

Catheter-associated UTIs

Asymptomatic catheter associated bacteriuria commonest nosocomial infection

Rates of bacteriuria

Single catheterisation	1-5%
Short-term catheterisation	
Immediately	10-20%
Thereafter	5-10% per day
After 30 days	100%

Short-term (< 30 day) catheter bacteriuria typically single organism; long-term catheters usually multiple organisms

Eradication of bacteriuria impossible due to biofilm formation.

Biofilm

Accumulation of micro-organisms (and their nucleic acid fragments) within a mucopolysaccharide medium attached to a solid surface
Not only on catheters, but other foreign bodies, prostatic calculi and renal scars

Pseudomonas and Proteus particularly good at biofilm formation

3 layers

 Linking film

 Mucopolysaccharide base (containing viable bacteria and fragments)

 Luminal layer – releases planktonic organisms into urine

Indications for treatment

 Symptomatic

 Asymptomatic

 High risk of bacteraemia/septicaemia

 Patient-related (immunocompromise)

 Organism-related (e.g. *Serratia marcescens*; ESBL etc.)

 Urological surgery

 Prostheses implantation

 Recurrent catheter blockage and *Proteus* spp.

Prevention

 Does the patient need a catheter?

 Could they have a condom catheter (reduced bacteriuria)?

 If they need an indwelling catheter:

 Aseptic technique

 Closed catheter system

 Shortest duration of catheterisation possible

 Special catheters

 Encrustation – latex > coated latex > silicone

 Reduced encrustation and biofilm with heparin-coated

 Reduced bacteriuria reported for antibiotic-impregnated (nitrofurazone) and silver-impregnated catheters but no comment on symptomatic UTI or bacteraemia rates (Johnson 2006)

 Antibiotic administration

 Controversial

 Reduces initial bacteriuria but equivalent rates by 4 days and risk of resistant bacteria increased

Requirement for antibiotics at the time of catheter changes unclear. Currently recommended by EAU, but recent randomised trial of antibiotics for catheter change in ITU patients with a positive CSU show no difference in rates of urosepsis (Leone 2007)

Recurrent catheter blockage

40-50% of long term catheterised patients

Typically due to *Proteus mirabilis* UTI

Urease production - alkaline urine - encrustation with calcium phosphate and magnesium

Biofilm formation and crystal apposition onto the luminal surface cause blockage.

Catheterised patients classified as blockers or non-blockers

Blockers have significantly elevated urinary pH, ammonium and calcium concentrations. Identified by pH testing and microscopy for struvite crystals

Management

Acidic catheter maintenance solutions to minimise the build-up of mineral deposits (Suby-G citric acid solution)

Systematic review evidence failed to demonstrate any beneficial effect of bladder washouts (Pratt 2000)

All types of catheters are unable to resist encrustation by *Proteus mirabilis* biofilms; however silicone catheters have larger lumens compared to hydrogel catheters and are therefore preferred.

No evidence to support the use of silver impregnated catheters in preventing catheter associated UTIs