Urosepsis and Other Catheter Related Disorders

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What is Sepsis?

SIRS: Severe inflammatory response syndrome

SIRS
2 of
T: >38°C
<36°C
HR: >90
RR: >20
pCO₂: <4.3kPa
WCC: >12,000
< 4,000

Sepsis
2 SIRS
+
Confirmed or suspected infection

Severe Sepsis
Sepsis +
Signs of end organ damage
Hypotension SBP< 90mmHg
Lactate >2mmol

Septic Shock
Severe sepsis with persistent hypotension

SIRS: Severe inflammatory response syndrome

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Incidence of Sepsis

Incidence: 100,000 pa UK
Mortality: 37,000 pa UK
Likely source of infection (STH)

- Urinary tract 42%
- Respiratory tract 18%
- G.I. tract 10%
- Unknown source 10%
- Hepatobiliary 8%
- Other source 8%
- Skin/soft tissue 4%
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Sterile Urine
- Healthy
- Normal anatomy/physiology
- Inoculation with commensal

Colonised Urine
- Systemic factor
- Anatomical/functional abnormality
- Increased bacterial load

Symptomatic Urinary Tract Infection
- Virulence/resistance
- Immunosuppression

Sepsis

Pressure
Impact of Colonisation

Sterile Urine

Colonised Urine
Impact of Colonisation

STD, TB

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# Impact of Colonisation

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Inoculation
- Female post coital

STD, TB

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Impact of Colonisation

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**STD, TB**

**Inoculation**
- Female post coital

**Raised pressure**
- Ureteric stone
# Impact of Colonisation

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*STD, TB: Sexually Transmitted Disease, Tuberculosis* 

*UTI: Urinary Tract Infection* 

*Sepsis: Bloodstream infection from infection of the urinary tract* 

*Urosepsis and Catheter Related Problems. February 2015. PR Tophill*
**Impact of Colonisation**

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### Impact of Colonisation

**STD, TB**

- Inoculation
  - Female post coital

- Raised pressure
  - Ureteric stone

- Raised pressure + Immunosuppression

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Management

Diagnosis

• Sepsis screening tool

Treatment

• The sepsis 6
  • Cardiovascular resuscitation
  • Antibiotics

• Manage systemic factors
  • E.g. diabetes, immune system support

• Relieve pressure
  • Drainage; catheter, nephrostomy
**SEPSIS SCREENING TOOL**
(Non-neutropenic)

To be applied to all patients with clinical suspicion of infection

**Does the patient have 2 or more of the following SIRS criteria?**
- Temperature < 36 or > 38.3°C
- Respiratory rate > 20/min
- Heart rate > 90/80
- WCC < 4.0 or > 12.0 x 10⁹/L
- Glucose > 7.7 mmol/L (Non-diabetic)

**Patient label**

**YOU MUST DOCUMENT:**
- No current evidence of sepsis
- If continued clinical suspicion of infection, continue monitoring hourly
- Reapply screening tool if any change in observations
- No suspicion of infection, consider other causes for abnormal physiology

**THINK SEPSIS!**

All patients require the following blood tests to be sent within 1 hour via ICE order set “Sepsis”. Call lists on 14438 (NHG) and 13298 (RHH) 8pm - 9am

- Full blood count
- U&E
- LFT
- Blood cultures
- Urine output

**SEPSIS RISK STRATIFICATION - For all patients with SIRS + suspected infection**

- Heart rate > 130BPM
- Respiratory rate > 25/min
- BP < 90mmHg systolic
- Urine output < 0.5 ml/kg/hr for 2 consecutive hours (<30 ml/hr)
- New requirement of oxygen to maintain SaO₂ > 90%
- Lactate > 2.0 mmol/L
- creatinine > 177
- INR > 1.5
- APTT > 60
- Platelets < 100 x 10⁹/L
- Bilirubin > 24

**NB. These criteria should be reviewed for each patient. Seek medical advice if unsure whether acutely abnormal or chronic.**

**SEVERE SEPSIS?**

- SIRS criteria + new organ dysfunction
- Urgent senior medical review required
- Monitor Sepsis 6 Bundle immediately

**UNCOMPLICATED SEPSIS IDENTIFIED**

You MUST document your decision whether to initiate the Sepsis 6 bundle or not.

- Initiate Sepsis 6 bundle immediately
- DO NOT initiate Sepsis 6 bundle at present

**AND**

- Give antibiotics as per empirical antibiotic treatment guidelines

**Compromise Sepsis 6 Bundle immediately**

- 7 signs of high risk sepsis

Please turn over for “Sepsis 6” bundle when required

**SEPTIC SHOCK = SEPSIS + HYPOTENSION DESPITE FLUID RESUSCITATION**

**SEPTIC SHOCK REFER IMMEDIATELY TO CRITICAL CARE**

**IS THERE ANY IMPROVEMENT WITHIN 1 HOUR OF INITIATING TREATMENT?**

**NO IMPROVEMENT**

- Immediately contact senior doctor
- Re-evaluate for signs of septic shock/severe sepsis or red flag sepsis

**IMPROVED**

- For uncomplicated sepsis, follow standard SIRS protocol. Be aware of any development of any signs of high risk sepsis or septic shock and reapply screening tool

Staff signatures of those involved in completing this form

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**Urosepsis and Catheter Related Problems. February 2015. PR Tophill**
### The Sepsis Six

1. **Give high-flow oxygen** via non-rebreath bag
2. **Take blood cultures** and **consider source control**
3. **Give IV antibiotics** according to local protocol
4. **Start IV fluid resuscitation** Hartmann’s or equivalent
5. **Check lactate**
6. **Monitor hourly urine output** consider catheterisation

**within one hour**

**plus Critical Care support to complete EGDT**

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**EGDT** – Early Goal Directed Therapy
Soft Tissue Infection

Fournier's Gangrene

- Necrotising fasciitis
- Synergistic gangrene
- Combination of aerobic anaerobic & microaerophilic
- Spreading toxin prevents antibiotic penetration
- Diabetic
- Urgent debridement
Scarpa’s and Colle’s Fascia
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Gas in Bladder

- Gas forming organisms
- Not always serious
- Needs a catheter
Gas in Bladder Wall

- Emphysematous cystitis
- Serious
- (Catheter in situ)
Left ureteric stone

- Sterile urine
  - Pain
- Colonised urine
  - Sepsis
  - Nephrostomy
Intra-Renal Reflux
Pelvi-ureteric junction obstruction

- Sterile urine
  - Pain with diuresis
- Colonised urine
  - Sepsis
  - Nephrostomy
Clinical History:
AKI post-op
?hydronephrosis

[US Kidney Both]

The right kidney demonstrates moderate hydronephrosis.
The left kidney also demonstrates moderate hydronephrosis with a loss of the renal cortex mid pole.
Kidneys unchanged from previous examination.
Thick walled urinary bladder.
Urinary catheter noted in situ.

......... End of Report .........
Stone in PUJ

- Nephrostomy
• Perinephric abscess
• Xanthogranulomatous pyelonephritis (XPN) with fistula
Emphysematous pyelonephritis

- Diabetic
- May be obstructed
- May need emergency nephrectomy
Managing the Dysfunctional Bladder

Treatment

• Obstruction e.g. prostate, urethral stricture

Management

• Dysfunction that cannot be cured
Problems in Neuropathic Bladder Management

Incontinence

- Neurogenic detrusor overactivity
  (Reflex bladder contractions)
- Stress incontinence

Infections, bladder stones

- Residual urine

Upper tract injury

- Infection – chronically colonised
- Pressure – hypocompliance
Goals in Neuropathic Bladder Management?

Protect the kidneys
Reduce complications
Manage continence

Promote independence
Preserve body image and sexuality
Empirical Bladder Management

Emptying? RU>100

ISC Catheter

Overactivity?

Treat
- Anti musc
- Bot A Tox

Contain
- Sheath
- Pads

Stress Incontinence?

Treat
- AUS
- Sling

Contain
- Sheath
- Pads
How can the dysfunctional bladder be managed?

Some preserved sphincter function
- Void with control

Hand function and cognitive function
- Intermittent self catheterisation (ISC)

No hand or cognitive function
- Suprapubic catheter (urethral)
- Penile sheath (pads) – effective emptying
Continuous Drainage
(catheter)

Little risk of hydronephrosis

But: catheter related problems

• Chronic infection, pyelonephritis
• Bladder and kidney stones
Catheter Strap

A

B

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Continuous Drainage Facilitation

Suprapubic

• Avoids urethral injury

Catheter valve

• Maintains bladder capacity and clears debris

Storage

• Reduce overactivity

  Antimuscarinics
  Bot A Tox
Suprapubic Catheter

Catheter valve
Contained Incontinence

Methods

- Penile Sheath Collection (EUCD)
- Pads
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ISC

- Appliance free continence

- Lowest risk of catheter related complications

- When combined with a large capacity low pressure bladder provides maximum kidney protection
Facilitating Bladder Management by ISC

Able to do ISC?

Drugs
- Antimuscarinics
- Botox

Reconstruction
- Augmentation
  - Reflex bladder
  - Poor compliance
- Stress incontinence
  - AUS
  - Sling
  - Urethral closure

Mitrofanoff Abdominal stoma
- Urethra
  - Not available
  - Not accessible
  - Choice
Intermittent Catheters
# Problems with Bladder Management Strategies

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<thead>
<tr>
<th></th>
<th>Catheter</th>
<th>Sheath</th>
<th>Void with Control</th>
<th>ISC</th>
<th>ISC + Surgery</th>
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<tbody>
<tr>
<td>Incontinence</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>-</td>
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<tr>
<td>Infections</td>
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<td>+++</td>
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Colonised Urine

Causation

• Undiagnosed urological disease
• Untreated urological disease

Comorbidity

• Bladder abnormality/ dysfunction
  Neuropathy, diabetes, bladder reconstruction

• Systemic factors
  Immune suppression
Challenge – asymptomatic bacteriuria

• Normal urine is sterile
• **BUT** – asymptomatic bacteriuria becomes increasingly common with increasing age and is rarely an indication for treatment

**EXCEPTION – PREGNANCY, CHILDREN**

• Prevalence of bacteriuria in over 70s

<table>
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<th>Female</th>
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<tbody>
<tr>
<td>Healthy</td>
<td>7%</td>
<td>17%</td>
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<tr>
<td>Institutionalised</td>
<td>37%</td>
<td>57%</td>
</tr>
<tr>
<td>Catheterised</td>
<td>100%</td>
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Prevalence of asymptomatic bacteriuria

Age (years) vs. approx. prevalence (%) for female and male populations.

- Female line (blue)
- Male line (red)

Legend:
- Female
- Male

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Catheter Associated UTI (CAUTI)

Cultures often mixed and difficult to interpret

Bacteriuria is universal by 30 days

Treatment

- Increases antibiotic-resistant organisms
- Only if patient develops fever/signs of bacteraemia
- Does not sterilise the system/reduce the number of bacterial species in the urine or decrease febrile episodes
Definite UTI in Patients with Colonised Urine

Diagnosis

• Clinical
  
  Fever, loin pain, foul urine despite adequate urine output
  
  Dip test – pointless

Treatment

• CSU for sensitivities
• Commence antibiotics
• Consider catheter on free drainage
Sepsis in Patients with Colonised Urine

- High index of suspicion for urosepsis
  Atypical presentation
- Use sepsis screening tool
- Implement sepsis 6
  Catheter on free drainage
  CSU for sensitivities
  Commence antibiotics
- CT abdomen/pelvis
- Nephrostomy if appropriate
Recurrent UTI in Patients with Colonised Urine

Diagnosis

- Clinical.
  - Dip test – pointless
- Definite UTI
  Fever, loin pain, foul urine despite adequate output

Beware

- Foul urine only
- Increased bladder overactivity due to increased bacterial load
Recurrent UTI in Patients with Colonised Urine

Investigate for treatable conditions

• Upper tract – ultrasound, CT
  Stones, tumours, hydronephrosis

• Lower tract – cystoscopy (flexible), residual urine
  Stones, tumours, poor emptying
Recurrent UTI in Patients with Colonised Urine

Treatment

• Review bladder management
  • Adequate throughput (minimum 2L day)
  • Effective emptying (ideally 4x day)
  • Effective control of overactivity

• Self help strategies

• Consider self start antibiotics

• Consider prophylactic antibiotics
  Personal benefit vs personal risk e.g. MRSA
  vs community risk

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Take Home Messages

Urosepsis

• Drainage is an important treatment in urosepsis

Colonised urine

• Is often a multisystem disorder
• Does not usually need treating
• Is a risk factor for urosepsis and presents atypically

Catheters

• Always consider a suprapubic catheter and/or catheter valve in patients requiring long term catheterisation
• Do not dip test urine in patients with catheters or doing intermittent self catheterisation