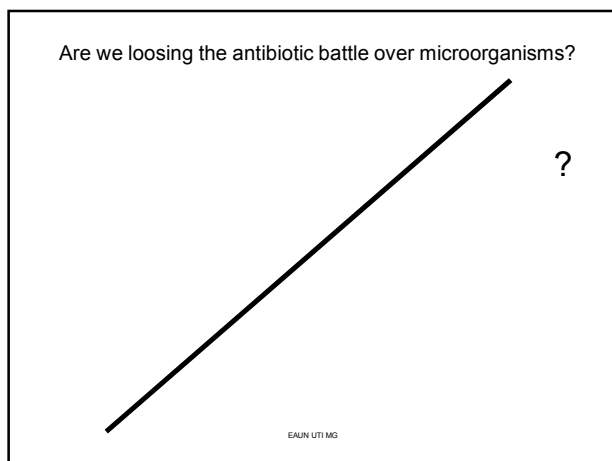
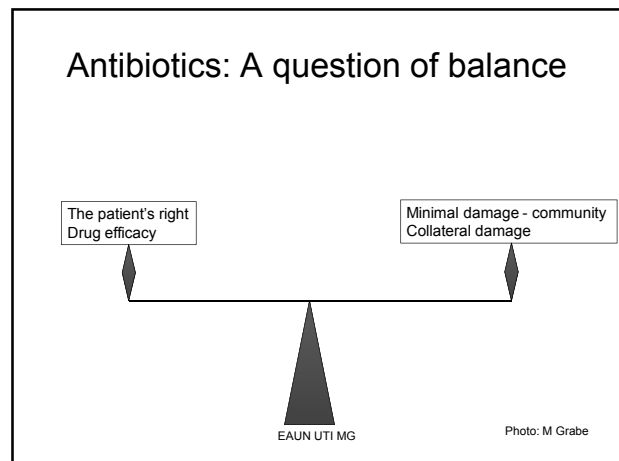
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Selection is an essential mechanism for the spread of resistant strains



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USE OF ANTIBIOTICS



- ### Level of action
- Cell wall inhibition
 - Penicillin group
 - Cephalosporins
 - Cytoplasmic membrane
 - Inhibitors of nucleic acids
 - Trimethoprim
 - Quinolones
 - Inhibition of protein synthesis
 - Tetracycline group
 - Aminoglycoside group
- EAUN UTI MG

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ANTIMICROBIAL AGENTS = ANTIBIOTICS USED IN THE URINARY TRACT

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Trimetoprim (+/- sulfa)

Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • Regarded as "golden standard" due to high efficacy (>90%) • Three days treatment in cystitis • Good penetration in the tissues and high concentrations 	<ul style="list-style-type: none"> • Resistance development up to 20 % worldwide • Act on faecal flora ("high pressure") <ul style="list-style-type: none"> • e.g. enterobacteriaceae • Plasmid transmission of resistance • Reversible?

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Nitrofurantoin

Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • Treatment efficacy close to TMP (approx 90%) • Five days for cytitis • Low penetration of tissues 	<ul style="list-style-type: none"> • Low resistance development • Minimal action on faecal flora

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Fosfomycin (not accessible in all countries)

Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • As for TMP and nitrofurantoin • Single dos in cystitis • Low or no penetration of tissues • Reduced action in renal failure 	<ul style="list-style-type: none"> • Low resistance • ESBL sensitive • Low impact on faecal flora

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Pivmecillinam (not accessible in all countries)

Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • Slightly less than quinolones (80-90%) • 3 d in female cystitis • 7 d in males • Poorly studies as for penetration in tissues 	<ul style="list-style-type: none"> • Very low resistance(S > 90%) • No new trend in resistance development • Little impact on faecal flora

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Fluoroquinolones

Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • Very high • Short treatment • High concentration in tissues 	<ul style="list-style-type: none"> • Dramatic development on a worldwide basis <ul style="list-style-type: none"> • Over 10-20% in Europe • > 70% in some countries • Direct relation to over-use • Great impact on faecal flora • Shared responsibility for ESBL spreading

EAUN UTI MG	
Cephalosporins (e.g. cefadroxil)	
Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • High efficacy, slightly below TMP and F-quinolones • 3d in cystitis • Questionable penetration of tissues 	<ul style="list-style-type: none"> • High risk of resistance development • Impact on faecal flora • Driving force in ESBL spreading • Over-growth of <i>Clostridium difficile</i>

EAUN UTI MG	
Amoxicillin (+/- clavulanat)	
Efficacy	Resistance/"collateral damage"
<ul style="list-style-type: none"> • Moderate to high efficacy (slightly lower than F-quinolones) • 5 d treatment for cystitis • Moderate penetration of tissues • Only directed treatment 	<ul style="list-style-type: none"> • <i>Enterococcus</i> sp high S • Impact on faecal flora

EAUN UTI MG	
Fungal infection (<i>candida</i> sp)	
<ul style="list-style-type: none"> • Encountered regularly • Risk Factors: <ul style="list-style-type: none"> • Diabetes mellitus • Use of antibiotics • Immunosuppression • After difficult or complex urological interventions • Catheter treatment • Etc... 	<ul style="list-style-type: none"> • Treatment <ul style="list-style-type: none"> • No if asymptomatic • If symptoms (e.g. cystitis) <ul style="list-style-type: none"> • Fluconazole 50-100 (200) mg x 1, 14d • In case of resistance: requires consultations with specialists • Pyelonephritis

EAUN UTI MG			
EAU guidelines for treatment of cystitis			
First choice			
Fosfomycin	3g	SD	1 day
Nitrofurantoin	100mg	bid	5 days
Pivmecillinam	400mg	bid	3 days
Second choice /Alternatives			
Ciprofloxacin	250mg	bid	3 days
Cefpodoxime (e.g)	100mg	bid	3 days
If local resistance pattern are known (<i>E. coli</i> resistance < 20%) and if not used within the previous 3 months			
TrimSX	160/800	bid	3 days
Trimethoprim	200	bid	3-5 days

EAUN UTI MG	
Basic philosophy (uUTI)	
<ul style="list-style-type: none"> • The three "good ones" (leave the GI flora in peace) <ul style="list-style-type: none"> • Pivmecillinam • Fosfomycin • Nitrofuradantoin • Trim/Trim SX (not any more the gold standard) <ul style="list-style-type: none"> • The price is resistance (only if < 20 % R) • Amoxicillin <ul style="list-style-type: none"> • Tailored treatment only (e.g. <i>Enterococcus</i> sp) • Oral cephalosporins / Quinolones <ul style="list-style-type: none"> • Avoid: only alternative treatment (e.g. allergy) 	

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Pyelonephritis ("uncomplicated")			
First choice			
Ciprofloxacin	500-750mg	bid	7-10 days
Levofloxacin	250-500/750mg	qd	7-10/5 days
Alternatives			
Cefpodoxime	200mg	bid	10 days
Ceftibuten	400mg	qd	10 days
Only if known susceptible pathogen (not for initial empirical therapy)			
Trim-SMZ	160/800 mg	bid	14 days
Co-amoxiclav	0.5/0.125g	tid	14 days

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Antibiotics for parenteral use (i.v.)

- Cephalosporins (3rd generation or group 3a, 3b)
 - E.g. Cefotaxim
- Acyloopenicillins + an inhibitor of beta lactamase enzymes
 - E.g. Piperacillin + tazobactam
 - If resistance lower than 20%
- Fluoroquinolone
 - E.g. Ciprofloxacin
 - If resistance lower than 10%
- Aminoglycoside group
 - E.g. gentamycin, amikacin,
- Carbapenem group
 - E.g.: Imipenem, meropenem

In case of

- Severe PN
- Febrile UTI
- SIRS
- Sepsis

Antibiotic stewardship

- Controlled and rational use of antimicrobial agents
- Avoid misuse !
- Prescription of antibiotics in relation to evidence based knowledge
 - Defined doses
 - Defined regimens
- Avoid "powerful" antibiotics in prophylaxis
 - Cephalosporins
 - F-quinolones
- Avoid unnecessary prolongations of treatment to "cover" during period of stenting/catheter treatment
- Avoid treatment of ABU*

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Roles of nurses

- Hygiene advisor and supervisor
- Information and teaching of the patients
- Information and teaching of staff
- Regular contact with the patients
 - Reacting on patients' symptoms
 - Initiator of urine culture
 - Report to and discuss with the physician/urologist
- Participation in research projects
- "Whistle-blowers" of cluster of cases

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Key messages to take home

- Escherichia coli is the most frequent pathogen of the urinary tract. The reservoir is the faecal flora
- Bacteria can express virulence in various degrees
- All bacteria can develop resistance to antimicrobial agents and spread in the population (community and hospitals). Resistance development is directly related to the over-use of antibiotics.
- Therefore, the use of antibiotics must be rational and evidence-based. The EAU guidelines on Urological Infections gives guidance for treatment and prophylaxis
- Nurses play an important role in infection control, teaching staff and patients and in clinical research

UTI in Adults

Dr John PFA Heesakkers
Department of Urology
Radboud UMC, NL



Radboudumc



10 & 11 September 2015
50 jaar Academic Urology
Nijmegen
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10-09 Live surgery:
AMS800 Male Female
Urolift
TVT / TOT
Minislings
Botox
Neuromodulation

11-09 Congres

esffu

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10-September 2015 Live Surgery on Functional Urology Nijmegen, the Netherlands

Procedures

- AMS800 Male for SUI
- AMS800 Female for SUI
- Urolift for Prostatic Enlargement
- TVT Exact
- TOT Abbrevio
- Singel incision slings for SUI
- Botox for OAB
- Neuromodulation

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Guidelines on Urological Infections

M. Grabe (chair), R. Bartoletti, T.E. Bjerklund-Johansen,
H.M. Çek, R.S. Pickard, P. Tenke, F. Wagenlehner, B. Wullt

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Definition, prevalence and diagnosis
UTIs in DIABETES MELLITUS AND
IMMUNOSUPPRESSION
URETHRITIS
BACTERIAL PROSTATITIS
EPIDIDYMITIS AND ORCHITIS
Recurrent and Chronic UTI
UTI and pregnancy

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15% of antibiotics in USA given for UTI

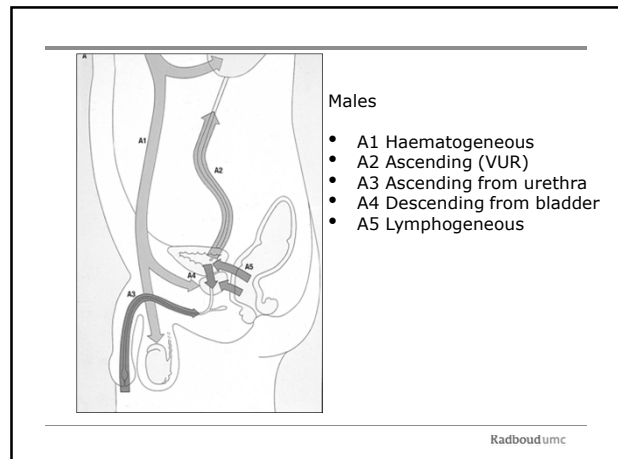
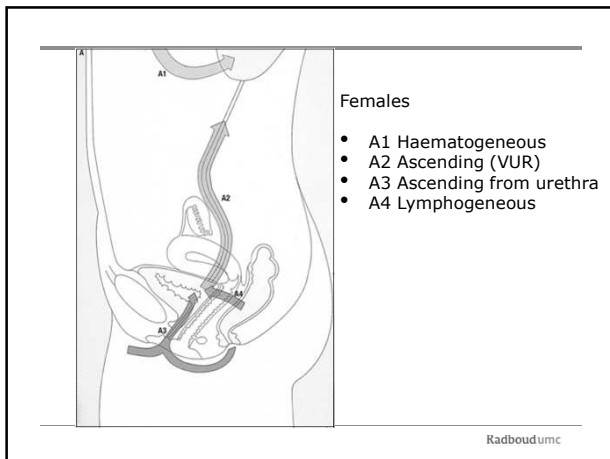
Account for at least 40% of all hospital-acquired infections

Mostly catheter associated

Bacteriuria develops in up to 25% of patients who require a urinary catheter
for > 7 days (daily risk of 5%)

Nosocomial UTIs comprise perhaps the largest institutional reservoir of
antibiotic-resistant pathogens

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Pathogenesis

- Mostly ascending from urethra
- Women > men
- Insertion of catheter gives 1-2% infection chance
- Open system drainage: within 3-4 days infection

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Suggested EAU Classification

- EAU/ICUD Urogenital Infections Initiative
- Aim is to provide clinician and researcher with standardized tool & terminology for UTI

Based on

1. Anatomical level of infection
2. Grade of severity of infection
3. Underlying risk factors
4. Microbiological findings

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Classification

1. Anatomical level

- Urethritis (UR)
- Cystitis (CY)
- Pyelonephritis (PN)
- Sepsis (US)
- Asymptomatic bacteriuria (ABU)

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Classification

2. Grade of severity

- 1 Low (CY)
- 2 Moderate (PN)
- 3 Severe (PN established)
- 4 US SIRS (Systemic Inflammatory Response Syndrome)
- 5 US Multiple Organ Dysfunction
- 6 US Multiple Organ Failure

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3. Underlying risk factors (ORENUC)

Type	Category of risk factor	Examples of risk factors
O	No known/associated RF	- Healthy premenopausal women
R	RF of recurrent UTI, but no risk of severe outcome	- Sexual behaviour and contraceptive devices - Hormonal deficiency in post menopause - Secretary type of certain blood groups - Controlled diabetes mellitus
E	Extra-urogenital RF, with risk or more severe outcome	- Pregnancy - Male gender - Badly controlled diabetes mellitus - Relevant immunosuppression* - Connective tissue diseases* - Prematurity, new-born
N	Nephropathic disease, with risk of more severe outcome	- Relevant renal insufficiency* - Polycystic nephropathy
U	Urological RF, with risk or more severe outcome, which can be resolved during therapy	- Ureteral obstruction (i.e. stone, stricture) - Transient short-term urinary tract catheter - Asymptomatic Bacteriuria** - Controlled neurogenic bladder dysfunction - Urological surgery
C	Permanent urinary Catheter and non resolvable urological RF, with risk of more severe outcome	- Long-term urinary tract catheter treatment - Non resolvable urinary obstruction - Badly controlled neurogenic bladder

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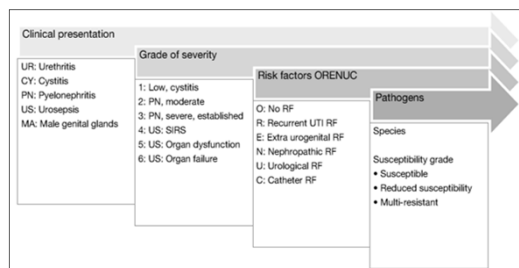
Pathogens

Urine culture

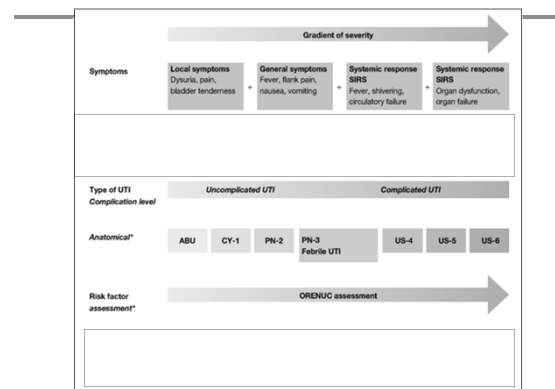
- Identification of causative pathogen ($> 10^4$ cfu/ml)
- Susceptibility pattern
 - Grade a (susceptible)
 - Grade b (reduced susceptibility)
 - Grade c (resistant)

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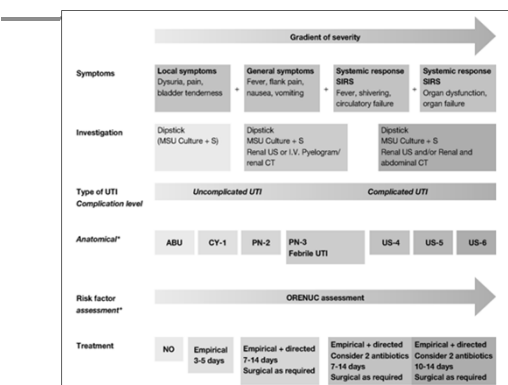
Classification & severity assessment



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Classification

Traditionally based on

- Clinical symptoms
- Laboratory data
- Microbiological cultures

Practically

- Uncomplicated UTI's
- Complicated UTI's

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Definitions

Significant bacteriuria in adults

1. $> 10^3$ uropathogens/mL of midstream urine in acute uncomplicated cystitis in female
2. $> 10^4$ uropathogens/mL of midstream urine in acute uncomplicated pyelonephritis in female
3. $> 10^5$ uropathogens/mL in midstream urine of women or $\geq 10^4$ uropathogens/mL of midstream urine in men (or in straight catheter urine in women) with complicated UTI
4. In a suprapubic bladder puncture specimen, any count of bacteria is relevant.

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Definitions

Asymptomatic bacteriuria: two positive urine cultures taken more than 24 hours apart containing 10^5 uropathogens/mL of the same bacterial strain (usually only the species can be detected)

Pyuria

10 white blood cells per high-power field (HPF) (x400) in the resuspended sediment of a centrifuged aliquot of urine or per mm³ in unspun urine. Dipstick can also be used, including a leukocyte esterase test and the assessment of haemoglobin and of nitrites

Urethritis

Symptomatic urethritis is characterized by alguria and purulent discharge

Epididymitis, orchitis

Most cases of epididymitis, with or without orchitis, are caused by common urinary pathogens. Bladder outlet obstruction and urogenital malformations are risk factors for this type of infection. Consider *Chlamydia trachomatis* infection in the younger male population

Diagnosis

UTI (general)

A disease **history, physical examination and dipstick** urinalysis, including white and red blood cells and nitrite reaction, is **recommended for routine diagnosis**. Except in isolated episodes of uncomplicated lower UTI (cystitis) in premenopausal, healthy women, **a urine culture is recommended in all other types of UTI before treatment**, so allowing antimicrobial therapy to be adjusted if necessary.

Pyelonephritis

In cases of suspected pyelonephritis, it may be necessary to **evaluate the upper urinary tract** to rule out upper urinary tract obstruction or stone disease.

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Diagnosis	Most frequent pathogen/species	Initial empirical antimicrobial therapy	Therapy duration
Prostatitis acute, chronic	E. Coli Other enterobacteria	Fluoroquinolone ² Alternative in acute bacterial prostatitis: Cephalosporin (group 3a/b)	Acute: 2-4 weeks
Epididymitis acute	Pseudomonas Staphylococci Chlamydia Ureaplasma	In case of Chlamydia or Ureaplasma: Doxycycline Macrolide	Chronic: 4-6 weeks or longer
Urosepsis	E. Coli Other enterobacteria After urological-multiresistant pathogens Pseudomonas Proteus Serratia Enterobacter	Cephalosporin (group 3a/b) Fluoroquinolone ² Anti-Pseudomonas active: Acylaminopenicillin/BLI Cephalosporin (group 3b) Carbapenem ±Aminoglycoside	3-5 days after de-escalation or control/elimination of complicating factor

¹Only in areas with resistance rate <20% (for E. Coli). ²Fluoroquinolone with mainly renal excretion. ³Avoid Fluoroquinolones in uncomplicated UTI if possible

Diabetes Mellitus

- 26% of non-pregnant women with diabetes mellitus have significant bacteriuria ($\geq 10^5$ cfu/mL) compared with 6% of controls
- Women with type I DM –higher risk if long evolution or complications (particularly peripheral neuroathy & proteinuria)
- Risk factors in type II DM: age, proteinuria, low BMI and recurrent UTI
- DM increases the risk of acute pyelonephritis from LUT
- Klebsiella infection is common (25% vs 12% in non-diabetics)

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Diabetes Mellitus

- Bacteriuria may lead to functional impairment
- Underlying mechanism is not well understood
- Other factors may include diabetic nephropathy, autonomic neuropathy causing voiding dysfunction & impaired host resistance
- Glycosuria inhibits phagocytosis & maybe cellular immunity and encourages bacterial adherence
- In spite of good glycaemic control diabetic women still show reduced urinary cytokine & leucocyte concentration
- Treatment does not reduce complications

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UTI is common after renal transplantation Bacteriuria is present in 35%-80% of patients

Recommendations for prevention and treatment of UTI in renal transplantation

Treat infection in recipient before transplantation
Culture donor tissue sample and perfusate
Perioperative antibiotic prophylaxis
6 month low-dose TMP-SMX (LOE 1 GR 2)
Empirical treatment of overt infection (quinolone, TMP-SMX for 10-14 days)

Drug interactions with cyclosporin and tacrolimus: Rifampicin, Erythromycin, Aminoglycosides, TMP-SMX, Amphotericin B

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Acute UTI men

	Reference	LE	GR
Only a small number of 15-50-year-old men suffer from acute uncomplicated UTI.	52		
Such men should receive, as minimum therapy, a 7-day antibiotic regimen.		4	B

3.8.2 Men with UTI and concomitant prostate infection

	Reference	LE	GR
Most men with febrile UTI have a concomitant infection of the prostate, as measured by transient increases in serum PSA and prostate volume.	53	2a	
Urological evaluation should be carried out routinely in adolescents and men with febrile UTI, pyelonephritis, or recurrent infection, or whenever a complicating factor is suspected.		4	A
A minimum treatment duration of 2 weeks is recommended, preferably with a fluoroquinolone since prostatic involvement is frequent.	54	2a	B

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Definitions

Urethritis

Symptomatic urethritis is characterized by alguria and purulent discharge

Epididymitis, orchitis

Most cases of epididymitis, with or without orchitis, are caused by common urinary pathogens. Bladder outlet obstruction and urogenital malformations are risk factors for this type of infection. Consider *Chlamydia trachomatis* infection in the younger male population

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Diagnosis

Urethritis

Pyogenic urethritis is indicated by a **Gram stain of secretion or urethral smear that shows more than five leukocytes per HPF (x1,000)** and in case of gonorrhoea gonococci are located intracellularly as Gram-negative diplococci.

A **positive leukocyte esterase test or more than 10 leukocytes per HPF (x400)** in the first voiding urine specimen is diagnostic.

Prostatitis/CPPS

In patients with prostatitis-like symptoms, an attempt should be made to differentiate between bacterial prostatitis and CPPS. This is best done by the four glass test according to Meares & Stamey, if acute UTI and STD can be ruled out

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Classification of prostatitis/chronic pelvic pain syndrome (CPPS) It is recommended that the classification according to NIDDK/NIH is used

Classification of prostatitis according to NIDDK/NIH

- I Acute bacterial prostatitis (ABP)
- II Chronic bacterial prostatitis (CBP)
- III Chronic pelvic pain syndrome (CPPS)
 - A. Inflammatory CPPS: WBC in EPS / voided bladder urine-3 (VB3)/ semen
 - B. Non-inflammatory CPPS: no WBC/EPS/VB3/semen
- IV Asymptomatic inflammatory prostatitis (histological prostatitis)

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Urethritis

First choice	Second choice
Cefixime 400 mg orally as a single dose	Ciprofloxacin 500 mg orally or Ofloxacin 400 mg orally or
Ceftriaxone 1g im as a single dose (im with local anaesthetic)	Levofloxacin 250 mg orally as a single dose

As gonorrhoea is often accompanied by chlamydial infection, an antichlamydial active therapy should be added. The following treatment has been successfully applied in *Chlamydia trachomatis* infections:

First choice	Second choice
Azithromycin 1 g (= 4 caps @ 250 mg) orally as single dose	Erythromycin 4 times daily 500 mg orally for 7 days
Doxycycline 2 times daily 100 mg orally for 7 days	Ofloxacin 2 times daily 300 mg orally or Levofloxacin once daily 500 mg orally for 7 days

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Acute uncomplicated cystitis in women

Clinical diagnosis

- Irritative symptoms (dysuria, frequency and urgency)
- Absence of vaginal discharge or irritation (4) (LE: 2a, GR: B)

Laboratory diagnosis

- Urine dipstick testing, reasonable alternative (LE: 2a, GR: B)
- Urine cultures are recommended in
 - (i) suspected acute pyelonephritis
 - (ii) symptoms that do not resolve within 2-4 weeks after the completion of treatment
 - (iii) atypical symptoms (LE: 4, GR: B)

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Therapy

- Antibiotics recommended because AB better than placebo (LE:1a,GR: A)
- The choice of an antibiotic for therapy should be guided by
 - Spectrum and susceptibility patterns of uropathogens
 - Efficacy for the particular indication in clinical studies
 - Tolerability
 - Adverse effects
 - Cost
 - Availability

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Acute uncomplicated PN in women

Clinical diagnosis

- Flank pain, nausea and vomiting, fever (> 38°C), costovertebral angle tenderness

Laboratory diagnosis

- Urinalysis (dipstick), including white, red blood cells and nitrites (LE: 4, GR: C)
- Colony counts > 104 cfu/mL (LE: 2b, GR: C)

Imaging diagnosis

- Upper urinary tract US to rule out dilatation or stones (LE: 4, GR: C).
- CT, excretory urography, DMSA scanning if fever after 72 h treatment (LE: 4, GR: C)

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Acute uncomplicated PN in women

Therapy

Mild to moderate

- Oral AB in mild cases (LE: 1b, GR: B).
- Quinolone for 7-10 days in E. Coli (LE: 1b, GR: A).
- Or less days with higher dose (LE: 1b, GR: A)
- Oral cephalosporine (LE: 1b, GR: B)

Severe

	LE	GR
a parenteral fluoroquinolone, in communities with <i>E. coli</i> fluoroquinolone-resistance rates < 10%	1b	B
a third-generation cephalosporin, in communities with ESBL-producing <i>E. coli</i> resistance rates < 10%	1b	B
an aminopenicillin plus a β -lactamase-inhibitor in cases of known susceptible Gram-positive pathogens	4	B
an aminoglycoside or carbapenem in communities with fluoroquinolone and/or ESBL-producing <i>E. coli</i> resistance rates > 10%.	1b	B

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Recurrent UTI in women

- Recurrent UTIs need to be diagnosed by urine culture (LE: 4, GR: A)
- Excretory urography, cystography and cystoscopy are not routinely recommended for evaluation (LE: 1b, GR: B)

Prevention

- Antimicrobial prophylaxis only after behavioural modification has been attempted (LE: 4, GR: A)
- Before start negative urine culture 1-2 weeks after treatment (LE: 4, GR: A)
- Continuous or postcoital antimicrobial prophylaxis should be considered to prevent recurrent UTI when non-antimicrobial measures have been unsuccessful (LE: 1a, GR: A)

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Recurrent UTI in women

Prevention

- Immunoactive prophylaxis OM-89 (Urovaxom) in uncomplicated UTI women (LE: 1a, GR: B)
- Other groups remain to be established
- StroVac® and Solco-Urovac® effective (LE: 1a, GR: C)
- Prophylaxis with probiotics no evidence yet
- Cranberry (*Vaccinium macrocarpon*) reduces UTIs (LE: 1b, GR: C)
- Daily consumption of cranberry products, giving a minimum of 36 mg/day proanthocyanidin A (the active compound), is recommended (LE: 1b, GR: C).
- Use compounds that have demonstrated clear bioactivity in urine

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UTI in pregnancy*Definition of significant bacteriuria*

asymptomatic pregnant woman

- 2 consecutive specimens $> 10^5$ cfu/mL of the same bacteria
- Single catheterised specimen $> 10^5$ cfu/mL (LE: 2a, GR: A).

symptomatic

- Single culture $> 10^3$ cfu/mL (LE: 4, GR: B).

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UTI in pregnancy*Screening*

Pregnant women should be screened for bacteriuria during the first trimester (LE: 1a, GR: A).

Treatment of asymptomatic bacteriuria

Asymptomatic bacteriuria detected in pregnancy should be eradicated with antimicrobial therapy (LE: 1a, GR: A).

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UTI in pregnancy: ABU and CY

Antibiotics	Duration of therapy	Comments
Nitrofurantoin (Macrobid®) 100 mg	q12 h, 3-5 days	Avoid in G6PD deficiency
Amoxicillin 500 mg	q8 h, 3-5 days	Increasing resistance
Co-amoxicillin/clavulanate 500 mg	q12 h, 3-5 days	
Cephalexin (Keflex®) 500 mg	q8 h, 3-5 days	Increasing resistance
Fosfomycin 3 g	Single dose	
Trimethoprim-sulfamethoxazole	q12 h, 3-5 days	Avoid trimethoprim in first trimester/term and sulfamethoxazole in third trimester/term

G6PD = glucose-6-phosphate dehydrogenase

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UTI in pregnancy: PN

Antibiotics	Dose
Ceftriaxone	1-2 g IV or IM q24 h
Aztreonam	1 g IV q8-12 h
Piperacillin-tazobactam	3.375-4.5 g IV q6 h
Cefepime	1 g IV q12 h
Imipenem-cilastatin	500 mg IV q6 h
Ampicillin +	2 g IV q6 h
Gentamicin	3-5 mg/kg/day IV in 3 divided doses

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UTI postmenopausal women*Risk factors*

	Reference	LE
In older institutionalised women, urine catheterisation and functional status deterioration appear to be the most important risk factors associated with UTI.	47	2a
Atrophic vaginitis.	47	2a
Incontinence, cystocele and post-voiding residual urine.	47	2a
UTI before menopause.	47	2a
Non-secretor status of blood group antigens.	47	2a

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UTI postmenopausal women*Treatment*

	Reference	LE	GR
Treatment of acute cystitis in postmenopausal women is similar to that in premenopausal women, however, short-term therapy is not so well-established as in premenopausal women.	49	1b	C
Treatment of pyelonephritis in postmenopausal women is similar to that in premenopausal women.		4	C
Asymptomatic bacteriuria in elderly women should not be treated with antibiotics.	17	2b	A
Optimal antimicrobials, doses and duration of treatment in elderly women appear to be similar to those recommended for younger postmenopausal women.		4	C
Oestrogen (especially vaginal) can be administered for prevention of UTI, but results are contradictory.	50	1b	C
Alternative methods, such as cranberry and probiotic lactobacilli, can contribute but they are not sufficient to prevent recurrent UTI.	51	1b	C
If complicating factors, such as urinary obstruction and neurogenic bladder, are ruled out, antimicrobial prophylaxis should be carried out as recommended for premenopausal women.		4	C

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Complicated UTI's due to urological disorders

- UTI is associated with a condition of the GU tract
- Broad range of bacteria
- Treatment depends on severity of illness
- If empirical therapy is needed, the antibacterial spectrum of the antibiotic should include most relevant pathogens (fluoroquinolones, piperacilin + β -lactamase inhibitor, 2 or 3^a cephalosporin or aminoglyside (LE 1B, GR:B)

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Factors that suggest a potential complicated UTI

- Presence of permanent or temporal catheter
- Post-void residual urine >100 ml
- BOO of any etiology
- Vesicoureteric reflux
- Urinary tract modifications, including ileal loop or pouch
- Chemical or radiation injuries of the uroepithelium
- Para-and postoperative UTI
- Renal insufficiency & immunodeficiency

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• UTI is the most common complication after SCI

- Prevalence: 28-38%
- 80% of SCI pts will get at least 1 UTI in 15 year period
- Most frequent cause for hospitalization

• Rate of UTI by bladder management (#UTI per 100 person days)

- 2.72 male with indwelling catheter (OR 7.77)
- 0.41 clean intermittent cath (OR 0.42)
- 0.36 condom catheter drainage (OR 0.24)
- 0.36 female with suprapubic catheter (OR 0.04)
- 0.06 spontaneous voiding (OR 0.04)

Noreau et al, Am J Phys Med Rehab 2000
De Ruz et al, Journal of Urology 2000

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Risk Factors

Risk Factor for NVD UTI	OR
Indwelling catheterization >30 days	4.04
Cervical Level SCI	2.99
Invasive Procedure (without prophylaxis abx)	2.62
Vesicoureteral reflux	1.77
Decreased functional independence	1.49

Not risk factors: gender, duration injury, type of injury

Febrile UTI in children with myelo meningocele on CIC

-Risk Factors

- Poor bladder compliance (<10 ml/ cm H₂O) (OR 10.8)
- Detrusor overactivity (OR 6.3)
- Vesicoureteral reflux (OR 4.5)

-Not Risk: Gender, duration, DSD

De Ruz J Urol 2000
Seki Int J Urol 2004

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Theories for Increased Risk of UTI in NVD

- Loss of physiologic cleansing of lower urinary tract
 - Bladder dysfunction
 - Elevated intravesical pressure
 - Incomplete emptying
 - Catheter use
 - Inoculation of urethral bacteria into bladder
 - Colonization of urine with bacteria of nearby skin
- More likely in female*
- Frequent exposure to antibiotics increases risk of resistant organism

Sauerwein 2002
Leoni 2003
Schlager 1999
Hermanci 1998

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Presentation

• Absence of typical classic symptoms as result of neurologic dysfunction

-Diagnosis of UTI may be delayed

•Bakke

- Only 35% had classic UTI symptoms
- Psychosocial factors were predictors of urinary tract complaints but not bacteriuria
- Complaints of UTI may suggest distress and not true infection

Linsenmeyer -39% not accurate based on symptoms

Sauerwein 2002
Balle 1998
Linsenmeyer 2003

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URINARY TRACT INFECTION IN PEOPLE WITH INDWELLING & INTERMITTENT CATHETER

Mary Lester
Urology Specialist Nurse

Introduction - setting the scene

Patient setting:

- Hospital
- Long term institutions
- Own homes

Patients include:

- Indwelling urinary catheters (urethral/suprapubic)
- Intermittent self catheterisation or intermittent catheterisation (IC)

Introduction – setting the scene (cont.)

- Indwelling catheters (IDC) are standard medical devices utilised in hospitals, care homes & the patients own homes to relieve urinary retention & urinary incontinence
- Approx 100 million sold annually world wide (Jacobson, 2008)
- The incidence of symptomatic catheter associated UTI's (CAUTI's) is a major health concern due to the complications, risk of recurrence & growing resistance to antibiotic therapies

Background to CAUTI's

Indwelling catheters:

- Act as a nidus for bacteria
- Promote inflammatory reaction
- Alter metabolic activity & cell proliferation

All the above facilitate bacterial infection

Background to CAUTI's

- CAUTI's can result in:
 - sepsis where mortality rates range from 10-33%
 - prolonged hospitalisation
 - re-admission
- Pts at particular risk are:
 - immunocompromised
 - the elderly
 - Diabetes Mellitus

CAUTI risk factors

- IDC for >6 days
- catheter not positioned correctly
- catheter not inserted using sterile conditions
- female
- pregnant
- malnourished, frail or has chronic illness
- length of stay in hospital prior to catheter insertion
- location of catheter insertion

Risk factors (cont.)

- have other sites of infections
- live in a long term facility
- catheterised post hip #
- have a ureteric stent
- impaired renal function
- history of previous catheter usage

Complications of catheterisation

- Physical & psychological discomfort
- Inflammation
- Urethral strictures
- Mechanical trauma
- Bladder calculi
- Other infections of the renal system
- Falls & delirium (esp. in the elderly)
- Treatment of CAUTI's can lead to antibiotic resistance in hospitals & long term institutions & uropathogens are a major source of infections caused by antimicrobial resistant organisms
- Risk of bladder cancer in those pts with indwelling catheters for 10 years or more

Complications of catheterisation (cont.)

- CAUTI increases the cost of health care due to:
 - delayed discharge from hospital
 - antimicrobial treatment
 - staff resources
- £99 million per year in the UK with an estimated cost per episode of £1968 (EPIC, 2013)

The source of CAUTI's

- The main route of infection is ascending by two principal mechanisms:
- Extraluminal – migration of bacteria along the outside of the catheter surface. May occur:
 - as the catheter is inserted
 - by contamination of the catheter by the health workers hands
 - patient's own perineal flora
 - Intraluminal – along the internal lumen of the catheter from colonisation of the catheter bag and/or contamination of the junction of the catheter & the catheter bag
- Most CAUTI's are derived from the patient's own colonic flora

Biofilm formation

Biofilm is associated with CAUTI's & resistant to antibiotics because:

- Metabolically inactive
- Biofilm acts as a physical barrier to the diffusion of antibiotics & host defence mechanisms
- Formation of biofilms by urinary pathogens on the surface of the catheter & drainage system occurs universally with prolonged duration of catheterisation
- Catheter becomes colonised with microorganisms within the biofilm that are then resistant to antimicrobials & host defences & impossible to eradicate without removing the catheter

Biofilm formation (cont.)

- Biofilms commonly form on devices inserted into the body
- Urease such as *Proteus mirabilis* causes urine to become alkaline, inducing crystallisation of calcium & magnesium within urine
- These crystals are incorporated into the biofilm
- Over time result in encrustation
- Encrustation generally associated with long term catheterisation as it has a direct relationship with the length of catheterisation

References

- Guidelines:
 - Grabe M, Bartoletti R, Bjerklund Johansen TE, et al. 2015 Guidelines on Urological Infections. European Association of Urology.
 - Vahr S, Cobussen-Boekhorst H, Eikenboom J, et al. 2013 Catheterisation Urethral intermittent in adults. European Association of Urology Nurses.
 - Averch TD, Stoffel J, Goldman HB et al. 2014 Catheter –Associated Urinary Tract Infections: Definitions and Significance in the Urologic Patient. American Urological Association.
 - Loveday HP, Wilson JA, Pratt RJ et al. 2014 epic 3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. Journal of Hospital Infection 86S1: S1-S70.
- Over 11,000 references
- Tenke P, Kovacs B, Bjerklund Johansen TE, et al. 2008 European and Asian guidelines on management and prevention of catheter-associated urinary tract infections. Int J Antimicrob Agents 31 Suppl 1:S68-78.

Guidelines

- Evidenced based using a systematic review of the literature that grade both the level of evidence & the recommendations
- Broad principles of best practice that need to be integrated into local & national practice guidelines
- Audit to reduce variation in practice & maintain patient safety
- Can be used as a benchmark:
 - for determining appropriate infection prevention decisions
 - as part of reflective practice to assess clinical effectiveness
 - provide a baseline for clinical audit, evaluation & education
 - facilitate on-going quality improvements & maintain patient safety

Definition of Aysmptomatic CAUTI

All guidelines acknowledge and differentiate between an asymptomatic CAUTI and a symptomatic CAUTI

Asymptomatic bacteriuria is defined as isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen from an individual without symptoms or signs of urinary tract infection.

- The clinical significance of asymptomatic bacteriuria (ABU) is undefined
- Treatment of ABU has not been shown to be clinically beneficial & is associated with the increase of antimicrobial resistant organisms
- All guidelines recommend that asymptomatic CAUTI's should NOT be routinely screened for

Definition of CAUTI

- No universally agreed definition
- Bacteriuria or funguria with a count of more than 10^3 CFU/ml (Tambyah & Maki 2000 adopted by EAUN 2013)
- The presence of symptoms or signs attributable to microorganisms that have invaded the urinary tract, where the patient has, or recently had, a urinary catheter (Loveday, 2014)

Most frequent pathogens associated with CAUTI

Short term catheterisation (usually single species organisms)

CAUTI's caused by gram +ve cocci & yeasts more likely to be extraluminally acquired

- Escherichia coli* most common infecting organism
- Candida spp*
- Enterococcus spp*
- Pseudomonas aeruginosa*
- Klebsiela*
- Enterobacter*

Pathogens associated with CAUTI (cont.)

Others include:

- Serratia*
- Staphylococcus*
- Proteus*
- Morganella morganii*
- Proteus mirabilis*
- Methicillin resistant *Staphylococcus aureus* (MRSA)
- Providencia stuartii*

Pts with IDC is the major site of resistant gram negative organisms in both acute & long term facilities, including ESBL & CRE

Prevalence of CAUTI in IDC

- UTI is the most common infection acquired as a result of health care accounting for 19% of HAI with between 43%-56% of UTI's associated with a urethral catheter
- Between 15%-25% of hospitalised patients may have short term IDC's inserted
- Highest ratio of catheterised pts found in ICU, lowest on medical/surgical wards
- The overall prevalence of long term catheter use is unknown
- Bacteriuria develops in approx 30% of catheterised pts after 2-10 days
- 24% of these will develop symptoms of a CAUTI

Prevalence with IDC (cont.)

- Approx 3.6% of those with CAUTI develop life-threatening secondary infections e.g. bacteraemia or sepsis, where mortality rates range from 10/5-33%

Suprapubic catheters

- Lack of controlled clinical trials to confirm its benefits of improved CAUTI rates compared to urethral IDC

Prevalence in IC

- Incidence as a consequence of IC is approx 2.5 per person per year
- Over 80% of pts experiencing at least one UTI over a 5 year period
- A recent Cochrane review failed to determine any significant difference in the rate of CAUTI between IC techniques:
 - clean v sterile
 - single v multiple use
- CAUTI with pyelonephritis is uncommon – 5% risk
- There is a lack of robust studies examining the effectiveness of IC in the reduction in the number of CAUTI's compared to IDC

Factors that influence prevalence

- Hand hygiene
- Use of personal protective equipment
- Asepsis
- Assessing the need for catheterisation
- Selection of catheter type
- Catheter insertion
- Catheter maintenance

Factors that influence prevalence (cont.)

Organisational responsibilities that affect prevalence:

1. Environmental hygiene

The environment must be:

- visibly clean
- free from non-essential items & equipment
- acceptable to pts & staff

Levels of cleaning should be increased in cases of infection and/or colonisation as environmental contamination may contribute to the spread of infection

Factors that influence prevalence (cont.)

2. System interventions include:

• Education of staff:

- all staff should be aware of their specific responsibilities in maintaining a clean environment
- continuing professional education of staff

- Regular assessment of healthcare workers skills in catheterisation, asepsis & care of catheterised pt

Factors that influence prevalence

- Audit of compliance with agreed local, national & international guidelines
- Feedback of compliance

Diagnosis ABU

Asymptomatic bacteriuria:

- Inevitable in catheterised patients
- In healthy individuals the infection will clear up spontaneously following catheter removal
- Urine culture not routinely recommended in asymptomatic catheterised pt

Consider treating ONLY if patient is:

- Immunosuppressed
- At risk of endocarditis
- About to undergo urinary tract instrumentation
- Pregnant

Diagnosis ABU (cont.)

Caution as ABU's can lead to:

- Pyelonephritis
- Bacteremia
- Mortality potentially

ABU remains a major health risk factor for patients with an IDC

Diagnosis of CAUTI

- Most short term (<30 days) catheter associated bacteriuria are asymptomatic & caused by a single organism
- Further multiple organisms tend to be acquired by pts catheterised long term (>30 days)

Diagnosis of CAUTI

The diagnosis of a symptomatic CAUTI is often a diagnosis of exclusion

Typical signs & symptoms of a UTI in the non-catheterised pt i.e.:

- bacteriuria
- pyuria (presence of WBC)
- suprapubic pain

are unreliable due to the presence of the catheter.

Therefore patients must exhibit other signs & symptoms prior to being diagnosed with a CAUTI

Diagnosis of CAUTI

- Patient with an indwelling catheter in situ
AND
- $\geq 10^4$ micro-organisms per ml from a catheter specimen of urine
AND

Diagnosis of CAUTI (cont.)

ONE or more of the following with no other recognised cause:

- Loin pain
- Loin or suprapubic tenderness
- Fever ($\geq 38^{\circ}\text{C}$ skin temp)
- Pyuria ($\geq 10^4$ WBC per ml)

Diagnosis of CAUTI following catheter removal

Patient who had:

- catheter removal within 3 days before the onset of CAUTI
AND
- $\geq 10^5$ micro-organisms from a mid stream specimen
AND

Diagnosis of CAUTI following catheter removal (cont.)

ONE or more of the following with no other recognised cause:

- Urgency
- Frequency
- Dysuria
- Loin pain
- Loin or suprapubic tenderness
- Fever ($\geq 38^{\circ}\text{C}$ skin temp)
- Pyuria

Diagnosis of CAUTI (cont.)

In summary

- Does the patient have an indwelling catheter?
- Does the patient have a CAUTI?
 - Are there defined signs and symptoms?
- What is the infection onset date?

Patients with asymptomatic bacteriuria/bacteria in their urine are NOT considered to have a CAUTI

Diagnosis of CAUTI – urine specimen collection

- Result reliable if collected from a newly inserted catheter
- Urine must be obtained from the sampling port only or directly from the catheter
- Never obtain sample from the catheter bag
- Catheter tips should never be submitted for analysis
- If a CAUTI is suspected, the best practice is removal of the old catheter before obtaining the urine specimen
- Obtain urine samples aseptically – aspirate the urine from the needleless sampling port with a sterile syringe after cleansing the port with a disinfectant
- Catheter specimens of urine must be labelled as such

Diagnosis of CAUTI (cont.)

If a patient does not respond to treatment:

- Blood cultures in septic pt
- Examination for other causes of fever. Febrile episodes only found in <10% of catheterised pts living in long term facilities
- USS for patients with loin pain & fever to exclude abscesses, stones & blockages
- Nuclear scans to detect kidney scarring
- CT and MRI scans to rule out kidney stones & obstruction
- X ray +/- contrast to determine structural abnormalities
- Cystoscopy – detect any abnormality including interstitial cystitis

Conclusion

CAUTI prevention & control is, more than ever, becoming an increasingly pressing problem for:

- The patient & his/her family
- Health care providers
- Society

It is our responsibility to ensure we as healthcare professionals:

- Deliver high quality evidence-based care to our patients
- Educate the staff who will continue to care for patients in the future
- Encourage/lobby for/participate in continuing research in this important area of Urology

Prevention and treatment of UTI in adults

Ronny Pieters, RN, Msc, Clinical nurse specialist Urology
Ghent University Hospital
President Urobel (Belgian association of urology nurses)

Prevalence

- ▶ Approximately 15% of all community-prescribed antibiotics in the US are dispensed for UTI and data from some European countries suggest a similar rate.
- ▶ In the US, UTIs account for >100,000 hospital admissions annually, most often for pyelonephritis. These data do not account for complicated UTI associated with urological patients, the prevalence of which is not well known.
- ▶ At least 40% of all hospital acquired infections are UTIs and the majority of cases are catheter associated.
- ▶ Bacteriuria develops in up to 25% of patients who require a urinary catheter for one week or more with a daily risk of 5-7%
- ▶ The recent Global Prevalence Infection in Urology (GPIU) studies have shown that 10-12% of patients hospitalised in urological wards have a healthcare-associated infection (HAI). The strains retrieved from these patients are even more resistant [12].

KCE study Nosocomial infections Belgium (2008)

- ▶ Most common UTI (23,9%), followed by airway infections (20,1%), wound infections after surgery (14,6%), septicemia (13,6%) and gastrointestinal infections (12,5%).
- ▶ Differ with the entity
 - ▶ Surgical wards: post-operative wound infections (38,7%)
 - ▶ Medical wards: more heterogeneous (UTI 23,6%, septicemia 22,8%, lower airway 20,4%, surgical wound infection 6,2%).
 - ▶ Geriatric wards: UTI (37%) and gastro-intestinal system (24,4%)
 - ▶ Intensive care: airway (50,8%), septicemia 20%
 - ▶ Rehab wards: UTI (54,5%).
- ▶ Extra costs
 - ▶ Blood stream infections 100 milj €
 - ▶ Airway infections 80 milj €
 - ▶ UTI 80 milj €

Vrijens F, Gordts B, De Laet C, Devriese S, Van de Sande S, Huybrechts M, et al. Nosocomiale infecties in België, deel 1: nationale prevalentiestudie. Health Services Research (HSR). Brussel: Federaal Kenniscentrum voor de Gezondheidszorg (KCE); 2008. KCE reports 92A (D/2008/10.273/70)

Prevalence

Table 1. Urinary Tract Infection Epidemiology: Measurement Concerns

- Not reportable
- Not a single clinical entity
 - ASB vs. symptomatic infection
 - Cystitis, bacteriuria, pyelonephritis
 - Complicated vs. uncomplicated infection
- Diagnostic criteria
 - Clinical presentation
 - Clinical presentation + urinalysis
 - Clinical presentation + urinalysis + culture
 - Culture
- Source of data
 - Office visits
 - Self-report of physician diagnosis
 - Population screens
 - Hospital discharges

ASB = asymptomatic bacteriuria.

Foxman B, The American Journal of Medicine, vol 13, 2002

Investigations EAU

- ▶ Urine dipstick testing, as opposed to urinary microscopy, is a reasonable alternative to culture for diagnosis of acute uncomplicated cystitis (LE: 2a, GR: B)
- ▶ Urine cultures are recommended in the following situations:
 - ▶ Suspected acute pyelonephritis
 - ▶ Symptoms that do not resolve or recur within 2-4 weeks after the completion of treatment
 - ▶ Women who present with atypical symptoms
 - ▶ Pregnant women
 - ▶ Males with suspected UTI (LE: 4, GR: B)

Prevalence

- ▶ Data
 - ▶ Valid data on number of UTI's in hospital ?
 - ▶ Valid data on number of UTI's in outpatient ?
 - ▶ Valid data on number of UTI's in home care ?
 - ▶ Valid data on number of UTI's in nursing homes ?
- ▶ Nursing
 - ▶ Cultures on initiative of nurses (odour, aspect,...)
 - ▶ Urinary cultures: how?
 - ▶ Urinary cultures: clinical information

Prevalence

- ▶ Continuum of care
 - ▶ More outpatient procedures
 - ▶ Adherence to guidelines for all concerned
 - ▶ Data (tackle problems)
 - ▶ Research
 - ▶ Quick wins
 - ▶ Avoidable errors

▶ <http://www.cdc.gov/nhsn/RA/PDF/csteWorkshopDHP6709Final.pdf>

Prevention

www.mayoclinic.org/diseases-conditions/urinary-tract-infection/basics/prevention/con-20037
[een snelle navigatie je blaaspijn op deze blaaspijnkaart. Blaaspijn nu importeren...](#)

Diseases and Conditions

Urinary tract infection (UTI)

Basics	Care at Mayo Clinic	In-Depth	Expert Answers	Multimedia	Resources	News From M
Definition						
Symptoms						
Causes						
Risk factors						
Complications						
Preparing for your appointment						
Tests and diagnosis						
Treatments and drugs						
Alternative medicine						
Lifestyle and home remedies						
Prevention						

Prevention

By Mayo Clinic Staff

Take these steps to reduce your risk of urinary tract infections:

- **Drink plenty of liquids, especially water.** Drinking water helps dilute your urine and ensures that you'll urinate more frequently — allowing bacteria to be flushed from your urinary tract before an infection can begin.
- **Wipe from front to back.** Doing so after urinating and after a bowel movement helps prevent bacteria in the anal region from spreading to the vagina and urethra.
- **Empty your bladder soon after intercourse.** Also, drink a full glass of water to help flush bacteria.
- **Avoid potentially irritating feminine products.** Using deodorant sprays or other feminine products, such as douches and powders, in the genital area can irritate the urethra.

Prevention

www.mayoclinic.org/diseases-conditions/urinary-tract-infection/basics/treatment/con-20037892
[een snelle navigatie je blaaspijn op deze blaaspijnkaart. Blaaspijn nu importeren...](#)

Urinary tract infection (UTI)

Basics	Care at Mayo Clinic	In-Depth	Expert Answers	Multimedia	Resources	News From Mayo Clinic
Definition						
Symptoms						
Causes						
Risk factors						
Complications						
Preparing for your appointment						
Tests and diagnosis						
Treatments and drugs						
Alternative medicine						
Lifestyle and home remedies						
Prevention						
Products and services						

Treatments and drugs

By Mayo Clinic Staff

Doctors typically use antibiotics to treat urinary tract infections. Which drugs are prescribed and for how long depend on your health condition and the type of bacterium found in your urine.

Simple infection

- Sulfamethoxazole-trimethoprim (Bactrim, Septra, others)
- Amoxicillin (Amoxil, Augmentin, others)
- Nitrofurantoin (Furadantin, Macrobid, others)
- Ampicillin
- Cephalexin (Cepros)
- Levofloxacin (Levaquin)

Usually, symptoms clear up within a few days of treatment. But you may need to continue antibiotics for a week or more. Take the entire course of antibiotics prescribed by your doctor to ensure that the infection is completely gone.

For an uncomplicated UTI that occurs when you're otherwise healthy, your doctor may recommend a shorter course of

Appointments & care

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Kidney Infection Symptoms

Do You Have These (3) Scary Kidney Infection Symptoms? See

Google: 7 tips

- ▶ **Flush out bacteria.** Drink plenty of fluids. The usual 6 to 8 glasses of water will do, but cut back on caffeine and alcohol, which can irritate the bladder. Heed the call of nature and urinate when you first feel the urge. If you leave the loo trip till later, you risk bacteria growth. Also, urinate soon after sex to clear out any bacteria that may have entered the urethra.
- ▶ **Practice good toilet hygiene.** As mentioned, go when you've got to. And after you're done, always wipe from front to back to keep from pushing bacteria nearer to your urethra. This is especially important after a bowel movement. If you have young children, remind them of the importance of proper wiping and check in on how frequently they visit the bathroom. Constipation has been linked to UTIs in children, so make sure you get to the root of any causes of constipation.
- ▶ **Create an environment inhospitable to bacteria.** Cranberry, long lauded as a UTI-fighting fruit, actually changes the surface of *E. coli* bacteria so that it cannot bind to the urinary tract. If it can't take hold, your body has more time and opportunity to flush it out of your system before it has a chance to grow in large amounts. Try cranberry juice or tablets, but check with your doctor because cranberry may not be good for those with a history of kidney stones or for those on blood thinners.
- ▶ **Protect your urethra.** Although they haven't been conclusively linked to raising UTI risk, bubble bath and bath oils, perfumed products used on or near the genitals, and poor hygiene can irritate the urethra. Some doctors suggest switching from tampons to sanitary pads, since tampons may give bacteria more opportunity to enter the body and irritate the urethra.
- ▶ **Maintain balanced flora.** A woman's vaginal area contains naturally protective bacteria to fend off infection. If the balance of this so-called "vaginal flora" is upset, harmful bacteria may flourish and a woman's UTI risk may increase. Feminine hygiene products, including douches, sprays, and powders, may upset this balance. On the other hand, consuming probiotic bacteria, found in fermented milk products like yogurt, may promote the balance and reduce recurrent infection risk.
- ▶ **Be intelligent about intimacy.** Sexual intercourse can also irritate the urethra and may be one of the reasons that sexually active women are more prone to UTIs. Always urinate soon after intercourse to clear out any bacteria that has been introduced to the body and may reach the urethra. A woman's contraceptive choice could affect her risk of UTIs. A diaphragm may compress the urethra and make it hard to empty the bladder. Urine that lingers too long in the bladder may gather more bacteria. And use of spermicides may also trigger bacteria growth by upsetting the natural balance of the vagina.
- ▶ **Dress for prevention.** Breathable fabrics and loose-fitting clothing allow a woman's vaginal area to stay dry, a deterrent to bacteria growth. Skip the skin-tight jeans and opt for natural fibre underwear, and don't lounge around in a wet swimsuit. Also, wash intimates using a mild detergent.

.....http://health.cancer.ca/channel_section_details.asp?text_id=5717&channel_id=7&relation_id=24636.....

Google: 9 tips

- ▶ **Drink plenty of water** – This dilutes your urine and can help flush out bacteria so it won't get a chance to cause an infection.
- ▶ **Urinate after sex** – Sex can cause bacteria to get into your urinary tract, and urinating right afterwards can flush it away.
- ▶ **Drink unsweetened cranberry juice** – One to two ounces per day has helped me a great deal, but you want to be sure that it's 100 percent cranberry. The taste is very strong, so I'd suggest knocking it back like a shot.
- ▶ **Cut down on sugar** – Bacteria eat sugar, so try not to feed it.
- ▶ **Limit alcohol consumption** – One to two drinks a day is OK, but more than that can make you more prone to UTIs. I'm not sure why this is, but when I drink more, I seem to end up at the urologist's office more.
- ▶ **Avoid synthetic undies** – Or, at the very least, choose undies with a natural cotton liner in the crotch area.
- ▶ **Urinate often** – If you're drinking plenty of water, this won't be a problem, but it's also important that you don't hold it in. If you have to pee, go as soon as possible.
- ▶ **Take showers, not baths** – Soaking in the tub is relaxing, but it's also an opportunity for bacteria to get into your urinary tract. The occasional bath probably won't be a problem, but in general stick to showers.
- ▶ **Eat fresh fruits and veggies** – Fresh produce has a lot of water in it, and it can help you stay hydrated.

▶ <http://www.care2.com/greenliving/which-is-better-cranberry-juice-or-pills-to-stop-utis.html#ixzz3Y4D9aEUW>

Google: 10 tips

- ▶ Water helps flush your urinary tract, so make sure you drink plenty of plain water daily.
- ▶ Don't hold it when you need to urinate! Women are often guilty of trying to finish a task before they go to the bathroom. Holding it when you need to go can help any bacteria that may be present develop into a full-fledged urinary tract infection.
- ▶ You've probably heard that you should wipe from front to back after a bowel movement. This is especially important to help prevent bacteria from the anus from entering the vagina or urethra.
- ▶ Taking showers instead of baths helps prevent bacteria from entering the urethra and causing a UTI.
- ▶ Always wash your genital area both before and after sexual intercourse to help prevent transferring bacteria to the urethra or vaginal area, which can create a breeding ground for a UTI.
- ▶ Feminine hygiene sprays and douches, particularly scented douches, can irritate the urethra and possibly lead to a UTI. Avoiding these products will help prevent not only urinary tract infections, but also other infections and irritations that these products may cause.
- ▶ Drinking cranberry juice is a fairly well-known and natural way to both help prevent urinary tract infections, as well as help speed the recovery process when a UTI develops. Just drinking two 4-ounce glasses of cranberry juice daily is often enough to both prevent a UTI and speed recovery when an infection does develop.
- ▶ Another nutritional route that may help prevent UTI is regularly taking vitamin C supplements. Vitamin C increases the acidity level of urine, which in turn helps decrease the number of harmful bacteria that may be present in your urinary tract system.
- ▶ Always wear panties with a cotton crotch. Cotton fabric lets moisture escape while other fabrics can trap moisture, creating a potential breeding ground for bacteria.
- ▶ If you are one of a large number of women who suffers from frequent, recurrent urinary tract infections, a change in your position during sexual intercourse may help reduce the number of UTIs that you experience. Changing sexual positions may reduce friction on your urethra and reduce your risk of recurrent UTI. Women who suffer from extremely frequent urinary tract infections may be prescribed an antibiotic to take immediately after sex to help prevent the likelihood of urinary tract infection occurrence.

▶ <http://womenshealth.about.com/od/urinarytractinfections/a/preventuti.htm>

EAU

- ▶ A number of measures such as fluid intake and personal hygiene behaviours (e.g. reduced fluid intake, habitual and post-coital delayed urination, wiping from back to front after defecation, douching and wearing occlusive underwear) have been suggested to increase the risk of UTI. However, studies that have explored these risk factors have consistently documented the lack of association with recurrent UTI.

Risk factors (Table EAU)

The most important age related known and possible risk factors for UTI in women [39, 54, 55]

- Young and premenopausal women
 - ▶ Sexual intercourse
 - ▶ Use of spermicide
 - ▶ A new sexual partner
 - ▶ A mother with a history of UTI
 - ▶ History of UTI during childhood
- Postmenopausal and elderly women
 - ▶ History of UTI before menopause
 - ▶ Urinary incontinence
 - ▶ Atrophic vaginitis due to oestrogen deficiency
 - ▶ Cystocele
 - ▶ Increased post-void urine volume
 - ▶ Blood group antigen secretory status
 - ▶ Urine catheterisation and functional status deterioration in elderly institutionalised women

What about?

- ▶ Antimicrobial prophylaxis
- ▶ Oestrogens
- ▶ Methenamine Hypurate
- ▶ Probiotics

- ▶ *Cranberry*

Belgium

For "treatment" of a common cystitis

- ▶ 32 OTC drugs
- ▶ 23 oral prescription drugs

Antibiotics for asymptomatic bacteriuria

- ▶ No clinical benefit was found for antibiotic treatment. Antibiotics eradicated the growth of bacteria in more participants but at the cost of more adverse events than in the no treatment groups.

Antibiotics for asymptomatic bacteriuria (Review) Copyright © 2015 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Antibiotics for preventing recurrent urinary tract infection in non-pregnant women

- ▶ The review found that non-pregnant women who had two or more UTIs in the past year had less chance of having a further UTI if given a six to 12 month treatment with antibiotics. The most commonly reported side effects are digestive problems, skin rash and vaginal irritation.
- ▶ More research is needed to determine the optimal duration for antibiotic treatment.

Antibiotics for preventing recurrent urinary tract infection in non-pregnant women (Review) Copyright © 2008 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Cranberry

- ▶ There was a small trend towards fewer UTIs in people taking cranberry product compared to placebo or no treatment but this was not a significant finding. Many people in the studies stopped drinking the juice, suggesting it may not be an acceptable intervention. Cranberry juice does not appear to have a significant benefit in preventing UTIs and may be unacceptable to consume in the long term. Cranberry products (such as tablets or capsules) were also ineffective (although had the same effect as taking antibiotics), possibly due to lack of potency of the 'active ingredient'.

..... Cranberries for preventing urinary tract infections (Review)
▶ Copyright © 2014 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Oestrogens

- ▶ In postmenopausal women the prevalence rate for having one episode of UTI in a given year varies from 8% to 10%. This increased risk is associated with a decrease in oestrogen levels. The use of oestrogens (orally or vaginally) has been proposed as a preventive strategy. This review identified nine studies (3345 women) treated with oestrogens versus placebo, no treatment or antibiotics. Vaginal oestrogens reduced the number of UTIs when compared to placebo.
- ▶ All studies reported adverse events for the oestrogen treatment groups. These included breast tenderness, vaginal bleeding or spotting, vaginal discharge, vaginal irritation, burning and itching.

..... Oestrogens for preventing recurrent urinary tract infection in postmenopausal women (Review)
▶ Copyright © 2008 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Methenamine hippurate

- ▶ This review identified 13 studies (2032 participants).
- ▶ Methenamine hippurate may be effective in preventing UTI in patients without renal tract abnormalities particularly when used for short term prophylaxis.
- ▶ It does not appear to be effective for long term prophylaxis in patients who have neuropathic bladder.
- ▶ There were few adverse effects. Additional well controlled randomised controlled trials are necessary in particular to clarify effectiveness for longer term prophylaxis in those without neuropathic bladder.
- ▶ **(Hiprex, Mandelamine, Urex)**

..... Methenamine hippurate for preventing urinary tract infections (Review) Copyright © 2012 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

EAU

Non-antimicrobial prophylaxis

- ▶ Hormonal replacement In postmenopausal women local, vaginal oestrogen replacement, but not oral oestrogen, showed a trend towards preventing UTI recurrences, but vaginal irritation occurred in 6 - 20% of women (LE: 1b, GR: C)
- ▶ Immunoactive prophylaxis OM-89 (Uro-Vaxom®) is sufficiently well documented and has been shown to be more effective than placebo in several randomised trials with a good safety profile. Therefore, it can be recommended for immunoprophylaxis in female patients with recurrent uncomplicated UTI (LE: 1a, GR: B). Efficacy in other groups of patients and relative to antimicrobial prophylaxis remains to be established.
- ▶ The vaginal vaccine Urovac® slightly reduced UTI recurrence and primary immunisation followed by booster immunisation increased time to re-infection (LE: 1a, GR: C).
- ▶ For parenteral immunotherapeutic products on the market, larger phase III studies are still missing. In smaller phase II studies, StroVac® and Solco-Urovac® have been shown to be effective when administered with a booster cycle of the same agents (LE: 1a, GR: C). For other immunotherapeutic products, no controlled studies are available. Therefore, no recommendations are possible.

EAU

Prophylaxis with probiotics (Lactobacillus sp)

- ▶ Accessibility of clinically proven probiotics for UTI prophylaxis is currently not universal. Only the Lactobacillus strains specifically tested in studies should be considered for prophylaxis. When commercially available, it is reasonable to consider the use of intravaginal probiotics that contain L. rhamnosus GR-1 and L. reuteri RC-14 for the prevention of recurrent UTI [107], and these products can be used once or twice weekly (LE: 4, GR: C).
- ▶ Vaginal application of Lactobacillus crispatus reduced the rate of recurrent UTI in pre-menopausal women in one study, and can also be used if available [108] (LE: 1b, GR: B).
- ▶ Daily use of the oral product with strains GR-1 and RC-14 is worth testing given that it can restore the vaginal lactobacilli, compete with urogenital pathogens, and prevent bacterial vaginosis, a condition that increases the risk of UTI. However, oral lactobacilli prophylaxis did not decrease UTI recurrence, therefore no recommendations are possible. In summary, pooled data from meta-analyses of available RCTs show no convincing benefit of lactobacillus products as prophylaxis of recurrent UTI. However differences in effectiveness between available preparations suggest further trials are needed before any recommendation for use can be made. Recommendation: Do not use outside of investigational trials.

EAU

Prophylaxis with cranberry

- ▶ Previous limited studies have suggested that cranberry (Vaccinium macrocarpon) is useful in reducing the rate of lower UTIs in women [109, 110]. A recent meta-analysis including 24 studies and comprising 4,473 participants showed however that cranberry products did not significantly reduce the occurrence of symptomatic UTI overall or for any of the following sub-groups: children with recurrent UTIs, older people, women with recurrent UTIs, pregnant women, cancer patients, or people with neuropathic bladder or spinal injury [111]. Due to these contradictory results, no recommendation of the daily consumption of cranberry products can be made.
- ▶ Prophylaxis with d-mannose
In a recent randomised placebo-controlled non-blinded clinical trial, it was shown that a daily dose of 2g d-mannose was significantly superior to placebo and as effective as 50 mg nitrofurantoin in preventing recurrent UTI [112]. This is indicative but not sufficient for a recommendation. D-mannose should at the present time only be used within the frame of high quality clinical investigations.

EAU

Antimicrobial prophylaxis

- Antimicrobial prophylaxis can be given continuously (daily, weekly) for longer periods of time (3-6 months), or as a single post-coital dose. Continuous or post-coital antimicrobial prophylaxis for prevention of recurrent UTI should be considered only after counselling and behavioural modification has been attempted, and when non-antimicrobial measures have been unsuccessful (LE: 4, GR: B).
- In appropriate women with recurrent uncomplicated cystitis, self-diagnosis and self-treatment with a short course regimen of an antimicrobial agent should be considered (LE: 2b, GR:A). The choice of antibiotics is the same as for sporadic acute uncomplicated UTI.
- Postcoital prophylaxis should be considered in pregnant women with a history of frequent UTIs before onset of pregnancy, to reduce their risk of UTI (LE: 2b, GR: B).

EAU

Antimicrobial prophylaxis

- Continuous antimicrobial prophylaxis regimens for women with recurrent UTIs include e.g. nitrofurantoin (macrocrystal) 50 mg or 100 mg once daily, fosfomycin trometamol 3 g every 10 days, and during pregnancy e.g. cephalexin 125 mg or 250 mg or cefaclor 250 mg once daily.

In general, the choice of antibiotics should be based upon the identification and susceptibility pattern of the organism causing the UTI, the patient's history of drug allergies and the ecological collateral effects including bacterial selection of resistance by the chosen antimicrobial.

EAU

Antimicrobial prophylaxis

There are recent warnings by governmental agencies for the long-term prophylactic use of nitrofurantoin because of the rare but severe pulmonary and hepatic adverse effects (allergic pneumonitis starting with a dry cough). Altogether this underlines the need for reconsidering long-term antibiotic prophylaxis in recurrent UTI and assess in each individual case effective alternative preventive measures.

Treatment



Acute uncomplicated UTI LUT EAU

Disease management

- Antibiotic therapy is recommended because clinical success is significantly more likely in women treated with antibiotics compared with placebo (LE: 1a, GR:A).
- The choice of antibiotic therapy should be guided by:
 - spectrum and susceptibility patterns of the aetiological uropathogens
 - efficacy for the particular indication in clinical studies
 - tolerability and adverse reactions
 - adverse ecological effects
 - cost
 - Availability

Nursing:
Observe the patients when started on AB
If adverse reactions document and inform the patient

UTI LUT EAU

Table 3: Recommended antimicrobial therapy in acute uncomplicated cystitis in otherwise healthy women

Antibiotics	Daily dose	Duration of therapy	Comments
<i>First choice</i>			
Fosfomycin trometamol	3 g SD	1 day	
Nitrofurantoin macrocrystal	100 mg bid	5 days	avoid in G6PD deficiency
Pivmecillinam	400 mg tid	3 days	
<i>Alternatives</i>			
Ciprofloxacin	250 mg bid	3 days	not during pregnancy
Levofloxacin	250 mg qd	3 days	not during pregnancy
Ofloxacin	200 mg bid	3 days	not during pregnancy
Cephalexin (e.g. cefadroxil)	500 mg bid	3 days	Or comparable (see Appendix 4.5)
<i>If local resistance pattern is known (E. coli resistance < 20%)</i>			
TMP	200 mg bid	5 days	TMP not in the first trimester of pregnancy
TMP- SMX	160/800 mg bid	3 days	SMX not in the last trimester of pregnancy

<http://uroweb.org/guideline/urological-infections/> dwl 25/04/2015

Acute uncomplicated pyelonephritis in adults EAU

- It is most important to differentiate by appropriate imaging very early between an acute uncomplicated and complicated, mostly obstructive form of pyelonephritis,
- Obstruction can lead to urosepsis.

Nursing:
Observe the patients
Follow the treatment scheme (early start of AB, not postpone administration)
AB treatment should have an effect on the patient's condition, if not: report



Acute uncomplicated pyelonephritis in adults EAU

Table 4: Recommended initial empiric oral antimicrobial therapy in mild and moderate acute uncomplicated pyelonephritis

Antibiotics	Daily dose	Duration of therapy	Reference
Ceftriaxone	1000-1500 mg bid	7-10 days	[80]
Levofloxacin	500 mg qd	7-10 days	[81]
Levofloxacin	750 mg qd	5 days	[86, 87]
Alternatives (clinical but not microbiological equivalent efficacy compared with fluoroquinolones):			
Cefpodoxime proxetil	200 mg bid	10 days	[88]
Cefixime	400 mg qd	10 days	[89]
Only if the pathogen is known to be susceptible (not for initial empirical therapy):			
Trimethoprim-sulphamethoxazole	160/800 mg bid	14 days	[84]
Co-amoxiclav ^{1,2}	0.5/0.125 g bid	14 days	

Note: Fluoroquinolones are contraindicated during pregnancy.
Not studied as monotherapy for acute uncomplicated pyelonephritis.
¹mainly for Gram-positive pathogens.

- Oral treatment if possible
- IV treatment if necessary



Table 5: Recommended initial empirical parenteral antimicrobial therapy in severe acute uncomplicated pyelonephritis

Antibiotics	Daily dose	Reference
Ceftriaxone	1000-1500 mg bid	[80]
Cefepime	1-2 g qid	[90]
Meropenem	1-2 g qid	[91]
Imipenem	1-2 g qid	[92]
Amikacin	0.5-1 g qid	[93]
Vancomycin	1-2 g qid	[94]
Linezolid	0.6 g qid	[95]
Daptomycin	6-10 mg/kg qd	[96]
Colistin	9 mg/kg qid	[97]

Note: Fluoroquinolones are contraindicated during pregnancy.
Toxin dose studied, but higher dose recommended by experts.
Not studied as monotherapy in acute uncomplicated pyelonephritis.
Mainly for Gram-positive pathogens.
Trimethoprim-sulphamethoxazole (only if susceptibility of pathogen is known).
Trimethoprim-sulphamethoxazole (only if susceptibility of pathogen is known).

<http://uroweb.org/guideline/urological-infections/> dwl 25/04/2015

COMPLICATED UTIs EAU

- A complicated UTI is an infection associated with a condition, such as
 - a structural or functional abnormality of the genitourinary tract
 - the presence of an underlying disease, which increase the risk of a more serious outcome than expected from UTI in individuals without identified risk factor or of failing therapy

Table 6: Factors that suggest a potential complicated UTI

The presence of an indwelling catheter, stent or splint (urethral, ureteral, renal) or the use of intermittent bladder catheterisation.
Post-void residual urine of > 100 mL.
An obstructive uropathy of any aetiology (upper and lower urinary tracts), e.g. bladder outlet obstruction (including neurogenic urinary bladder), stones and tumour.
Vesicoureteric reflux or other functional abnormalities.
Urinary tract modifications/deviation, such as an ileal loop or pouch.
Chemical or radiation injuries of the uroepithelium.
Pre- and postoperative UTI, including renal transplantation.

COMPLICATED UTIs EAU

- Treatment strategy depends on the severity of the illness and encompasses three goals:
 - management of the urological abnormality (stone, PVR,...)
 - antimicrobial therapy
 - supportive care when needed.
- Hospitalisation is often required.
To avoid the emergence of resistant strains, therapy should be guided by urine culture whenever possible.

Nursing:

A valid urine culture sample before AB treatment is imperative



COMPLICATED UTIs EAU

- Duration of antibiotic therapy
Treatment for 7-14 days is generally recommended, but the duration should be closely related to the treatment of the underlying abnormality.
- Sometimes, a prolongation for up to 21 days, according to the clinical situation, is necessary.



COMPLICATED UTIs EAU

Table 7: Antimicrobial treatment options for empirical therapy

Antibiotics recommended for initial empirical treatment, if local resistance pattern is still < 20%
Fluoroquinolones
Aminopenicillins plus a BLI
Cephalosporins (Groups 3a)
Aminoglycoside
Antibiotics recommended for empirical treatment in case of initial failure, or for severe cases
Fluoroquinolones (if not used for initial therapy)
Piperacillin plus BLI
Cephalosporins (Group 3b)
Carbapenem
Antibiotics not recommended for empirical treatment
Aminopenicillins, e.g. amoxicillin, ampicillin
Trimethoprim-sulphamethoxazole (only if susceptibility of pathogen is known)
Fosfomycin trometamol

BLI = β -lactam inhibitor

<http://uroweb.org/guideline/urological-infections/> dwl 25/04/2015



Urosepsis

- 9% to 31% of sepsis cases are urosepsis
- Mortality rate 28,3% to 41,1%
 - Depending on the region
 - Increasing over time (resistance)

Int J Urol. 2013 Oct;20(10):963-70. doi: 10.1111/iju.12200. Epub 2013 May 29.
 Wagenlehner FM¹, Lichstein C, Rolles C, Mayer K, Uhle F, Weidner W, Weigand MA.



UROSEPSIS EAU

- The most effective methods to prevent nosocomial urosepsis are the same as those used to prevent other nosocomial infections:
 - Isolation of all patients infected with multi-resistant organisms to avoid cross-infection
 - Prudent use of antimicrobial agents for prophylaxis and treatment of established infections, to avoid selection of resistant strains. Antibiotic agents should be chosen according to the predominant pathogens at a given site of infection in the hospital environment
 - Reduction in hospital stay. It is well known that long inpatient periods before surgery lead to a greater incidence of nosocomial infections
 - Early removal of indwelling urethral catheters, as soon as allowed by the patient's condition. Nosocomial UTIs are promoted by bladder catheterisation as well as by ureteral stenting
 - Antibiotic prophylaxis does not prevent stent colonisation, which appears in 100% of patients with a permanent ureteral stent and in 70% of those temporarily stented
 - Use of closed catheter drainage and minimisation of breaks in the integrity of the system, e.g. for urine sampling or bladder wash-out
 - Use of least-invasive methods to release urinary tract obstruction until the patient is stabilised
 - Attention to simple everyday techniques to assure asepsis, including the routine use of protective, disposable gloves, frequent hand disinfection, and using infectious disease control measures to prevent cross-infections.



Nursing:
Observe and remediate!



UROSEPSIS EAU

- Nurses' observation

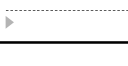
Table B: Clinical diagnostic criteria of sepsis and septic shock [148, 149]

Disorder	Definition
Infection	Presence of organisms in a normally sterile site that is usually, but not necessarily, accompanied by an inflammatory host response.
Bacteremia	Bacteria present in blood as confirmed by culture. May be transient.
Systemic inflammatory response syndrome (SIRS)	Response to a wide variety of clinical insults, which can be infectious, as in sepsis but may be non-infectious in aetiology (e.g. burns, or pancreatitis). This systemic response is manifested by two or more of the following conditions: • Temperature $> 38^{\circ}\text{C}$ or $< 36^{\circ}\text{C}$ • Heart rate > 90 bpm • Respiratory rate > 20 breaths/min or $\text{PaCO}_2 < 32$ mmHg (a 4.3 kPa) • WBC $> 12,000$ cells/mm ³ or $< 4,000$ cells/mm ³ or $> 10\%$ immature (band) forms
Sepsis	Activation of the inflammatory process due to infection.
Hypotension	Systolic blood pressure < 90 mmHg or a reduction of > 40 mmHg from baseline in the absence of other causes of hypotension.
Severe sepsis	Sepsis associated with organ dysfunction, hypoperfusion or hypotension. Hypoperfusion and perfusion abnormalities may include but are not limited to lactic acidosis, oliguria, or acute alteration of mental status.
Septic shock	Sepsis with hypotension despite adequate fluid resuscitation along with the presence of perfusion abnormalities that may include, but are not limited to lactic acidosis, oliguria, or acute alteration in mental status. Patients who are on inotropic or vasopressor agents may not be hypotensive at the time that perfusion abnormalities are measured.
Refractory septic shock	Septic shock that lasts for > 1 h and does not respond to fluid administration or pharmacological intervention.



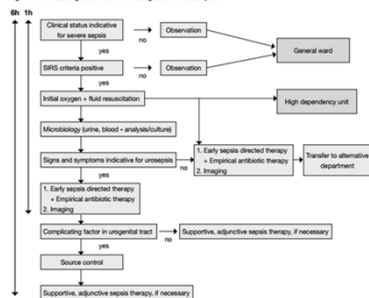
UROSEPSIS EAU

- Nurses' observation
- Nurses' actions:
 - Call for help: emergency
 - Drainage
 - If catheters in place: control /switch catheter
 - If not: place catheter
 - Urine culture before AB
 - IV fluids
 - Put in IV line + haemocultures + blood specimen
 - Order **and** administrate AB on doctor's prescription
 - Increase controls or/and transfer to ICU



UROSEPSIS EAU

Figure 3: Clinical algorithm for the management of urosepsis



<http://uroweb.org/guideline/urological-infections/> dwl 25/04/2015



Conclusions

- Prevalent condition
- Underestimated condition
- Costly condition
- Lack of information in the general public



Conclusions

- A task for the urology nursing associations?



Treatment and prevention of UTI in catheter users and patients with a urostomy (module 7)

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Radboudumc

Content

General

- Symptoms that may indicate UTI in catheters/ urostomy users
- Possible colour and odour changes in urine due to food or medication
- EB CAUTI nursing prevention & treatment in catheter/urostomy users

Specific

- EB CAUTI nursing prevention & treatment AND in daily practice
 - Indwelling catheter
 - Intermittent catheterisation
 - Urostomy (incontinent/ continent)

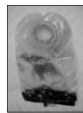


ESUN course may 2015

Radboudumc

Symptoms that may indicate UTI in catheters/ urostomy users

- Leakage suddenly occur
- Skin problems
- Mucus / cloths
- Cloudy urine / purple bag
- Offensive odour
- Visible blood/ haematuria
- Pain/tenderness in the kidney area
- Urgency/ frequency ↑
- Bladder spam
- Capacity ↓
- Temperature ↑
- Feeling sick / headache
- A-typical complaints



ESUN course may 2015

Radboudumc

Possible colour and odour changes in urine due to food or medication

Medication	Colour or odour of urine
Amisoprine	Blue-green
Anticoagulants	Red-brown (in alkaline urine)
Antibiotics (not all)	Offensive smell
Chloroquine	Rusty brown, yellow
Dantrolene	Orange
Ferrous salts	Black
Ibuprofen	Red
Indomethacin	Green
Lidocaine	Darkens
Methyldopa	Uniform (red-black on standing)
Metronidazole	Red to brown
Nifedipine	Pink (alkaline)
Phenothiazines	Pink to red-brown
Rituximab	Red to brown
Senna	Yellow-brown (acid urine); yellow-pink (alkaline urine) darkens on standing
Sulphonamides	Greenish blue
Triamterene	Blue
Uroguin	Orange
Vitamin B complex	Dark yellow
Warfarin	Orange
Caused by food and drink	
Asparagus	Green colour and offensive smell (not in all patients)
Beetroot	Pink to dark red
Red fruit drinks	Pink to dark red
• Oily fish	Fatty
Total parenteral nutrition	Offensive

Adapted from Landowski (2008) [190], Mason (2004) [93], Wallach (1992) [191] and Watson (1987) [192]. EAUN guideline "Incontinent Urostomy" 2009, p37.

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CAUTI prevention in catheter/urostomy users

Recommendations	LE	GR
• The patient should be given sufficient fluid to maintain an output of 50-100 ml/h	2b	B
• To promote "Good fluid intake" should be advised to all catheter users to promote the flow of urine and prevent blockage	4	C
Recommendations	LE	GR
• Perform hand hygiene immediately before and after insertion or any manipulation of the catheter device or site [16]	1b	A
• Carers and patients managing their own catheters must wash their hands before and after manipulation of the catheter [8]	1b	A
• Healthcare professionals should observe protocols on hand washing and the need to use disposable gloves between catheterised patients [12, 20]	1b	B

Geng V. et al., Catheterisation, indwelling catheters in adults, Urethral and Suprapubic, 2012 EAUN

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CAUTI prevention in catheter/urostomy users

Recommendations	LE	GR
• Routinely bladder washouts are not beneficial [45, 137]	1a	A
• Bladder Irrigation and instillation of maintenance solutions do not prevent catheter associated infections. However they may be recommended in special circumstances e.g. management of blood clots [45, 137]	1b	A
• Do not recommend cranberry supplementation routinely to prevent or treat UTI [102, 103]	1b	A
• In case of constipation a bowel assessment should be made	4	C
• Educating the patient regarding the link between constipation and bypassing urine	4	C

Geng V. et al., Catheterisation, indwelling catheters in adults, Urethral and Suprapubic, 2012 EAUN
Jepson RG, Craig JC. Cranberries for preventing urinary tract infections. Cochrane Database Syst Rev 2008

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CAUTI prevention in catheter/urostomy users

- No standard AB therapy in asymptomatic individuals
- Use of dipstick to detect UTI is not recommended. If dipstick is used to detect glucose in the urine, attention should be paid that uric acid and vitamin C can cause a false-negative result.

Recommendations	LE	GR
For urine analyses; aspirate the urine from the needleless sampling port with a sterile syringe/cannula adapter after cleansing the port with a disinfectant [16]	1b	B
Obtain large volumes of urine for special analyses (not culture) aseptically from the drainage bag [16]	1b	B
Undertake urinalysis or take a specimen of urine for culture if a patient has symptoms suggesting a UTI [13]	4	C



Geng V, et al. Urethral and Suprapubic, catheterization, indwelling catheters in adults. 2011 EAU
Wynne J. Complications of intermittent catheterization: their prevention and treatment. Spinal Cord 2002;40(10):536-41

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Indwelling catheter- TUC/ SPC

- Bacterial colonisation with indwelling catheterisation is inevitable with almost 100% colonisation risk at 7-10 days.



Recommendations	LE	GR
Use of closed urinary drainage systems [55, 79, 118, 119]	1a	A
Use of silver coated catheters [53, 108, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129] (Decrease by between 17 and 85%) only for less than a week	1b	A
Use of a combination of a silver coated all silicone catheter and an antiseptic drainage system [130, 131] (Decrease by between 67% and 67%)	2a	A
Use of stop orders and daily assessment of the need for urethral catheterisation [132] (Decrease by 52%)	1a	A
Avoid drainage tube occlusion [133]	3	A
Adhere to commonplace hand washing policy [133]	3	B
Use small lumen catheters [56]	4	C
Avoid unnecessary catheterisation	1b	A
Remove the catheter as soon as possible	1b	B
Use urinary catheters in operative patients only if necessary, not routinely	1b	B

Geng V, et al. Urethral and Suprapubic, catheterization, indwelling catheters in adults. 2011 EAU

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Indwelling catheter- TUC/ SPC

Recommendations	LE	GR
Silicone catheters (100%) might be preferable to other catheter materials to reduce the risk of encrustation in long-term catheterised patients who have frequent obstruction of the catheter [16]	1b	B
Catheter materials designed for long-term use (100% silicone, silicone coating or hydrogel coating) should be used where catheter is expected to be used long-term (more than 2 weeks) [21, 51]	Unresolved Issue	
Silver alloy coated catheters may reduce the risk of catheter-associated bacteriuria in hospitalised patients during short-term catheterisation (less than 1 week) [12, 53]	1a	B
Antibiotic-impregnated catheters may decrease the frequency of asymptomatic bacteriuria in hospitalised patients within 1 week	1a	B

Geng V, et al. Catheterisation, indwelling catheters in adults. Urethral and Suprapubic, 2013 EAU
Nell-Weise SS, van den Broek PJ. Urinary catheter policies for short-term bladder drainage in adults. Cochrane Database Syst Rev. 2005 Jul 20;(3)

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Indwelling catheter- TUC/ SPC

- There is no evidence that antibiotic-impregnated catheters decrease symptomatic infection and therefore they cannot be recommended routinely

Unresolved Issue

Geng V, et al. Urethral and Suprapubic, catheterization, indwelling catheters in adults. 2011 EAU

- Nitrofurazone-impregnated catheters reduced the risk of sympt. UTI
 - BUT: reduction was low and may not be clinically important
 - More likely to cause discomfort than standard catheters

Thomas BL Lam et al. Types of indwelling urethral catheters for short-term catheterisation in hospitalised adults (Review) Cochrane Database of Systematic Reviews 2014, Issue 9. Art. No.: CD004013. DOI:10.1002/14651858.CD004013.pub4.

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Indwelling catheter TUC/SPC

Recommendations	LE	GR
Changing indwelling catheters or drainage bags at routine, fixed intervals is not recommended. Rather, catheters and drainage bags should be changed based on clinical indications such as infection, obstruction, or when the closed system is compromised [16]	1b	B
Prevention Replacing chronic catheters prior to commencement of antibiotics for symptomatic UTI yields greater and faster clinical improvement. [141] (LE: 2b)		
In appropriate patients use of a suprapubic catheter, male external or intermittent catheter are preferable to an indwelling urethral catheter [20]	2b	B

Geng V, et al. Catheterisation, indwelling catheters in adults. Urethral and Suprapubic, 2012 EAU

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Indwelling catheter- not recommended**Not recommended is:**

- Cleansing with 0.05% chlorhexidine gluconate [79, 134, 135] (LE: 1a)
- Addition of chlorhexidine to drainage bags [79, 136] (LE: 1a)
- Utilising povidine iodine to wash the genital area [138] (LE: 3)
- Regular bladder washouts [79, 137] (LE: 1a)
- Regular catheter bag changing [79, 139] (LE: 1a)
- Regular meatal cleansing beyond normal hygiene [140, 79] (LE: 1a)
- Systemic antimicrobial prophylaxis. This should not be routinely used in patients with short-term or long-term catheterisation to reduce catheter associated bacteriuria or UTI because of concern about selection of antimicrobial resistance. [45] Antibiotic prophylaxis when changing catheters should only be used for patients with a history of catheter-associated urinary tract infection following catheter change. [8] There is weak evidence that prophylactic antibiotics reduce CAUTI in female post abdominal surgical patients. [114] (LE: 3)

Geng V, et al. Catheterisation, indwelling catheters in adults. Urethral and Suprapubic, 2012 EAU
Jepson RG, Craig JC. Cranberries for preventing urinary tract infections. Cochrane Database Syst Rev 2008

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Patient information (1)

Give patients and cave-givers written and verbal information

- Simple anatomy of the urinary tract
- What is a catheter, position of catheter in bladder in relation to function
- Hygiene and hand washing
- Care of the drainage system and obtaining further supplies
- How to set up a link system and care for a free-standing bag
- Frequency of catheter and bag changes
- Information on who will change their catheter, date of re-catheterisation
- Avoiding constipation, fluid intake advice !
- How to recognise the onset of problems
- How to deal with specific problems, where and when to seek further advice
- Contact numbers to access advice and support

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Patient information (2)

Observation	Management
1. Emptying bag problem	Check whether there are other systems with different tips.
2. Incorrect position of the drainage bag above the level of the bladder	Teach patient to check regular position of drainage bag.
3. Over full drainage bag	Check when emptying of drainage bag or write a protocol to empty when the level of the bag is full. Get phone or alarm watch can be used. Ensure drainage bag is supported, disinfected correctly, advice patient to cover the drainage bag.
4. Clothing problem	There are different clothes on the market such as underwear for catheterised people. Women's leggings to hold the products. "Tucking into with bags for a drainage bag".
5. Occlusion of catheter tubes by tight clothing	Teach patients about occlusion by tight clothing. Teach patient to check if necessary.
6. Catheter system including the non return valve of the drainage bag	Try different types of catheter bag support products e.g. leg holders / splitters to support drainage bag.
7. Incorrect position of tubing	Should be correctly positioned and secured to avoid free drainage and patient mobility.
8. Change in colour or colour of urine	See Appendix 11! Possible colour and colour changes in urine. Inform patient about possible reasons for abnormal colour change. Change in colour may be caused by urinary tract infection but also by the catheter - indicator of bacteria in the urinary tract.
9. Kinking of catheter	Try non-kinking catheter tubes. Check the positioning of the drainage bag. Tube can be stabilised with tape.
10. No flow of urine	Check whether the drainage bag is full, whether there is a kink in the catheter or drainage system, whether the catheter is still in the bladder and whether there was a sufficient fluid intake.

- Inform patients about common problems with indwelling catheter equipment
- What can patient do/check
- When contact with healthcare giver

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Living with a long-term indwelling catheter can be a challenge, but with support and information about the best practice, individuals can adapt to this change
(Wilde, 2003)

Wilde MH. Meanings and practical knowledge of people with long-term urinary catheters. J Wound Ostomy Continence Nurs 2003;30:33-43

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Patient's experience (1)

Female, 44 yrs

- Married, 2 children
- MS, fully wheelchair bound, limited hand function



- 2009: SPC with valve: social freedom
- 2013: UTI's started >
 - Treated with AB and
 - Drainage of bladder
- 2013/2014: Multiresistant UTI
 - Bowel problems > bowel enema & macrogol
 - Catheter blockage : ch 14 >> ch 16
 - Started with bladder washout (NaCl. Sol G -R)
 - Medio 2014: daily AB for 3 months

2015: Daily AB

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Patient's experience (2)

Response of the patient:

- Regular contact with urologist/ nurse specialist
- Time was taken, which was important because I felt increasingly uncertain
- Not only prescribe AB, but also give advice what to do in case of suspicion of UTI and how to prevent a UTI
- The 'aftersale' gives me the feeling that I am not a number
- In this way I can deal with my catheter and the problems which sometimes occur
 - Know now what I have to do: a urine culture and drainage of the catheter
 - Know that feeling dizzy en feel like living in cocon are my complaints
 - For now I drain the catheter during the night, use daily AB, bladder washout if necessary and bowel enema
 - In this way hopefully the UTI will be limited to a minimum



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Intermittent catheterisation (CISC/CIC)

- Incidence of CAUTI in the region of 2.5 per person per year
- 80% of patients experiencing at least one UTI over a 5-year period.
- Majority of IC pat. have chronic or recurring bacteriuria (1)
- Cochrane review: failed to determine any significant difference in the rate of CAUTI between the various IC techniques, for example: single versus multiple use; clean versus sterile (2)
- The EAU guidelines on neurogenic bladder dysfunction suggest that an aseptic technique would be the most appropriate compromise between UTI incidence, practicality and economic viability (3)

1. Wyndaele JJ. Complications of intermittent catheterization: their prevention and treatment. Spinal Cord 2002;40(10):536-41.
2. Nèl-Weise BS, van den Broek PJ, da Silva EM. Urinary catheter policies for long-term bladder drainage. Cochrane Database Syst Rev. 2005;(1):CD004201.
3. Stohrner M, Krummer G, Lichner-Ernst D, et al. Diagnosis and treatment of bladder dysfunction in spinal cord injury patients. Eur Urol 1994 (Update Series);3:170-5.

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Factors increasing the risk of infection in IC

Low frequency of IC [19, 21, 28, 29, 30, 31]	2b
Bladder overdistension [32]	1b
Female [19, 33]	1b
Poor fluid intake [19]	3
Non-hydrophilic coating [19, 34]	1b
Poor technique [17]	3
Poor education [29, 30, 31, 33, 35]	2b

Vahr S, et al. Catheterisation - Urethral intermittent in adults - Dilatation, urethral intermittent in adults, 2013 EAUN

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Intermittent catheterisation

Recommendations	LE	GR
• Observe protocols on hand hygiene before catheterisation [13, 105]	1b	A
• Educate patient/caregiver in techniques of hand hygiene before discharge from hospital	4	C
• Observe the protocols for the principles of the aseptic procedures [88]	4	C
• Choose a catheter size large enough to allow free drainage but small enough to reduce risk of trauma	4	C
• Use a sterile catheter to prevent cross contamination in clinical, rehabilitations and long term care settings	4	C

Vahr S, et al. Catheterisation - Urethral intermittent in adults - Dilatation, urethral intermittent in adults, 2013 EAUN

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Intermittent catheterisation

• In case of post voiding residual urine (PVR) IC once daily is recommended to prevent CAUTI	4	C
• Make sure that patients using reusable catheters are aware how to clean and store the catheter	4	C
• Develop a relationship and environment that encourages and supports the patient towards self-management of long-term bladder conditions [63]	4	B
• Routine use of antiseptic lubricants for inserting the catheter is not necessary*	4	C
• Reassess the choice of material, equipment, catheterisation technique, lubrication, etc. in case of problems	4	C

Vahr S, et al. Catheterisation - Urethral intermittent in adults - Dilatation, urethral intermittent in adults, 2013 EAUN

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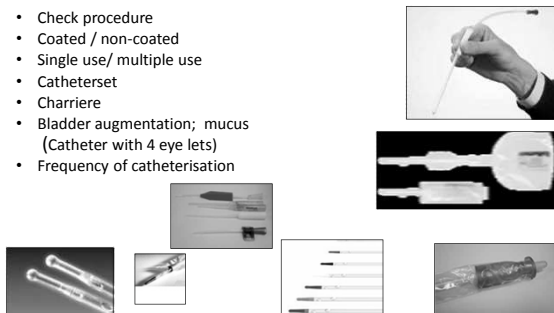
CAUTI nursing prevention and treatment in daily practice Intermittent catheterisation

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Different types of catheters

- Check procedure
- Coated / non-coated
- Single use/ multiple use
- Catheterset
- Charriere
- Bladder augmentation; mucus (Catheter with 4 eye lets)
- Frequency of catheterisation



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Patient information



- Patients need to know**
- Why IC is necessary
 - Basic anatomical knowledge about the urogenital tract
 - How to perform the IC procedure
 - The number of times to perform IC
 - Which difficulties may occur during or after the catheterisation procedure
 - Name, size and length of catheter
 - How to store the catheters correctly
 - To check the expiry date of the material before use
 - How to prepare the catheter for use
 - How to obtain supplies of the catheter [85]
 - That the technique of IC may vary in different settings (e.g., hospital, outpatient clinic, and home)
 - Importance of fluid intake
 - Importance of a healthy diet to avoid constipation
 - Importance of good hygiene
 - How to avoid UTI
 - How to recognise symptoms or the common signs of UTI
 - Burning on urination
 - Increasing and/or urgency
 - pain
 - difficult/clearing urine
 - cloudy/dark urine
 - feeling tired or shaky
 - fever or chills
 - haematuria [5, 69, 78]
 - Difficulties with either insertion or removal of the catheter
 - Availability of appropriate aids to help with catheterisation such as mirrors, hand grips, leg abductors, integrated drainage bags, and travel kits
 - What to do when travelling abroad
 - When to contact a health care professional
 - Contact the health care professional in case of
 - pain during or after catheterisation
 - catheterisation becoming more difficult
 - haematuria
 - fever
 - problems in bowel movement
 - lower back pain
 - discoloured or malodorous urine

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Patient's experience (1)

Male, 68 years

Referred by other hospital

- Neurogenic bladder (MS) > CISC
- Urolithiasis (treated)
- UTI (ESBL) > AB and daily AB

Treatment

- CISC 6-8 per day
- Fluid intake 4 ltr per day
- 2011: Bladder instillation with chondroitin sulphate solution (now 1 x per month)
- Since start of this treatment no complaints > AB treatment stop since 2 yrs
- 2013 Urine culture: multiresistant UTI, no complaints > no AB
- 2014 Urine culture: still multiresistant UTI, but no complaints > no AB
- Monitoring for urolithiasis once a year
- Very satisfied with current treatment



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Urostomy (incontinent/ continent)

- As conduit urine is usually bacteriuric, patients must learn what to do about specific symptoms of upper or lower UTIs.

Recommendation	LE	GR
• Patient education before discharge about UTI symptoms and adequate fluid intake	4	C
• To collect urine for analyses catheterise the ileal loop	4	C
• No treatment for asymptomatic bacteriuria, unless there is a history of recurrent pyelonephritis (asymptomatic bacteriuria: presence of bacteria in urine without symptoms)	2b	B

1. Geng V, et al. Incontinent Urostomy. 2009 EAUN
2. Chang SS, et al. Analysis of early complications after radical cystectomy: Results of a collaborative care pathway. J Urol 2002;167(5):2012-6.
3. Falagas ME, et al. Urinary 42: Tract infections in patients with urinary diversion. Am J Kidney Dis 2005;46(6):1030-7.
4. Nieuwenhuijsen JA, et al. Urinary diversions after cystectomy: the association of clinical factors, complications and functional results of four different diversions. Eur Urol 2008;53:834-44.

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CAUTI

nursing prevention and treatment in daily practice

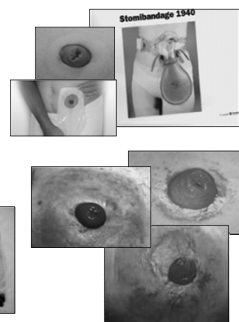
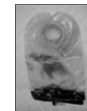
Urostomy (incontinent/ continent)

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Incontinent stoma

- Check procedure
- Check for UTI
- Advice about other material
- Skin protection
- Change system frequently until problems are solved
- Pictures or measure systems to describe and follow problem



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Patiënt's experience

Female 50 yrs, married

- Bricker urostomy
- Partner takes care of urostomy
- Contact because of UTI > skin problems and leakage
- All interventions not effective
- After checking everything again
 - Husband mentioned patient had high glucose by GP
 - Referred to specialist > insulin
 - Stoma problems solved



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Continent urostomy

- Check procedure
- Combination with bladder augmentation > Mucus
 - Start bladder washout with syringe
 - Or more frequent bladder washout
 - Catheter with bigger lumen if possible
 - Catheter with 4 eye lets
- Instillation with chondroitin sulphate (evidence?)



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Patient's experience (1)

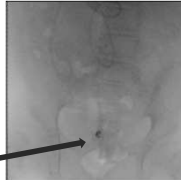
Girl 12 yrs

- Spina bifida , fully wheelchair bound
- Vesicostomy
- Wants permanent solution for vesicostomy
 - Bladder augmentation & mitrofanoff

- Since 5 months rec UTI (ESBL)
 - AB (7x) by GP
 - Urine culture: AB and daily AB

- Investigations (UDI/ MCG/ultrasound kidney)
 - MCG: What is this????

- Now bladder augmentation & mitrofanoff which is working perfect!




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Patient's experience (2)

Response patient (and mother)

- Healthcare workers have to do investigations, when problems are not solved with AB, and have to communicate with each other
 - Sometimes solution of the problem is simple
 - In complex patients be aware that problems can be also 'normal' problems
- 



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Patient's experience (1)

Girl 14 yrs old

- Spina bifida
- Wheelchair bound long distance
- Bladder augmentation & mitrofanoff 2008 / Malone stoma 2012: perfect
 - Lot of mucus production > rec UTI > bladder washout
- 2014: rec UTI (multires), sepsis, no urolithiasis
- Ped. urologist discussed Bricker urostomy

- Catheter with 4 eye lets and bladder washout via urethra 2 x per day

- Last 1,5 months 2 x UTI (not multires): no complaints > no AB

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Patient's experience (2)

Response patient and mother

- UTI from birth
- Used to drink enough and attention for hygiene
- In 2013/2014: UTI more difficult to treat
- Multiresist.> only iv in hospital first day
AB at home iv by district nurse
- Once a bladder bleeding and once sepsis > very stressful
- Urethrosocopy urethral: bladder irrigation
and now 2x day via urethra
- Overcome the multiresist. UTI since one year
- Very stressful period: sick, absence of school, missing social activities
- Very important to have a team of healthcare workers which can be contacted



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Radboudumc - Patiëntbanner Epic



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Radboudumc – actions Epic

RIF status	Infectiezone	Infectiezonegrens	Keuring definieërde deur schermak (lees en van horizontale app)	Keuring definieërde deur poel-moedertu- apparaat en materiaal en aansteekingsvlakke
BBDO, EBEL, Jmgg, VRE	Contaminate		NVT	EAD
MEIA, ACBS, CPE	Contaminate		NVT	EAD
CDI, NOBO	Contaminate	 (EAD) NVT (aansteek)	EAD (altem by breken of incontinentie)	EAD
TBC	Afgepoeie isolate	 (EAD) NVT	EAD (TBC kanne 15 min lengte hante)	EAD
Ziektebeeld	Infectiezone	Infectiezonegrens	Keuring definieërde deur schermak (lees en van horizontale app)	Keuring definieërde deur poel-moedertu- apparaat en materiaal en aansteekingsvlakke
Gastro-enteritis (braken en diarree)	Contaminate		EAD (altem by breken of incontinentie)	EAD
Respirasie virusom (Sjv- Influenza)	Stroep-contaminate		NVT	EAD
Waspokke (HPV), Maslen (TFT)	Stokke isolate	 maslen	EAD	EAD

Category	Value
Category 1	Value 1
Category 2	Value 2
Category 3	Value 3
Category 4	Value 4
Category 5	Value 5
Category 6	Value 6
Category 7	Value 7
Category 8	Value 8
Category 9	Value 9
Category 10	Value 10
Category 11	Value 11
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Category 95	Value 95
Category 96	Value 96
Category 97	Value 97
Category 98	Value 98
Category 99	Value 99
Category 100	Value 100

Radboudumc – practical execution

	ARTS	POLIKLINIEKASSISTENTE	ADMINISTRATIE
BRNO ESBL PAMC MBSA VRE ACU CFE	<p><u>Contactinstructiesmaatregelen bij</u></p> <ol style="list-style-type: none"> 1. Lichamelijk intensief contact 2. Bij ontkleden van patiënt 3. Contact met gekoloniseerd gebied 4. Contact met woorden <p>Daarnaast zijn algemene voorzorgsmaatregelen noodzakelijk</p>	<p><u>Contactinstructiesmaatregelen bij</u></p> <ol style="list-style-type: none"> 1. Lichamelijk intensief contact 2. Bij ontkleden van patiënt 3. Contact met gekoloniseerd gebied 4. Contact met woorden <p>Daarnaast zijn algemene voorzorgsmaatregelen noodzakelijk</p>	<p><u>Contactinstructiesmaatregelen bij</u></p> <ol style="list-style-type: none"> 1. Lichamelijk intensief contact 2. Bij ontkleden van patiënt 3. Contact met gekoloniseerd gebied 4. Contact met woorden <p>Daarnaast zijn algemene voorzorgsmaatregelen noodzakelijk</p>

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Take home messages

- Lifestyle advices
 - Handhygiëne !
 - Fluidintake
 - Defecation
- Indwelling catheter >> other options??
- Follow evidence based guidelines
- Best practice when EB interventions are not successful
- Patient care plan
- Inform and instruct patients what to do in case of problems



You are important

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Urinary Tract Infections

1st Course of the European School of Urology Nursing

8-9 May 2015, Amsterdam, the Netherlands



Module 8. and 9. How to educate caregivers and patients to prevent UTI

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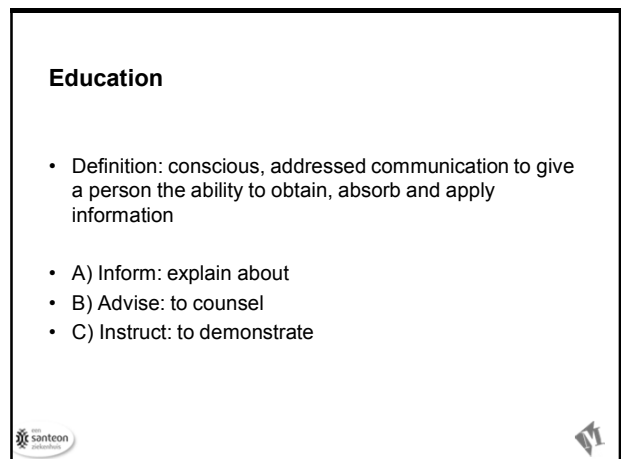
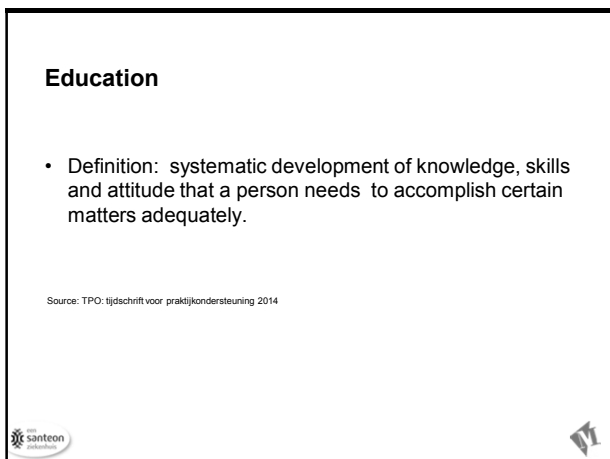
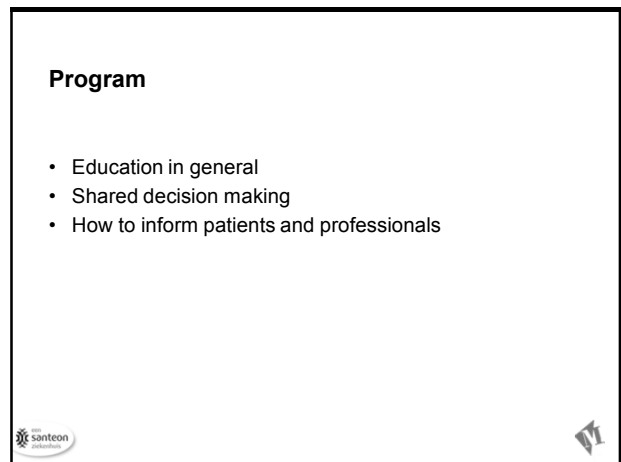
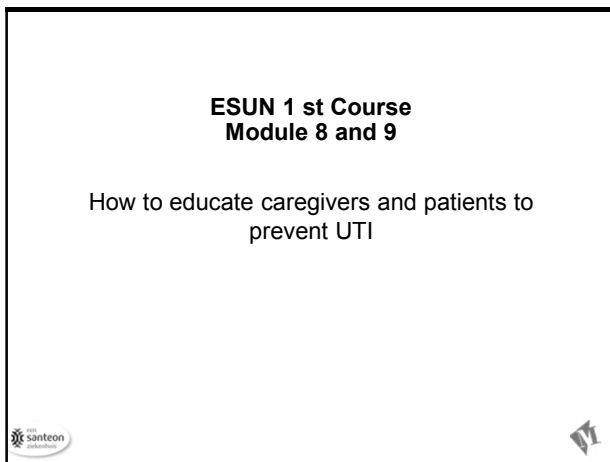
In module 8 and 9 education of patients and caregivers is discussed from a point of view of Urinary tract infection.

Communication in general and shared decision making will be addressed.

Items that will be discussed:

- 1) How caregivers can help patients to store information best.
- 2) How can caregivers teach each other to give the best care (to avoid urinary tract infections).
- 3) Do patients have responsibility in their own healthcare?

It will be an interactive session where students will learn from each other.



Means of communication

There are different means of communication



Memory



Memory

- 10% by reading
- 20% by hearing
- 30% by seeing
- 50% by hearing and seeing
- 80% by expressing
- 90% by expressing and practising

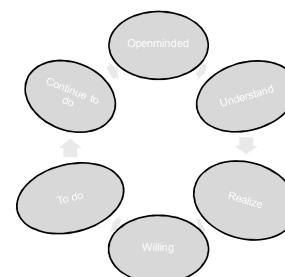
Be aware of

- Giving information is main part of professional acting
- Good information may prevent damage
- Listening is part of giving information
- Realize that patients may not understand the information

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- Listening is part of giving information
- Realize that patients may not understand the information
- Patient is the one to say if information is clear (feedback)
- Checking
- Compliance
- Make use of the fact that patients orientate themselves on the internet
- Practise

Steps for adjusting behaviour



Shared decision making

- Aim: putting patients in the centre of healthcare and in control of decisions

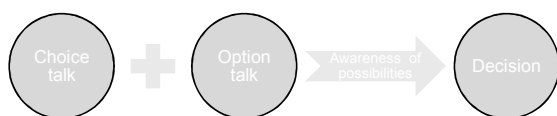


Shared decision making

- https://www.youtube.com/watch?feature=player_detailpage&v=XPm5IEDEI8Y



Shared decision making



Shared decision making (depression)

- https://www.youtube.com/watch?feature=player_detailpage&v=SpIqYmywdfM

Source: BMJ 2012;344:e256. Siggeibout et al.



Shared decision making

- Are you practising SDM?
- How can SDM help in preventing UTI?



How to inform

- Professionals
- Patients



Professionals

Instruct caregivers according to guidelines:

- Face to face
- E-learning
- Peer assessments
- Feedback



Patients

Instruct patients according to guidelines / protocols

- Using instruction aids
- Reviewing
- Innovative tools



- https://www.youtube.com/watch?list=PLs8xLiXKlIKLx8mTfDZdgRSFJXdXo8UEY&v=_7-Sy2EsSug&feature=player_detailpage



Thank you for your attention

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17th International EAUN Meeting

12-14 March 2016, Munich, Germany



DEADLINES

Abstract Submission

Difficult Case
Submission

Research Project
Plan Submission

1 December 2015



in conjunction with
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